

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Horticulture Specialist  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0101010102
Program Type	College Credit Certificate (CCC)
Program Length	15 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	37-1012 - First-Line Supervisors/Managers of Landscaping, Lawn Service, and Grounds keeping Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This certificate program is part of the Agribusiness Management AS degree program (1101010100).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agribusiness management sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to apply the economic and business principles involved in the organization, operation and management of farms and agricultural business. Subject matter includes finance, laws, labor, machinery, facilities, and marketing, as well as leadership, communication, employability and human relations skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate an understanding of plant physiology and growth.
- 02.0 Classify plants.
- 03.0 Manage a pest-control program.
- 04.0 Prepare growing media and seedbeds.
- 05.0 Grow plants.
- 06.0 Design, install, and maintain nursery irrigation systems.

Florida Department of Education  
Student Performance Standards

Program Title: Horticulture Specialist  
CIP Numbers: 0101010102  
Program Length: 15 credit hours  
SOC Code(s): 11-9011

**This certificate program is part of the Agribusiness Management AS degree program (1101010100). At the completion of this program, the student will be able to:**

01.0	Demonstrate an understanding of plant physiology and growth--The student will be able to:
01.01	Describe the process of photosynthesis.
01.02	Identify and describe the functions of all parts of the plant.
01.03	Describe an asexual reproduction process.
01.04	Explain the differences between angiosperms and gymnosperms.
01.05	Identify the differences between woody and herbaceous plants.
02.0	Classify plants--The student will be able to:
02.01	Identify and group shade and flowering trees.
02.02	Identify and group fruit trees and plants.
02.03	Identify and group annuals, vegetables, and herbs.
02.04	Identify and group woody ornamentals, vines, and ground covers.
02.05	Identify and group tropical foliage plants.
02.06	Identify and group turf and ornamental grasses.
03.0	Manage a pest-control program--The student will be able to:
03.01	Develop an integrated pest management program or schedule.
03.02	Train employees in the safe use of pesticides.
03.03	Obtain a pesticide license.

04.0	Prepare growing media and seedbeds--The student will be able to:
04.01	Identify media materials.
04.02	Mix rooting and growing media according to plant requirements.
04.03	Sterilize rooting, potting, and growing media.
04.04	Collect and test a soil sample from field and potting media.
04.05	Adjust pH and nutritional levels of media.
04.06	Prepare planting beds and sites.
04.07	Fill and level benches and pots with media.
04.08	Demonstrate sanitation practices when handling and storing plant media materials.
05.0	Grow plants--The student will be able to:
05.01	Prepare media for containers.
05.02	Prepare field site for transplants.
05.03	Select plant containers.
05.04	Determine plant spacing in the field and on container beds.
05.05	Transplant propagated materials to various containers and to the field.
05.06	Determine and provide light requirements of various plant types.
06.0	Design, install, and maintain nursery irrigation systems--The student will be able to:
06.01	Determine irrigation requirements.
06.02	Assess quality of irrigation water.
06.03	Operate and service various types of irrigation systems.



## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Aquaculture Technology  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0101030302
Program Type	College Credit Certificate (CCC)
Program Length	26 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	45-1011 - First-Line Supervisors of Farming, Fishing, and Forestry Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This certificate program is part of the Aquaculture Management AS degree program (1101030301).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the aquaculture industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in ichthyology, fish breeding, fish nutrition, pond maintenance, diagnosis and treatment of diseases in fish, business management of a fish farm, and field experience necessary to operate an aquaculture operation.

See **additional information** relevant to Career and Technical Education (CTE) program implementation provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Identify important aquaculture plants and animals and describe their culture in various production units.
- 02.0 Perform general aquaculture production unit operations.
- 03.0 Determine methods of fish identification.
- 04.0 Demonstrate an understanding of water quality and aquaculture.
- 05.0 Maintain optimal nutrition for aquaculture organisms.
- 06.0 Diagnose and control common aquaculture maladies.
- 07.0 Operate and maintain aquaculture equipment.
- 08.0 Assist in the maturation, spawning, larval and juvenile rearing of aquaculture organisms.
- 09.0 Perform general aquaculture nursery systems operations.

Florida Department of Education  
Student Performance Standards

Program Title: Aquaculture Technology  
 CIP Number: 0101030302  
 Program Length: 26 credit hours  
 SOC Code(s): 45-1011

**This certificate program is part of the Aquaculture Management AS degree program (1101030301). At the completion of this program, the student will be able to:**

01.0	Identify important aquaculture plants and animals and describe their culture in various production units – the student will be able to:
01.01	Define aquaculture and describe the historical important of aquaculture to local, state, national and international economies.
01.02	List occupations in aquaculture production, processing, distribution, marketing, and service.
01.03	Identify important aquatic species and products produced by aquatic farmers in Florida, U. S., and foreign countries.
01.04	List the types of production units and systems employed by aquaculturist in Florida, U. S. and foreign countries.
01.05	Outline basic techniques for constructing ponds, tanks, raceways, net pens and cages.
01.06	Describe basic production techniques for the culture of plants, mollusks, crustaceans, and finfish.
01.07	List and describe the major factors in growth of aquaculture species.
01.08	List important criteria in selecting a site for an aquaculture farm.
01.09	Describe natural fisheries and aquaculture production trends.
02.0	Perform general aquaculture production unit operations – the student will be able to:
02.01	Identify and describe the general anatomy, biology and life cycles for aquaculture species studied in this program.
02.02	Identify and describe the general morphology of aquatic macro and microalgae.
02.03	List methods to help determine aquatic animal health and behavior for various aquaculture production units.
02.04	List techniques for routine maintenance of aquaculture ponds, cage culture systems, and submerged lands.
02.05	Identify common aquaculture predators and list predator control techniques
02.06	Record production data such as water quality parameters, feed amounts, mortality and other routine information required for a

	specific operation on data sheets and enter into a computer.
03.0	Determine methods of fish identification – the student will be able to:
03.01	Identify the major families of fish.
03.02	Describe the complexities of fish anatomy for the following systems: <ul style="list-style-type: none"> <li>• Skeletal systems</li> <li>• Musculature</li> <li>• Nervous system</li> <li>• Vascular system</li> <li>• Respiratory system</li> <li>• Urogenital system</li> <li>• Digestive system</li> <li>• Reproductive system</li> </ul>
03.03	Identify the major anatomical fish structures.
03.04	Describe the physiological characteristics of fish for the following: <ul style="list-style-type: none"> <li>• Color</li> <li>• Bioluminescence</li> <li>• Sound production</li> <li>• Sensory systems</li> <li>• Osmoregulation</li> </ul>
03.05	Classify fish.
03.06	Describe the aquatic environment.
03.07	Discuss the basics of fish behavior.
03.08	Identify the muscles of a fish.
03.09	Measure the physical characteristics of fish.
03.10	Use a taxonomic key to identify fish.
03.11	Identify the major taxa of fish.
04.0	Demonstrate an understanding of water quality and aquaculture – the student will be able to:
04.01	Define environmental variables and list ranges important for survival and growth of important aquaculture species.
04.02	Demonstrate an understanding of aquifers, water quantity and management, and agricultural water use in Florida.

04.03	Identify water quality measurements necessary for accurately culturing aquaculture organisms.
04.04	Measure water quality parameters in aquaculture production units, record data in logs and computers, and interpret results.
04.05	Describe the nitrogen cycle and identify system equipment and/or processes which reduce nitrogenous wastes.
04.06	Discuss the importance of oxygen to the maintenance of production units and aquatic animal health and the effect of temperature on oxygen concentration.
04.07	Describe processes in aquaculture production units that effect pH, alkalinity, carbon dioxide, oxygen, ammonia, and other environmental parameters.
04.08	Measure primary productivity and discuss its importance in various aquaculture production units.
04.09	Calculate water volumes for various sizes of aquaculture production units.
04.10	List potential sources of aquaculture pollution and describe methods of preventing or abating these problems.
04.11	Identify Best Management Practices for treating waste water from various aquaculture production units.
05.0	Maintain optimal nutrition for aquaculture organisms – the student will be able to:
05.01	Explain the digestive anatomy of fish.
05.02	Explain fish metabolic rates.
05.03	Identify fish food additives
05.04	Outline the basic concepts of nutrition for plants, mollusks, crustaceans, and fish.
05.05	Discuss the importance of nutrition to growth and survival of various aquaculture species.
05.06	Identify feeding habits and practices of a variety of aquaculture species.
05.07	List common ingredients and additives of aquatic feeds and identify practices in feeds formulation and manufacturing.
05.08	Demonstrate an ability to culture live feeds including microalgae, rotifers and artemia and discuss their importance.
05.09	Calculate feeding rates, growth and feed conversion ratios for various aquaculture species stocked at different densities and rates.
05.10	List different feeding methods, measure feed and maintain feed records in logs and computers.
05.11	Discuss and differentiate feeding practices for hatchery, nursery and grow out of mollusks.
05.12	Discuss nutrition practices for culturing aquatic plants.
05.13	Discuss the principles of bioenergetics to growth.

06.0	Diagnose and control common aquaculture maladies – the student will be able to:
06.01	Identify the common diseases that infect aquaculture organisms.
06.02	Understand the basic mechanisms for control of disease.
06.03	Identify common bacterial diseases and treatment options.
06.04	Identify common mycotic diseases and treatment options.
06.05	Identify common viral diseases and treatment options.
06.06	Identify common parasitic diseases and treatment options.
06.07	Discuss the relationship of nutrition, water quality and stress how they may cause disease in aquaculture organisms.
06.08	Prepare an aquatic organism for diagnostic examination or shipment.
06.09	Observe various diseases of aquatic organisms and demonstrate use of a microscope.
06.10	List approved drugs available for use in aquaculture.
06.11	Describe approved chemicals and their use in treating diseases.
06.12	Identify common aquatic parasites found in Florida waters.
06.13	Identify toxic environmental diseases in fish.
07.0	Operate and maintain aquaculture equipment – the student will be able to:
07.01	List equipment used in various production units necessary to raise plants, mollusks, crustaceans, and fish.
07.02	Set up and maintain standard aquaria.
07.03	Set up field aquaculture ponds.
07.04	Measure field parameters such as temperature, salinity, and hardness.
07.05	Set up a system to culture aquatic plants.
07.06	Demonstrate an ability to correctly use aquaculture equipment including, but not limited to, a thermometer, oxygen meter, refractometer, pH meter, pump, graduated cylinder, beaker, nets, siphon, scales, sieves, calipers, secchi disk, and a microscope.
07.07	Set up aquaculture filtration systems.
07.08	List equipment options of a recirculating system including solids removal, biofiltration, sterilization and aeration, and explain their basic functions.

07.09	Operate and perform system maintenance on a recirculating system.
07.10	Estimate pumping requirements and select an appropriately sized pump for a given system and water volume.
07.11	Layout a PVC plumbing scheme for a given aquaculture system with a sufficient number of valves to allow for bypass and isolation and then measure, cut and assemble that water system.
07.12	Layout and put together an aeration system operated on airlift technology.
07.13	Replace and install a pump.
07.14	Perform simple calculations related to water volume, water flow and system loading.
07.15	Use and operate tools and equipment safely.
07.16	Measure productivity in aquaculture systems.
08.0	Assist in the maturation, spawning, larval and juvenile rearing of aquaculture organisms – the student will be able to:
08.01	Describe the reproductive anatomy, function of reproductive organs, and reproductive cycles of selected aquaculture organisms.
08.02	Differentiate between males and females of the same species.
08.03	Relate environmental factors to successful reproduction of various aquaculture species.
08.04	Explain the use of hormones, anesthetics, chemicals, antibiotics, and other techniques to manage broodstock and accelerate reproductive cycles and contrast the difference between environmental conditioning and induced spawning techniques.
08.05	Maintain and care for broodstock and prepare spawning tanks and/or systems.
08.06	Describe maturation, spawning, hatching, and larval rearing techniques for selected aquaculture species.
08.07	Discuss the importance of nutrition at various stages of the larval rearing cycle for selected aquaculture species.
08.08	Use a microscope to examine the stages and condition of eggs and larvae.
08.09	Prepare, stock, feed and maintain larval rearing tanks.
08.10	Culture live feeds and calculate feeding rates.
08.11	Outline a maturation system design for selected aquatic species.
08.12	List important practices and tasks in hatchery management.
08.13	Estimate production numbers from a given spawn of a given species.
08.14	Record hatching date in logs and computers and interpret results.



09.0	Perform general aquaculture nursery systems operations – the student will be able to:
09.01	Maintain, clean and operate a broodstock tank and list important practices in managing broodstock.
09.02	Start, maintain, count and harvest live feeds.
09.03	Maintain a nursery system by demonstrating an ability to clean tanks and filtration equipment, adjust water flow and volume, set aeration, and monitor water quality and feeding levels.
09.04	Describe and differentiate between land-based and field-based nursery systems, equipment and operations.
09.05	Monitor and record routine data such as feed amounts and times, temperature, oxygen, salinity, and ammonia and enter data into a computer or log book.
09.06	List and describe nursery production systems and larval husbandry techniques for fish, crustaceans, and mollusks.
09.07	Demonstrate practical hands-on experience in handling a variety of juvenile aquaculture organisms and operating nursery production units.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

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### **Accommodations**

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### **Additional Resources**

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Florida Department of Education  
Curriculum Framework

**Program Title:** Equine Assistant Management  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0101050701
Program Type	College Credit Certificate (CCC)
Program Length	24 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	45-1011 - First-Line Supervisors of Farming, Fishing, and Forestry Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This certificate program is part of the Equine Studies AS degree program (1101050701).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the equine industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction to individuals in the areas of planning, organizing, and supervising equine operations with emphasis on the science and care of equine species and the knowledge and understanding necessary for managing equine operations.

The Equine Assistant Management College Credit Certificate should include the requirements specified in the statewide Articulation Manual.

See **additional information** relevant to Career and Technical Education (CTE) program implementation provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Identify veterinary terminology and illustrate equine health practices.
- 02.0 Analyze equine nutrient requirements and evaluate equine diets.
- 03.0 Evaluate equine management systems for appropriate animal welfare, including housing, care and regulations.
- 04.0 Demonstrate employability skills including interpersonal skills, ethics, communication and responsibility through work based learning activities and a portfolio.
- 05.0 Demonstrate techniques in evaluation, selection and breeding of horses.
- 06.0 Demonstrate ability to plan, schedule and maintain records and contracts, using appropriate technical information systems.
- 07.0 Demonstrate leadership and effective communication in employee management.

Florida Department of Education  
Student Performance Standards

**Program Title:** Equine Assistant Management  
**CIP Number:** 0101050701  
**Program Length:** 24 credit hours  
**SOC Code(s):** 45-1011

**This certificate program is part of the Equine Studies AS degree program (1101050701). At the completion of this program, the student will be able to:**

01.0	Identify veterinary terminology and illustrate equine health practices – the student will be able to:
01.01	Understand equine diseases and establish appropriate wellness programs for equine populations.
01.02	Comprehend equine anatomy and form to function concepts
01.03	Anticipate typical problems of performance and reproductive horses to prevent injury or poor health; effectively follow veterinarian orders to restore health and productivity.
01.04	Identify and describe equine anatomy, with special emphasis on physiology and function.
01.05	Provide first aid for horses.
01.06	Identify equine medications and demonstrate ability to administer as per veterinarian instructions
02.0	Analyze equine nutrient requirements and evaluate equine diets – the student will be able to:
02.01	Evaluate equine diets according to nutrient requirements for different classes of horses (working, growing, lactating).
02.02	Determine economic impact of feedstuff purchasing decisions
02.03	Maintain safe feeding management programs for enhanced equine health
02.04	Prepare a typical diet for horses of different classes
02.05	Understand feed manufacturing techniques and feed analysis systems.
03.0	Evaluate equine management systems for appropriate animal welfare, including housing, care and regulations – the student will be able to:
03.01	Describe housing designs for different equine management systems.
03.02	Identify appropriate levels of care and welfare for equines.

03.03	Develop a health care program for an equine farm including vaccination protocols, deworming schedules/programs, biosecurity and first aid.
04.0	Demonstrate employability skills including interpersonal skills, ethics, communication and responsibility through work based learning activities and a portfolio – the student will be able to:
04.01	Demonstrate punctuality, initiative, courtesy, dependability, flexibility and honesty.
04.02	Demonstrate ability to work as part of a team.
04.03	Conduct a job search, write a resume and practice interview techniques.
04.04	Understand legal requirements for employees including hiring, firing, and documentation.
04.05	Develop managerial skills such as mentoring, management by objectives, balanced feedback, critical appraisal and promotion.
05.0	Demonstrate techniques in evaluation, selection and breeding of horses – the student will be able to:
05.01	Evaluate equine conformation according to use and purpose.
05.02	Understand basic genetics and selection techniques for effective animal breeding.
05.03	Show ability to manage reproductive health and efficiency.
05.04	Develop appropriate management techniques for equine breeding farm, including stallion management, estrus detection, breeding, foaling and foal management.
06.0	Demonstrate ability to plan, schedule and maintain records and contracts, using appropriate technical information systems – the student will be able to:
06.01	Maintain and analyze equine records and basic business records (health, breeding, inventory, equipment, purchases, and depreciation).
06.02	Understand contract language and different types of contracts.
06.03	Maintain machinery, equipment and facility inventory records.
06.04	Understand legal requirements, rules and regulations concerning horses and agribusiness.
06.05	Manage farm inventory (horses, feed, equipment) for optimum efficiency and profitability.
07.0	Demonstrate leadership and effective communication in employee management – the student will be able to:
07.01	Demonstrate punctuality, initiative, courtesy, dependability, flexibility and honesty.
07.02	Select and hire farm managers who will work with various levels of farm workers, work well in a team environment and care about equine.
07.03	Develop effective oral and written communication skills.

## **Additional Information**

### **Laboratory Activities**

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### **Career and Technical Student Organization (CTSO)**

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**Florida Department of Education  
Curriculum Framework**

**Program Title:** Equine Technician  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0101050703
Program Type	College Credit Certificate (15 credits)
Program Length	15 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	45-1011 - First Line Supervisors of Farming, Fishing & Forestry Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

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This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the equine industry within the Agriculture, Food and Natural Resources career cluster.

The Equine Technician, a 15-credit hour college certificate program, introduces students to equine care and entry-level employment. The content includes but is not limited to instruction to individuals in the area of basic equine care. The program includes the requirements specified in the statewide Articulation Manual.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.



## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Identify veterinary terminology and illustrate equine health practices.
- 02.0 Analyze equine nutrient requirements and evaluate equine diets.
- 03.0 Identify, analyze and apply basic concepts related to normal and abnormal equine behaviors.
- 04.0 Perform safe horse handling techniques.
- 05.0 Evaluate equine management systems for appropriate animal welfare, including housing, care and regulations.

Florida Department of Education  
Student Performance Standards

Program Title: Equine Technician  
 CIP Numbers: 0101050703  
 Program Length: 15 credit hours  
 SOC Code(s): 45-1011

**This certificate program is part of the Equine Studies AS degree program (1101050700). At the completion of this program, the student will be able to:**

01.0	Identify veterinary terminology and illustrate equine health practices – the student will be able to:
01.01	Understand equine diseases and establish appropriate wellness programs for equine populations.
01.02	Comprehend equine anatomy and form to function concepts.
01.03	Anticipate typical problems of performance and reproductive horses to prevent injury or poor health; effectively follow veterinarian orders to restore health and productivity.
01.04	Identify and describe equine anatomy, with special emphasis on physiology and function.
01.05	Provide first aid for horses.
01.06	Identify equine medications and demonstrate ability to administer as per veterinarian instructions.
02.0	Analyze equine nutrient requirements and evaluate equine diets – the student will be able to:
02.01	Evaluate equine diets according to nutrient requirements for different classes of horses (working, growing, and lactating).
02.02	Determine economic impact of feedstuff purchasing decisions.
02.03	Maintain safe feeding management programs for enhanced equine health.
02.04	Prepare a typical diet for horses of different classes.
02.05	Understand feed manufacturing techniques and feed analysis systems.
03.0	Identify, analyze and apply basic concepts related to normal and abnormal equine behaviors – the student will be able to:
03.01	Understand and recognize natural horse behaviors.
03.02	Identify and resolve abnormal equine behaviors.

03.03	Utilize horse learning behaviors to improve management and safe handling of horses.
04.0	Perform safe horse handling techniques – the student will be able to:
04.01	Safely catch, lead, tie, groom, restrain and work around horses of various levels of training.
04.02	Safely administer health and medical practices, such as leg wraps, vital signs, injections and restraint for such treatments.
04.03	Evaluate safe transportation techniques and equipment for transportation.
04.04	Evaluate training equipment and demonstrate application of training equipment.
05.0	Evaluate equine management systems for appropriate animal welfare, including housing, care and regulations – the student will be able to:
05.01	Describe housing designs for different equine management systems.
05.02	Identify appropriate levels of care and welfare for equines.
05.03	Develop a health care program for an equine farm including vaccination protocols, deworming schedules/programs, biosecurity and first aid.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Landscape and Horticulture Specialist  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0101060503
Program Type	College Credit Certificate (CCC)
Program Length	12 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	37-3011 - Landscaping and Groundskeeping Workers 45-2092 - Farmworkers and Laborers, Crop, Nursery, and Greenhouse
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060502).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the landscape and horticulture sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction pertaining to an understanding of plant physiology and growth, plant classification and identification, maintenance of landscape plants and employability and human relations skills.

See **additional information** relevant to Career and Technical Education (CTE) program implementation provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate an understanding of plant physiology and growth.
- 02.0 Classify plants.
- 03.0 Maintain landscape plants
- 04.0 Demonstrate employability skills.

Florida Department of Education  
Student Performance Standards

Program Title: Landscape and Horticulture Specialist  
 CIP Number: 0101060503  
 Program Length: 12 credit hours  
 SOC Code(s): 37-3011, 45-2092

**This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060500). At the completion of this program, the student will be able to:**

01.0	Demonstrate an understanding of plant physiology and growth – the student will be able to:
01.01	Describe the process of photosynthesis.
01.02	Identify and describe the functions of all parts of the plant.
01.03	Describe an asexual reproduction process.
01.04	Explain the differences between angiosperms and gymnosperms.
01.05	Identify the differences between woody and herbaceous plants.
02.0	Classify plants – the student will be able to:
02.01	Identify and group shade and flowering trees.
02.02	Identify and group fruit trees and plants.
02.03	Identify and group annuals, vegetables, and herbs.
02.04	Identify and group woody ornamentals, vines, and ground covers.
02.05	Identify and group tropical foliage plants.
02.06	Identify and group turf and ornamental grasses.
03.0	Maintain landscape plants – the student will be able to:
03.01	Determine water requirements and apply at proper rates.
03.02	Identify weeds and apply herbicides safely.
03.03	Determine fertilization requirements and apply at proper rates.

03.04	Identify plant pest problems and apply corrective measures.
03.05	Regulate the growth of landscape plants through chemical or mechanical needs.
03.06	Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).
03.07	Cultivate and mulch plants.
03.08	Brace and repair trees.
04.0	Demonstrate employability skills – the student will be able to:
04.01	Conduct a job search.
04.02	Secure information about a job.
04.03	Identify documents that may be required when applying for a job.
04.04	Complete a job application form.
04.05	Demonstrate competency in job interview techniques.
04.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
04.07	Identify acceptable work habits.
04.08	Demonstrate knowledge of how to make job changes.
04.09	Demonstrate acceptable employee health habits.



## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Landscape and Horticulture Professional  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0101060504
Program Type	College Credit Certificate (CCC)
Program Length	18 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	37-1012- First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060502).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the landscape and horticulture sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to , instruction pertaining to an understanding of plant physiology and growth, plant nutrition and fertilization, plant classification and identification, pest control, pruning and shaping plants, maintenance of landscape plants and employability and human relations skills. This program also prepares for certification and licensure as horticulture professional.

See **Additional information** relevant to Career and Technical Education (CTE) program implementation provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate an understanding of plant physiology and growth.
- 02.0 Classify plants.
- 03.0 Maintain landscape plants.
- 04.0 Demonstrate employability skills.

Florida Department of Education  
Student Performance Standards

**Program Title:** Landscape and Horticulture Professional  
**CIP Number:** 0101060504  
**Program Length:** 18 credit hours  
**SOC Code(s):** 37-1012

**This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060500). At the completion of this program, the student will be able to:**

01.0	Demonstrate an understanding of plant physiology and growth--The student will be able to:
01.01	Describe the process of photosynthesis.
01.02	Identify and describe the functions of all parts of the plant.
01.03	Describe an asexual reproduction process.
01.04	Explain the differences between angiosperms and gymnosperms.
01.05	Identify the differences between woody and herbaceous plants.
02.0	Classify plants--The student will be able to:
02.01	Identify and group shade and flowering trees.
02.02	Identify and group fruit trees and plants.
02.03	Identify and group annuals, vegetables, and herbs.
02.04	Identify and group woody ornamentals, vines, and ground covers.
02.05	Identify and group tropical foliage plants.
02.06	Identify and group turf and ornamental grasses.
03.0	Fertilize plants--The student will be able to:
03.01	Evaluate influences of nutrients on plant growth.
03.02	Apply fertilizers, using appropriate methods (dry, liquid, slow-release, injection, etc.).
03.03	Demonstrate proper handling and storage of fertilizers, observing safety precautions.

04.0	Manage a pest-control program--The student will be able to:
04.01	Develop an integrated pest management program or schedule.
04.02	Train employees in the safe use of pesticides.
05.0	Prune and shape plants--The student will be able to:
05.01	Train employees in pruning techniques.
05.02	Identify and use tools for pruning.
05.03	Prune plants to achieve desired growth.
05.04	Demonstrate sanitation and safety practices when pruning.
06.0	Demonstrate employability skills--The student will be able to:
06.01	Conduct a job search.
06.02	Secure information about a job.
06.03	Identify documents that may be required when applying for a job.
06.04	Complete a job application form.
06.05	Demonstrate competency in job interview techniques.
06.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
06.07	Identify acceptable work habits.
06.08	Demonstrate knowledge of how to make job changes.
06.09	Demonstrate acceptable employee health habits.
07.0	Maintain landscape plants--The student will be able to:
07.01	Determine water requirements and apply at proper rates.
07.02	Identify weeds and apply herbicides safely.
07.03	Determine fertilization requirements and apply at proper rates.
07.04	Identify plant pest problems and apply corrective measures.

07.05 Regulate the growth of landscape plants through chemical or mechanical needs.

07.06 Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).

07.07 Cultivate and mulch plants.

07.08 Brace and repair trees.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

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### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Landscape and Horticulture Technician  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0101060505
Program Type	College Credit Certificate (CCC)
Program Length	30 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	37-1012 - First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060502).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the landscape and horticulture sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction pertaining to an understanding of plant physiology and growth, plant nutrition and fertilization, plant classification and identification, pest control, pruning and shaping plants, maintenance of landscape plants, equipment maintenance, and employability and human relations skills. This program also prepares for certification and licensure as a horticulture professional and landscape technician.

See **additional information** relevant to Career and Technical Education (CTE) program implementation provided at the end of this document.



## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate an understanding of plant physiology and growth.
- 02.0 Classify plants.
- 03.0 Select, operate, and maintain tools and equipment.
- 04.0 Fertilize plants.
- 05.0 Manage a pest-control program.
- 06.0 Prune and shape plants.
- 07.0 Maintain landscape plants.
- 08.0 Demonstrate employability skills.

## **Landscape Specialization:**

- 09.0 Plan, install, and maintain landscape irrigation systems.
- 10.0 Analyze and organize the project.
- 11.0 Lay out and install landscape and interiorscape.

## **Horticulture Specialization:**

- 12.0 Determine drainage system needs and design a drainage system.
- 13.0 Prune and shape plants.
- 14.0 Maintain and analyze records.
- 15.0 Prepare growing media and seedbeds.
- 16.0 Propagate plants.
- 17.0 Grow plants.
- 18.0 Harvest, process, and ship plants.
- 19.0 Market plants.
- 20.0 Design, install, and service nursery irrigation systems.

Florida Department of Education  
Student Performance Standards

**Program Title:** Landscape and Horticulture Technician  
**CIP Number:** 0101060505  
**Program Length:** 30 credit hours  
**SOC Code(s):** 37-1012

**This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060500). At the completion of this program, the student will be able to:**

01.0	Demonstrate an understanding of plant physiology and growth – the student will be able to:
01.01	Describe the process of photosynthesis.
01.02	Identify and describe the functions of all parts of the plant.
01.03	Describe an asexual reproduction process.
01.04	Explain the differences between angiosperms and gymnosperms.
01.05	Identify the differences between woody and herbaceous plants.
02.0	Classify plants – the student will be able to:
02.01	Identify and group shade and flowering trees.
02.02	Identify and group fruit trees and plants.
02.03	Identify and group annuals, vegetables, and herbs.
02.04	Identify and group woody ornamentals, vines, and ground covers.
02.05	Identify and group tropical foliage plants.
02.06	Identify and group turf and ornamental grasses.
03.0	Select, operate, and maintain tools and equipment – the student will be able to:
03.01	Select and operate equipment for the job.
03.02	Maintain an inventory of parts and supplies.
04.0	Fertilize plants – the student will be able to:

04.01	Evaluate influences of nutrients on plant growth.
04.02	Apply fertilizers, using appropriate methods (dry, liquid, slow-release, injection, etc.).
04.03	Demonstrate proper handling and storage of fertilizers, observing safety precautions.
05.0	Manage a pest-control program – the student will be able to:
05.01	Develop an integrated pest management program or schedule.
05.02	Train employees in the safe use of pesticides.
05.03	Obtain a pesticide license.
06.0	Prune and shape plants – the student will be able to:
06.01	Train employees in pruning techniques.
06.02	Identify and use tools for pruning.
06.03	Prune plants to achieve desired growth.
06.04	Demonstrate sanitation and safety practices when pruning.
07.0	Maintain landscape plants – the student will be able to:
07.01	Determine water requirements and apply at proper rates.
07.02	Identify weeds and apply herbicides safely.
07.03	Determine fertilization requirements and apply at proper rates.
07.04	Regulate growth of landscape plants through chemical or mechanical needs.
07.05	Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).
07.06	Identify plant pest problems and apply corrective measures.
07.07	Cultivate and mulch plants.
07.08	Brace and repair trees.
08.0	Demonstrate employability skills – the student will be able to:
08.01	Conduct a job search.

08.02	Secure information about a job.
08.03	Identify documents that may be required when applying for a job.
08.04	Complete a job application form.
08.05	Demonstrate competency in job interview techniques.
08.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
08.07	Identify acceptable work habits.
08.08	Demonstrate knowledge of how to make job changes.
08.09	Demonstrate acceptable employee health habits.
<b><u>Landscape Specialization:</u></b>	
09.0	Plan, install, and service landscape irrigation systems – the student will be able to:
09.01	Determine irrigation requirements.
09.02	Operate and service low-volume irrigation system.
09.03	Operate and service overhead irrigation systems.
09.04	Operate and maintain automatic system.
10.0	Analyze and organize the project – the student will be able to:
10.01	Interpret plans and specifications.
10.02	Identify safety requirements.
10.03	Organize site preparation.
10.04	Locate project materials.
11.0	Lay out and install landscape – the student will be able to:
11.01	Rough grade site.
11.02	Install large materials.
11.03	Install irrigation system.

11.04	Lay out and install plants.
11.05	Prepare final grade.
11.06	Install lawns.
11.07	Install mulch.
11.08	Perform final clean up.
<b><u>Horticulture Specialization:</u></b>	
12.0	Determine drainage system needs and design a drainage system – the student will be able to:
12.01	Determine the texture and percolation characteristics of the soil.
13.0	Prune and shape plants – the student will be able to:
13.01	Develop a pruning program and time schedule.
13.02	Select and use chemical growth regulators.
13.03	Root-prune plants and trees.
14.0	Maintain and analyze records – the student will be able to:
14.01	Maintain fertilizer and pesticide application records.
14.02	Use computers in the landscape and horticulture operations.
15.0	Prepare growing media and seedbeds – the student will be able to:
15.01	Identify media materials.
15.02	Mix rooting and growing media according to plant requirements.
15.03	Sterilize rooting, potting, and growing media.
15.04	Collect and test a soil sample from field and potting media.
15.05	Adjust pH and nutritional levels of media.
15.06	Prepare planting beds and sites.
15.07	Fill and level benches and pots with media.

15.08	Demonstrate sanitation practices when handling and storing plant media materials.
16.0	Propagate plants – the student will be able to:
16.01	Collect propagation materials at proper time (seeds, cuttings, scions, bulbs, etc.).
16.02	Demonstrate propagation by grafting, budding, layering, separating, dividing, cutting, and tissue culturing.
16.03	Prepare flats and a seedbed and plant seeds.
16.04	Prepare a rooting bed.
16.05	Prepare propagation materials (seeds, cuttings, scions, etc.)
16.06	Apply growth stimulants to propagation materials.
16.07	Transplant rooted propagation materials including tissue culture transplants.
16.08	Demonstrate sanitation and safety practices when propagating.
17.0	Grow plants – the student will be able to:
17.01	Prepare media for containers.
17.02	Prepare field site for transplants.
17.03	Select plant containers.
17.04	Determine plant spacing in the field and on container beds.
17.05	Transplant propagated materials to various containers and to the field.
17.06	Determine and provide light requirements of various plant types.
18.0	Harvest, process, and ship plants – the student will be able to:
18.01	Grade and harvest field-grown plants (ball, burlap, bare-root, “grow-bags”).
18.02	Select, grade, and assemble container-grown plants.
18.03	Prepare for shipment, loading, and transporting harvested plant materials.
19.0	Market plants – the student will be able to:
19.01	Identify, inventory, and label marketable plants.

20.0	Design, install, and maintain nursery irrigation systems – the student will be able to:
20.01	Determine irrigation requirements.
20.02	Assess quality of irrigation water.
20.03	Operate and service various types of irrigation systems.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

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### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>



**Florida Department of Education  
Curriculum Framework**

**Program Title:** Biomass Cultivation Specialist  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>CCC</b>	
CIP Number	0101110301
Program Type	College Credit Certificate (CCC)
Program Length	21 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	19-4011 - Agricultural and Food Science Technicians 45-2092 - Farmworkers and Laborers, Crop, Nursery, and Greenhouse 19-4099 - Precision Agriculture Technicians 45-2091 - Agriculture Equipment Operators
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This certificate program is part of the Biomass Cultivation AS degree program (1101110302).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agricultural production sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to manage land, water, machinery, crops and facilities as well as keep records, analyze records and technical reports, and demonstrate leadership, employability, communication and human relations skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Distinguish varieties of energy grasses.
- 02.0 Manage crops.
- 03.0 Manage machinery and equipment.
- 04.0 Demonstrate safe chemical handling and chemical waste removal.
- 05.0 Keep and analyze production records.
- 06.0 Demonstrate leadership, communication, employability and human relations skills.

Florida Department of Education  
Student Performance Standards

**Program Title:** Biomass Cultivation Specialist  
**CIP Number:** 0101110301  
**Program Length:** 21 credit hours  
**SOC Code(s):** 19-4011, 45-2092, 19-4099, 45-2091

**This certificate program is part of Biomass Cultivation AS degree program (1101110302). At the completion of this program, the student will be able to:**

01.0 Distinguish varieties of energy grasses – the student will be able to:

01.01 List species used as bioenergy feedstock.

01.02 Compare and contrast morphology and anatomy of energy grass species.

01.03 Explain how biological features of energy grasses are important for cellulosic bioethanol production.

02.0 Manage crops – the student will be able to:

02.01 Prepare soil for crops.

02.02 Determine seeding/planting rate and spacing.

02.03 Calibrate and adjust planting equipment.

02.04 Plant crops.

02.05 Select appropriate cultural practices including cultivation, fertilization and irrigation.

02.06 Identify and control diseases, insects and pests.

02.07 Determine maturity of crops.

02.08 Harvest crops.

02.09 Store crops.

03.0 Manage machinery and equipment – the student will be able to:

03.01 Maintain oil, fuel and hydraulic levels in equipment.

03.02 Maintain tires, batteries and coolant system on all equipment and vehicles.

03.03	Operate and service small gasoline engines.
03.04	Replace hoses, belts and lines.
03.05	Cut and weld with oxy-acetylene and arc welding equipment.
03.06	Observe safety procedures when operating farm equipment.
03.07	Follow a general maintenance schedule.
04.0	Demonstrate safe chemical handling and chemical waste removal – the student will be able to:
04.01	Maintain records per state and federal regulations.
04.02	Know and practice chemical handling according to the guidelines established by Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA).
04.03	Demonstrate safe waste disposal practices.
05.0	Keep and analyze production records – the student will be able to:
05.01	Keep fertilization and pesticide use records.
05.02	Keep equipment maintenance and service records.
05.03	Record cultural and production information.
06.0	Demonstrate leadership, communication, employability and human relations skills – the student will be able to:
06.01	Develop citizenship awareness and responsibility.
06.02	Demonstrate effective communication skills.
06.03	Complete an employment application.
06.04	Conduct a job search.
06.05	Demonstrate job interview skills.
06.06	Recognize appropriate work habits.
06.07	Identify associations and societies associated with occupation.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Pest Control Operations  
**Program Type:** ATD (Applied Technology Diploma)  
**Career Cluster:** Agriculture, Food and Natural Resources

	<b>CC</b>	<b>PSAV</b>
Program Number	N/A	A020408
CIP Number	0101110502	0101110503
Grade Level	Applied Technology Diploma (ATD)	Applied Technology Diploma (ATD)
Standard Length	24 credit hours	720 clock hours
CTSO	Collegiate FFA	Collegiate FFA
SOC Codes (all applicable)	37-3012 - Pesticide Handlers, Sprayers, and Applicators, Vegetation	37-3012 - Pesticide Handlers, Sprayers, and Applicators, Vegetation
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>	
Basic Skills Level:	N/A	Mathematics: 10 Language: 10 Reading: 10

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to identify pests, select the appropriate pesticide, and apply pesticides safely. Subject matter includes correct workplace practices, route planning, pest identification, safety, pesticide categories, and alternative control methods.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is an Applied Technology Diploma (ATD) program that is part of a technical degree program, is less than 60 credit hours, and leads to employment in a specific occupation. An ATD program may consist of either technical credit or college credit. A public school district may offer an ATD program only as technical credit, with college credit awarded to a student upon articulation to a community college.

**PSAV Program**

When offered at the district level, this program is a planned sequence of instruction consisting of one occupational completion points and the courses as shown below.

OCP	Course Number	Course Title	Length	SOC Code
A	ORH0867	Pesticide Handlers, Sprayers, and Applicators, Vegetation 1	360 hours	37-3012
	ORH0868	Pesticide Handlers, Sprayers, and Applicators, Vegetation 2	360 hours	

**College Credit**

When offered at the community college level, this ATD program is part of the Pest Control Technology AS program (1101110500) and has a program length of 24 credits.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Apply pesticides and agricultural chemicals safely and efficiently.
- 02.0 List and explain laws and regulations relative to the safe application of pest control materials.
- 03.0 Maintain equipment used to apply pest control materials.
- 04.0 Qualify for appropriate certification to apply pest control materials.
- 05.0 Assist in keeping accurate records required by law and for business purposes.
- 06.0 Identify pests and the appropriate chemicals used to control them.
- 07.0 Market and merchandise goods and services.
- 08.0 Demonstrate adequate communication, employability, human and interpersonal relations skills.



Florida Department of Education  
Student Performance Standards

Program Title: Pest Control Operations  
PSAV Number: A020408

When this program is offered at the PSAV level, the following organization of courses, standards, and benchmarks apply.

<b>PSAV Course Number: ORH0867</b>	
<b>Occupational Completion Point: A</b>	
<b>Pesticide Handlers, Sprayers, and Applicators, Vegetation 1 – 360 Hours – SOC Code 37-3012</b>	
01.0	Apply pesticides and agricultural chemicals safely and efficiently – the student will be able to:
01.01	Recognize pesticide and chemical poisoning symptoms.
01.02	Read and interpret packaging labels and guidelines for safety.
01.03	Read and interpret package labels for application rates and instructions.
01.04	Recommend kinds of pesticides and agricultural chemicals to be used in specific situations.
01.05	Use protective clothing and equipment when handling agricultural chemicals.
01.06	Recognize symptoms of pesticide, chemical, and residue damage.
01.07	Calculate coverage of chemical.
01.08	Assess compatibility of selected chemicals.
01.09	Determine rate and volume of chemical to be applied.
01.10	Select time of chemical application.
01.11	Select and match nozzles for equipment type, chemical used, and pattern of application.
01.12	Safely store chemicals.
01.13	Mix chemicals and carrying agents.
01.14	Apply granular or dry chemical materials.
01.15	Apply liquid materials.
01.16	Adjust ground speed of chemical application equipment.

01.17	Dispose of used chemical containers.
01.18	Recognize & respond to pesticide spills.
01.19	Read and interpret MSDS information.
02.0	List and explain laws and regulations relative to the safe application of pest control materials – the student will be able to:
02.01	Observe local, state, and federal pesticide and agricultural chemical regulations.
02.02	Observe EPA regulations.
02.03	List agencies responsible for the regulation of the pest control and chemical application industry.
02.04	Attend workshops and seminars to upgrade skills and knowledge.
02.05	List sources of up-to-date information and services.
02.06	List societies, organizations, and associations relative to the occupation or profession.
03.0	Maintain equipment used to apply pest control materials – the student will be able to:
03.01	Inspect safety equipment for cleanliness, effectiveness, and proper fit.
03.02	Inspect equipment for leaks, clogs, and other malfunctions, and identify improper equipment for the job.
03.03	Adjust pressure and spray patterns.
03.04	Adjust equipment height and width.
03.05	Adjust mixing apparatus.
03.06	Repair or replace hoses, nozzles, and cut-off valves.
03.07	Prepare equipment for storage.
03.08	Lubricate equipment.
03.09	Follow operator's manuals.
03.10	Repair and/or maintain dusters.
03.11	Repair and/or maintain fumigators.
03.12	Assist in keeping vehicle maintenance records.

03.13	Maintain and use shop equipment and tools.
03.14	Clean and flush chemical application equipment.
03.15	Select appropriate equipment to be used with each chemical.
04.0	Qualify for appropriate certification to apply pest control materials – the student will be able to:
04.01	Interpret certification and licensing requirements.
04.02	Identify qualifications needed for various certificates or licensures.
04.03	Apply for license or certificate.
04.04	Maintain license or certificate.

**PSAV Course Number: ORH0868**  
**Occupational Completion Point: A**  
**Pesticide Handlers, Sprayers, and Applicators, Vegetation 2 – 360 Hours – SOC Code 37-3012**

05.0	Assist in keeping accurate records required by law and for business purposes – the student will be able to:
05.01	Assist in maintaining personnel records.
05.02	Assist in maintaining health and accident records.
05.03	Assist in keeping equipment maintenance records.
05.04	Assist in keeping pesticide application records.
05.05	Assist in maintaining inventory of pesticides and chemicals.
06.0	Identify pests and the appropriate chemicals used to control them – the student will be able to:
06.01	Identify fungi and bacteria and their symptoms.
06.02	Recognize symptoms of insects and nematodes.
06.03	Classify feeding habits and life cycles of insects.
06.04	Describe life cycles of bacteria and fungi.
06.05	Consider the pest, host being attacked, and chemical when recommending chemical control measures.
06.06	Assess environmental impact when recommending chemical control measures.

06.07	Identify insect, weed, and other pests.
06.08	Assess economic and aesthetic thresholds to determine if pesticide applications are warranted.
07.0	Market and merchandise goods and services – the student will be able to:
07.01	Handle customer complaints and questions.
07.02	Take orders for goods and services by telephone.
07.03	Advise customers in the selection of goods or services.
08.0	Demonstrate adequate communication, employability, human, and interpersonal relations skills – the student will be able to:
08.01	Conduct a job search.
08.02	Secure information about a job.
08.03	Identify documents that may be required when applying for a job.
08.04	Complete a job application form correctly.
08.05	Demonstrate competence in job interview techniques.
08.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
08.07	Identify acceptable work habits.
08.08	Demonstrate knowledge of how to make job changes appropriately.
08.09	Demonstrate acceptable employee health habits.

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Pest Control Operations  
**ATD CIP Number:** 0102040802  
**SOC Code(s):** 37-3012

When this program is offered at the college level, the following standards and benchmarks apply:

01.0	Apply pesticides and agricultural chemicals safely and efficiently – the student will be able to:
01.01	Read and interpret packaging labels and guidelines for safety.
01.02	Read and interpret package labels for application rates and instructions.
01.03	Recommend kinds of pesticides and agricultural chemicals to be used in specific situations.
01.04	Use protective clothing and equipment when handling agricultural chemicals.
01.05	Recognize symptoms of pesticide, chemical, and residue damage.
01.06	Calculate coverage of chemical.
01.07	Assess compatibility of selected chemicals.
01.08	Determine rate and volume of chemical to be applied.
01.09	Select time of chemical application.
01.10	Select and match nozzles for equipment type, chemical used, and pattern of application.
01.11	Safely store chemicals.
01.12	Mix chemicals and carrying agents.
01.13	Apply granular or dry chemical materials.
01.14	Apply liquid materials.
01.15	Adjust ground speed of chemical application equipment.
01.16	Dispose of used chemical containers.
02.0	List and explain laws and regulations relative to the safe application of pest control materials – the student will be able to:

02.01	Observe local, state, and federal pesticide and agricultural chemical regulations.
02.02	Observe EPA regulations.
02.03	List agencies responsible for the regulation of the pest control and chemical application industry.
02.04	Attend workshops and seminars to upgrade skills and knowledge.
02.05	List sources of up-to-date information and services.
02.06	List societies, organizations, and associations relative to the occupation or profession.
03.0	Maintain equipment used to apply pest control materials – the student will be able to:
03.01	Inspect safety equipment for cleanliness, effectiveness, and proper fit.
03.02	Inspect equipment for leaks, clogs, and other malfunctions, and identify improper equipment for the job.
03.03	Adjust pressure and spray patterns.
03.04	Adjust equipment height and width.
03.05	Adjust mixing apparatus.
03.06	Repair or replace hoses, nozzles, and cut-off valves.
03.07	Prepare equipment for storage.
03.08	Lubricate equipment.
03.09	Follow operator's manuals.
03.10	Repair and/or maintain dusters.
03.11	Repair and/or maintain fumigators.
03.12	Assist in keeping vehicle maintenance records.
03.13	Maintain and use shop equipment and tools.
03.14	Clean and flush chemical application equipment.
03.15	Select appropriate equipment to be used with each chemical.
04.0	Qualify for appropriate certification to apply pest control materials – the student will be able to:

04.01	Interpret certification and licensing requirements.
04.02	Identify qualifications needed for various certificates or licensures.
04.03	Apply for license or certificate.
04.04	Maintain license or certificate.
05.0	Assist in keeping accurate records required by law and for business purposes – the student will be able to:
05.01	Assist in maintaining personnel records.
05.02	Assist in maintaining health and accident records.
05.03	Assist in keeping equipment maintenance records.
05.04	Assist in keeping pesticide application records.
05.05	Assist in maintaining inventory of pesticides and chemicals.
06.0	Identify pests and the appropriate chemicals used to control them – the student will be able to:
06.01	Identify fungi and bacteria and their symptoms.
06.02	Recognize symptoms of insects and nematodes.
06.03	Classify feeding habits and life cycles of insects.
06.04	Describe life cycles of bacteria and fungi.
06.05	Consider the pest, host being attacked, and chemical when recommending chemical control measures.
06.06	Assess environmental impact when recommending chemical control measures.
06.07	Identify insect, weed, and other pests.
07.0	Market and merchandise goods and services – the student will be able to:
07.01	Handle customer complaints and questions.
07.02	Take orders for goods and services by telephone.
07.03	Advise customers in the selection of goods or services.
08.0	Demonstrate adequate communication, employability, human, and interpersonal relations skills – the student will be able to:

08.01	Conduct a job search.
08.02	Secure information about a job.
08.03	Identify documents that may be required when applying for a job.
08.04	Complete a job application form correctly.
08.05	Demonstrate competence in job interview techniques.
08.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
08.07	Identify acceptable work habits.
08.08	Demonstrate knowledge of how to make job changes appropriately.
08.09	Demonstrate acceptable employee health habits.



## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Basic Skills**

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C. the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 10, and Reading 10. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

### **Program Length**

In accordance with Rule 6A-10.024, F.A.C. an ATD program consists of a course of study that is part of an AS or AAS degree program, is less than 60 credit hours, is approximately 50% of the technical component (non-general education), and leads to employment in a specific occupation. An ATD program may consist of either technical credit or college credit.

Students must have a high school diploma, a GED, or a certificate of completion to be admitted to an ATD program. Within six weeks of entry, students in ATD programs of 450 or more hours must be tested pursuant to Rule 6A-10.040, F.A.C. and if below minimum standards for completion from the program, must receive remedial instruction. The minimum standards must be at least the equivalent of a score of ten (10) on all sections of basic skills test approved in Rule 6A-10.040, F.A.C. Students must successfully complete all remedial instruction before completing the ATD.

Community Colleges may offer either college or career credit toward the ATD. A Career Center in a public school district may offer an ATD program only as technical credit, with college credit awarded to a student upon articulation to a community college (Section 1004.02, F.S.)

When offered at a community college the standard length of this program is 24 credits. When offered at a technical center the standard length of this program is 720 clock hours.

In accordance with Rule 6A-10.024, F.A.C. all faculty providing instruction must have at least a baccalaureate degree or an associate degree with demonstrated competencies in the specific instructional program as defined by the Southern Association of Colleges and Schools.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Marine Mammal Behavior and Training  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0103060101
Program Type	College Credit Certificate (CCC)
Program Length	15 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	39-2011 - Animal Trainers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This certificate program is part of the Marine Environmental Technology AS degree program (1103060100).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The purpose of this program is to provide technically skilled employees for the marine mammal training, behavior, and research fields. Graduates of this program will obtain the fundamental academic skills necessary to be successful at entry level positions in the marine mammal training, behavior and research fields and demonstrate the an understanding of the fundamental concepts of marine mammal science.

Graduates will demonstrate the ability to understand and practice the fundamentals of: marine mammal husbandry; marine mammal medical care and pathology; behavior modification and training; anatomy; physiology; maternity; population management; habitat and maintenance; environmental enrichment; cognitive and behavioral research methodology, design and implementation; dolphin acoustics; and communication; marine mammal law; and conservation.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate an understanding of the fundamental principles of marine mammal anatomy and evolution.
- 02.0 Demonstrate basic knowledge of marine mammal social structure and culture.
- 03.0 Demonstrate proficiency of basic marine mammal training and husbandry techniques.
- 04.0 Demonstrate knowledge of principle marine mammal laws and regulations.
- 05.0 Describe and discuss research focused on marine mammals.
- 06.0 Demonstrate knowledge of conservation issues involving marine mammals.
- 07.0 Demonstrate an understanding of the guiding principles and practices of marine mammals in human care.

Florida Department of Education  
Student Performance Standards

Program Title: Marine Mammal Behavior and Training  
CIP Number: 0103060101  
Program length: 15 credit hours  
SOC Code (s): 39-2011

**This certificate program is part of the Marine Environmental Technology AS degree program (1103060100). At the completion of this program, the student will be able to:**

01.0	Demonstrate an understanding of the fundamental principles of marine mammal anatomy and evolution – the student will be able to:
01.01	Demonstrate an understanding of the external and internal aspects of dolphin anatomy and physiology, and their role in the successful survival of a mammal in the marine environment.
01.02	Demonstrate knowledge of the anatomy and evolution of various marine mammals including other cetaceans, pinnipeds and sirenians.
01.03	Demonstrate knowledge of the evolution of marine mammals.
02.0	Demonstrate basic knowledge of marine mammal social structure and culture – the student will be able to:
02.01	Demonstrate an understanding of basic dolphin ecology as related to communication, foraging, reproduction, calf rearing and social structure.
02.02	Explain and outline marine mammal maternal characteristics, behaviorism human care and the wild, as well as prenatal care, birthing situations and maternity care of mother and neonate human care facilities.
02.03	Explain how the natural social ecology of dolphins and the importance and impact of it on how they are managed at human care facility.
02.04	Demonstrate an understanding of the basic social structure of other representative marine mammal taxa.
02.05	Demonstrate how the term “culture” has been theorized to apply to certain aspects of cetacean societies and how that impacts our understanding of their cognition.
02.06	Understand the portrayal of marine mammals in the media and how and why it has changed over time.
02.07	Understand the application of animal assistance to humans throughout history and the more recent use of marine mammals in military service and how the latter has greatly contributed to our essential knowledge base of marine mammals overall.
03.0	Demonstrate proficiency of basic marine mammal training and husbandry techniques – the student will be able to:
03.01	Understand the philosophy and techniques of operant (behavioral) conditioning, with a focus on positive reinforcement in training behavior and its application to working with dolphins.
03.02	Demonstrate operant conditioning techniques through the use of learned hand signals in communicating requests for various trained behaviors from the dolphin.

03.03	Apply skills learned in animal care, handling and reinforcement during a live animal presentation for the general public.
03.04	Construct a plan for basic marine mammal care, dietary and medical needs, and animal handling.
03.05	Understand the medical issues unique to marine mammals, methods of treatment of bacterial, viral, fungal and parasitic disease, established preventive care practices.
03.06	Demonstrate the use of operant conditioning in training a new behavior through outlining, developing, implementing and modifying a behavior chain through practical application with the animals.
03.07	To summarize the importance of voluntary medical behavior training, concepts and techniques used to desensitize animals to non-invasive medical equipment and procedures. Understand the importance of the of trainer/animal relationship with regard to properly maintaining the health and well being of the animals.
03.08	To investigate and understand the purpose and necessity of animal enrichment including cognitive, development, and social aspects. Design and implement enrichment activities to enhance the habitat and activities of the animals.
03.09	To summarize safety precautions and the social issues surrounding enrichment devices, habitat design, safety & maintenance social groupings, training and dolphin & sea lion nutrition & energetics.
03.10	To critique various career pathways and opportunities available in the field of marine mammal care and training, including necessary academics, field experience, trainer forums, further experiential education in the field, networking, etc.
04.0	Demonstrate knowledge of principle marine mammal laws and regulations – the student will be able to:
04.01	Understand and explain the laws and regulating agencies, and their evolution, designed to protect marine mammals in both the wild and human care as well as regulate facilities .
04.02	Understand the separate roles of both NOAA and the Department of Agriculture and how they impact marine mammals and marine mammal facilities.
05.0	Describe and discuss research focused on marine mammals – the student will be able to:
05.01	Describe the historical and current research efforts relating to dolphin cognition, behavior, acoustics, communication, strandings, physiology, reproduction and conservation.
05.02	Summarize basic medical procedures and the importance and implications of husbandry techniques to marine mammal research.
05.03	Explain how research with dolphins in human care have expanded our understanding of their wild cousins and contributed to their conservation.
05.04	Summarize trends in basic dolphin ethology, past and ongoing studies related to cognition, behavior and communication and its application in research, as well as an understanding of passive observational data collection and facilitation of active cognitive research.
05.05	Evaluate theories and research on dolphin echolocation and whistle production; implication of anthropogenic noise in the marine environment and ongoing research in the area.
05.06	Conduct independent behavioral observations.
05.07	Review research design and logistics as it applies to marine mammals in human care through a project design exercise conducted collaboratively throughout the course, including an understanding of results analyses and interpretation.
05.08	Critique career pathways and requirements toward becoming a marine mammal research scientist in human care settings (ex situ) and in the field (in situ).

06.0	Demonstrate knowledge of conservation issues involving marine mammals – the student will be able to:
06.01	Understand the current conservation issues of international/domestic concern which affect marine mammals and their environment, cumulative impacts both natural and human induced, as well as ways in which individuals can affect the environment in a positive manner to conserve the species.
06.02	Master the skills in synthesizing new information and experiences with prior conceptions of dolphins and the marine environment to clearly refine their opinions and knowledge base.
06.03	Outline the organization of the Marine Mammal Stranding Network; procedures used in assisting and rehabilitating stranded marine mammals; international and domestic issues concerning threats to dolphins and the marine environment.
06.04	List anthropogenic impacts affecting marine mammals and their environment, and demonstrate an understanding of research needed in this area, implications of impacts and associated research.
06.05	Understand past and present state of whaling operations around the world and the processes and organizations that govern these activities
06.06	Understand status of certain endangered marine mammal species and conservation measures to sustain their populations.
07.0	Demonstrate an understanding of the guiding principles and practices of marine mammals in human care – the student will be able to:
07.01	To diagram population management, including theories, tools and strategies for maintaining a population's genetic diversity and demographic stability in order to insure its long term persistence.
07.02	Summarize specific concerns surrounding appropriate design, construction and maintenance of aquatic mammal habitats for marine mammals in human care.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>



**Florida Department of Education  
Curriculum Framework**

**Program Title:** Tropical Ornamental Mariculture Technician  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0103060102
Program Type	College Credit Certificate (CCC)
Program Length	30 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	45-2093 - Farmworkers, Farm, Ranch, and Aquacultural Animals
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This certificate program is part of the Marine Environmental Technology AS degree program (1103060100).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in tropical marine ornamental finfish and invertebrate husbandry, disease and parasite diagnostics and prevention, nutrition of marine aquaculture organisms, aquaculture best management practices, marine aquaculture systems and design, as well as an internship at a tropical marine aquaculture facility.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Compose scientific and/or technical reports.
- 02.0 Demonstrate an understanding of marine ecosystems, environmental management, and resource conservation.
- 03.0 Comprehension of fundamental principles governing business and entrepreneurship.
- 04.0 Demonstrate an understanding of the fundamental principles of marine aquaculture.
- 05.0 Demonstrate a thorough knowledge of aquaculture best management practices.
- 06.0 Identify and diagnose common diseases and parasites that infect marine aquaculture organisms.
- 07.0 Demonstrate a moderate understanding of marine aquaculture systems.
- 08.0 Recognize appropriate nutritional requirements for the most common marine aquaculture organisms.
- 09.0 Demonstrate a basic understanding of marine aquaculture husbandry principles and practices.

Florida Department of Education  
Student Performance Standards

Program Title: Tropical Ornamental Mariculture Technician  
CIP Number: 0103060102  
Program Length: 30 credit hours  
SOC Code(s): 45-2093

**This certificate program is part of the Marine Environmental Technology AS degree program (1103060100). At the completion of this program, the student will be able to:**

01.0	Compose scientific and/or technical reports – the student will be able to:
01.01	Explain the peer-review process of publishing a scientific article.
01.02	Explain the function of each section of a scientific paper or technical report.
01.03	Critically analyze a scientific paper describing its thesis, methods, results and conclusions.
01.04	Create at least two reports formatted according to a scientific publishing format.
02.0	Demonstrate an understanding of marine ecosystems, environmental management, and resource conservation – the student will be able to:
02.01	Explain the essential components of ecology, and how energy flows through an ecosystem.
02.02	Explain the functional role of primary producers in the marine environment, and identify common species of marine plants and algae.
02.03	Explain the essential components of intertidal ecology, and how energy flows through various types of intertidal ecosystems.
02.04	Describe the features and functional systems in the intertidal, neritic, epipelagic and deep ocean regions.
02.05	Explain the basic functional ecology and energy flow on a coral reef.
02.06	List the various resources humans derived from the sea and what problems this presents.
02.07	Explain how humankind has and continues to impact the marine environment.
02.08	Describe methods and best practices currently in use to conserve marine ecosystems including but not limited to as marine spatial planning, integrated coastal zone management and marine protected areas.
02.09	Explain the concepts of “Tragedy of the Commons” and “Precautionary Principle” as they relate to marine ecosystem and resource conservation.
03.0	Comprehension of fundamental principles governing business and entrepreneurship – the student will be able to:

03.01	Demonstrate a familiarity of entrepreneurship by understanding the characteristics and mindset of entrepreneurs.
03.02	Identify and evaluate opportunities within the marketplace, both for new venture creation and within existing organizations.
03.03	Create the tools necessary to act on an entrepreneurial opportunity by writing a business plan, building a management team, financing the opportunity and creating an innovative marketing plan.
03.04	Describe successful strategies and common mistakes made by successful entrepreneurs.
03.05	Describe the legal requirements and obstacles in starting a business venture.
04.0	Demonstrate an understanding of the fundamental principles of marine aquaculture – the student will be able to:
04.01	Demonstrate a basic understanding of marine aquaculture husbandry principles and practices.
04.02	Demonstrate the skills required to culture phytoplankton and zooplankton required for larval rearing.
04.03	Describe the basic types of marine aquaculture systems.
04.04	Describe the various types of common organisms and techniques currently used
04.05	Demonstrate a basic knowledge of common diseases and parasites during marine aquaculture and methods for their control.
05.0	Demonstrate a thorough knowledge of aquaculture best management practices – the students will be able to:
05.01	Describe the concept of aquaculture Best Management Practices.
05.02	Compile and analyze marine aquaculture industry management data.
05.03	Identify and demonstrate proper use of key Quality Management tools.
05.04	Develop and implement the key components and concepts of an aquaculture management plan.
06.0	Demonstrate a basic understanding of marine aquaculture husbandry principles and practices – the students will be able to:
06.01	Identify the principles of water quality specific to marine aquaculture from a variety of marine taxa.
06.02	Demonstrate a working knowledge of variety of husbandry techniques for most of the known marine species currently being cultured, including temperature and photoperiod control conducive to spawning and species specific life styles.
06.03	Understand basic selective breeding techniques for enhanced phenotypic traits.
07.0	Identify and diagnose common diseases and parasites that infect marine aquaculture organisms – the students will be able to:
07.01	Demonstrate an understanding of how the culture environment is associated with the occurrence and outbreak of disease and parasites in marine aquaculture systems.
07.02	Identify the differences between environmental, viral, bacterial, parasitic and fungal diseases of marine species.

07.03	Demonstrate a basic understanding of methodologies for treatment of diseases commonly encountered during marine aquaculture operations.
07.04	Demonstrate an understanding of the basic principles of marine aquatic health management and biosecurity.
08.0	Demonstrate a moderate understanding of marine aquaculture systems – the students will be able to:
08.01	Describe the various types of marine aquaculture systems and demonstrate the ability to distinguish the primary components of specific marine aquaculture systems.
08.02	Identify which systems are best for the culture and business model of the target species.
08.03	Recognize the System requirements for Integrated Multi-Trophic Mariculture (IMTM) systems.
08.04	Demonstrate an understanding of the impacts of specific marine aquaculture systems on the environment and especially marine ecosystems.
08.05	Demonstrate basic skills for computer automated drafting.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

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### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Turf Equipment Technology  
**Program Type:** ATD (Applied Technology Diploma)  
**Career Cluster:** Agriculture, Food and Natural Resources

	<b>CC</b>	<b>PSAV</b>
Program Number	N/A	A020608
CIP Number	0131030202	0131030203
Grade Level	Applied Technology Diploma (ATD)	Applied Technology Diploma (ATD)
Standard Length	38 credit hours	1140 clock hours
CTSO	Collegiate FFA	Collegiate FFA
SOC Codes (all applicable)	49-3053 - Outdoor Power Equipment and Other Small Engine Mechanics	49-3053 - Outdoor Power Equipment and Other Small Engine Mechanics
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>	
Basic Skills Level:	N/A	Mathematics: 10 Language: 10 Reading: 10

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to manage and maintain turf care equipment and to manage a shop facility. Instruction includes: hand tools, gasoline and diesel mechanics, paints and painting, sharpening and grinding, welding, hydraulics, electrical systems, training on specialized turf care equipment, record keeping, inventory control, safety, laws and regulations, public relations, human relations, shop management, professionalism, employability skills, communications skills, and management skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is an Applied Technology Diploma (ATD) program that is part of a technical degree program, is less than 60 credit hours, and leads to employment in a specific occupation. An ATD program may consist of either technical credit or college credit. A public school district may offer an ATD program only as technical credit, with college credit awarded to a student upon articulation to a community college.

**PSAV Program**

When offered at the district level, this program is a planned sequence of instruction consisting of one occupational completion points and the courses as shown below.

OCP	Course Number	Course Title	Length	SOC Code
A	SER0004	Outdoor Power Equipment and Other Small Engine Mechanics 1	435 hours	49-3053
	SER0005	Outdoor Power Equipment and Other Small Engine Mechanics 2	435 hours	
	SER0006	Outdoor Power Equipment and Other Small Engine Mechanics 3	270 hours	

**College Credit**

When offered at the community college level, this ATD program is part of the Turf Equipment Management AS program (1131030201) and has a program length of 38 credits.



## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Disassemble, reassemble, adjust, repair, and diagnose the problems related to two and four-cycle engines.
- 02.0 Service electrical systems, fuels and lubricating systems, cooling systems, power train/hydraulic drives, and controls on turf equipment.
- 03.0 Adjust, sharpen, grind, and rebuild reel and rotary mowing units.
- 04.0 Demonstrate understanding of governmental regulations and compliances pertaining to golf courses.
- 05.0 Use shop tools and equipment, and organize a shop following appropriate safety, management, and inventory techniques.
- 06.0 Order and stock parts and keep shop records.
- 07.0 Perform basic welding tasks using both gas and arc welding techniques.
- 08.0 Identify and safely operate turf care equipment.
- 09.0 Demonstrate employability skills.
- 10.0 Identify the various professional organizations and publications that pertain to the turf management industry.
- 11.0 Design a functional golf course maintenance facility and select appropriate maintenance equipment.
- 12.0 Develop a preventive maintenance program for turf care equipment.
- 13.0 Develop human relations skills.
- 14.0 Perform decision making activities.

Florida Department of Education  
Student Performance Standards

Program Title: Turf Equipment Technology  
PSAV Number: A020608

When this program is offered at the PSAV level, the following organization of courses, standards, and benchmarks apply.

<b>PSAV Course Number: SER0004</b>	
<b>Occupational Completion Point: A</b>	
<b>Outdoor Power Equipment and Other Small Engine Mechanics 1 – 435 Hours – SOC Code 49-3053</b>	
01.0	Disassemble, reassemble, adjust, repair, and diagnose the problems related to two-cycle and four-cycle engines – the student will be able to:
01.01	Evaluate horsepower and torque.
01.02	Disassemble and reassemble a two-cycle and four-cycle engine.
01.03	Identify crankcase and cylinder assembly.
01.04	Identify and be able to assemble valves, piston assembly, crankshaft, cooling system, and air filters.
01.05	Identify and assemble parts of the carburetor assembly.
01.06	Identify and assemble the ignition system, governor, alternator, and starter system.
01.07	Identify types of batteries.
01.08	Follow safety rules and precautions when dealing with engines.
02.0	Service electrical systems, fuel and lubricating systems, power train/hydraulic drives, and controls on turf equipment – the student will be able to:
02.01	Identify turf equipment electrical systems.
02.02	Service hydraulic systems on a variety of turf equipment.
02.03	Service turf equipment power train systems.
02.04	Identify and service various lubricating systems and understand types of fuels and lubricants.
02.05	Operate and repair the various mechanical and hydraulic controls on turf equipment.
02.06	Repair the governor, ignition, alternator, and starter system on various pieces of turf equipment.

03.0	Adjust, sharpen, grind, and rebuild reel and rotary mowing units – the student will be able to:
03.01	Sharpen and balance rotary mower blades.
03.02	Remove and replace rotary mower blades.
04.0	Demonstrate understanding of governmental regulations and compliances pertaining to golf courses – the student will be able to:
04.01	Control pollution
04.02	Protect water quality
04.03	Demonstrate fire prevention methods
04.04	Identify and prevent health hazards and demonstrate proper first aid
05.0	Use shop tools and equipment and organize a shop following appropriate safety, management and inventory techniques – the student will be able to:
05.01	Follow basic OSHA safety regulations and shop fire prevention techniques.
05.02	Perform basic first aid procedures.
05.03	Establish a file system for shop records.
05.04	Identify and use shop hand tools and equipment that relate to turf equipment maintenance.
05.05	Select the appropriate fasteners, bearings, seals, belts, chains, fuels, and lubricants for various turf equipment.
05.06	Establish and maintain appropriate shop space for specific shop tasks.
05.07	Establish an appropriate equipment inventory system.

**PSAV Course Number: SER0005**  
**Occupational Completion Point: A**  
**Outdoor Power Equipment and Other Small Engine Mechanics 2 – 435 Hours – SOC Code 49-3053**

06.0	Order and stock parts and keep shop records – the student will be able to:
06.01	Use the various equipment manuals to identify parts and service procedures.
06.02	Order parts properly.
06.03	Establish a system for stocking appropriate turf equipment parts.
06.04	Gather the appropriate forms for establishing a recordkeeping system.

06.05	Maintain computer-based inventory and record-keeping system.
07.0	Perform basic welding tasks using both gas and arc welding techniques – the student will be able to:
07.01	Follow welding symbols, and safety practices.
07.02	Connect and operate oxy-acetylene welding equipment.
07.03	Run beads and weld various types of joints.
07.04	Braze and solder metal.
07.05	Cut metal with and oxy-acetylene torch.
07.06	Select appropriate welding rods.
07.07	Set up an electrical arc welding machine.
07.08	Arc weld various types of joints.
08.0	Identify and safely operate turf care equipment – the student will be able to:
08.01	Identify the appropriate use for commonly used turf care equipment.
08.02	Identify the operation safety procedures for commonly used turf equipment.
08.03	Operate properly all commonly used turf care equipment.
09.0	Demonstrate employability skills – the student will be able to:
09.01	Conduct a job search.
09.02	Secure information about a job.
09.03	Identify documents which may be required when applying for a job interview.
09.04	Complete a job application correctly.
09.05	Demonstrate competence in a job interview.
09.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
09.07	Identify acceptable work habits.
09.08	Demonstrate knowledge or how to make job changes appropriately.

09.09	Demonstrate acceptable employee health habits.
09.10	Identify appropriate attire and grooming to maintain a functional and professional atmosphere in the equipment maintenance facility.
10.0	Identify the various professional organizations and publications that pertain to the turf management industry – the student will be able to:
10.01	Identify major points in the history of the golf course/turf industry.
10.02	Identify and understand various professional turf publications.
10.03	Identify and understand the basic role of professional turf organizations.
10.04	Identify the basics of the seed production and sod production industries.
10.05	Identify the various classes of golf courses and turf maintenance organizations.
11.0	Design a functional golf course maintenance facility and select appropriate maintenance equipment – the student will be able to:
11.01	Evaluate the organization and management styles utilized by various golf courses.
11.02	Classify, by use, the various equipment used on a typical 18-hole golf course.
11.03	List the equipment needed to properly maintain an 18-hole golf course.
11.04	Design and organize a golf course maintenance complex.
11.05	Develop an equipment budget for an 18-hole golf course.
11.06	Identify appropriate attire and grooming to maintain a functional and professional atmosphere in the equipment maintenance facility.

**PSAV Course Number: SER0006**  
**Occupational Completion Point: A**  
**Outdoor Power Equipment and Other Small Engine Mechanics 3 – 270 Hours – SOC Code 49-3053**

12.0	Develop preventive maintenance programs for turf care equipment – the student will be able to:
12.01	Develop a recordkeeping system to record equipment use.
12.02	Develop a recordkeeping system to record service work performed on equipment.
13.0	Develop human relations skills – the student will be able to:
13.01	Demonstrate appropriate work habits.
13.02	Identify traits that promote good human relations and increase job performance.

13.03	Develop an understanding of the role of the golf course superintendent and turf equipment service manager in the overall successful operations of the golf course.
14.0	Perform decision-making activities – the student will be able to:
14.01	Develop the ability to solve problems in a logical sequence.
14.02	Demonstrate the ability to determine proper work priorities.
14.03	Prepare a day's work schedule for the superintendent.
14.04	Choose appropriate action in situations requiring following a chain of command.
14.05	Choose appropriate action in situations requiring effective time management.
14.06	Choose appropriate action in situations requiring application of business ethics.
14.07	Identify ways to assign work to others.

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Turf Equipment Technology  
**ATD CIP Number:** 0131030202  
**SOC Code(s):** 49-3053

When this program is offered at the college level, the following standards and benchmarks apply:

01.0	Disassemble, reassemble, adjust, repair, and diagnose the problems related to two-cycle and four-cycle engines – the student will be able to:
01.01	Evaluate horsepower and torque.
01.02	Disassemble and reassemble a two-cycle and four-cycle engine.
01.03	Identify crankcase and cylinder assembly.
01.04	Identify and be able to assemble valves, piston assembly, crankshaft, cooling system, and air filters.
01.05	Identify and assemble parts of the carburetor assembly.
01.06	Identify and assemble the ignition system, governor, alternator, and starter system.
01.07	Identify types of batteries.
01.08	Follow safety rules and precautions when dealing with engines.
02.0	Service electrical systems, fuel and lubricating systems, power train/hydraulic drives, and controls on turf equipment – the student will be able to:
02.01	Identify turf equipment electrical systems.
02.02	Service hydraulic systems on a variety of turf equipment.
02.03	Service turf equipment power train systems.
02.04	Identify and service various lubricating systems and understand types of fuels and lubricants.
02.05	Operate and repair the various mechanical and hydraulic controls on turf equipment.
02.06	Repair the governor, ignition, alternator, and starter system on various pieces of turf equipment.
03.0	Adjust, sharpen, grind, and rebuild reel and rotary mowing units – the student will be able to:

03.01	Repair and sharpen various types of reel mowers.
03.02	Grind reel bedknives with various bedknife grinders.
03.03	Lap reel mower blades.
03.04	Follow safety procedures when using reel and bedknife grinders.
03.05	Adjust reel mowers to produce proper cutting heights.
03.06	Sharpen and balance rotary mower blades.
03.07	Remove and replace rotary mower blades.
04.0	Demonstrate understanding of governmental regulations and compliances pertaining to golf courses – the student will be able to:
04.01	Control pollution
04.02	Protect water quality
04.03	Demonstrate fire prevention methods
04.04	Identify and prevent health hazards and demonstrate proper first aid
04.05	Identify and manage hazardous waste on the golf course
04.06	Manage fertilizer storage demonstrating proper handling techniques
04.07	Demonstrate pesticide safety
05.0	Use shop tools and equipment and organize a shop following appropriate safety, management and inventory techniques – the student will be able to:
05.01	Follow basic OSHA safety regulations and shop fire prevention techniques.
05.02	Perform basic first aid procedures.
05.03	Establish a file system for shop records.
05.04	Identify and use shop hand tools and equipment that relate to turf equipment maintenance.
05.05	Select the appropriate fasteners, bearings, seals, belts, chains, fuels, and lubricants for various turf equipment.
05.06	Establish and maintain appropriate shop space for specific shop tasks.
05.07	Establish an appropriate equipment inventory system.



06.0	Order and stock parts and keep shop records – the student will be able to:
06.01	Use the various equipment manuals to identify parts and service procedures.
06.02	Order parts properly.
06.03	Establish a system for stocking appropriate turf equipment parts.
06.04	Gather the appropriate forms for establishing a recordkeeping system.
06.05	Maintain computer-based inventory and record-keeping system.
07.0	Perform basic welding tasks using both gas and arc welding techniques – the student will be able to:
07.01	Follow welding symbols, and safety practices.
07.02	Connect and operate oxy-acetylene welding equipment.
07.03	Run beads and weld various types of joints.
07.04	Braze and solder metal.
07.05	Cut metal with and oxy-acetylene torch.
07.06	Select appropriate welding rods.
07.07	Set up an electrical arc welding machine.
07.08	Arc weld various types of joints.
08.0	Identify and safely operate turf care equipment – the student will be able to:
08.01	Identify the appropriate use for commonly used turf care equipment.
08.02	Identify the operation safety procedures for commonly used turf equipment.
08.03	Operate properly all commonly used turf care equipment.
09.0	Demonstrate employability skills – the student will be able to:
09.01	Conduct a job search.
09.02	Secure information about a job.
09.03	Identify documents which may be required when applying for a job interview.

09.04	Complete a job application correctly.
09.05	Demonstrate competence in a job interview.
09.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
09.07	Identify acceptable work habits.
09.08	Demonstrate knowledge or how to make job changes appropriately.
09.09	Demonstrate acceptable employee health habits.
09.10	Identify appropriate attire and grooming to maintain a functional and professional atmosphere in the equipment maintenance facility.
10.0	Identify the various professional organizations and publications that pertain to the turf management industry – the student will be able to:
10.01	Identify major points in the history of the golf course/turf industry.
10.02	Identify and understand various professional turf publications.
10.03	Identify and understand the basic role of professional turf organizations.
10.04	Identify the basics of the seed production and sod production industries.
10.05	Identify the various classes of golf courses and turf maintenance organizations.
11.0	Design a functional golf course maintenance facility and select appropriate maintenance equipment – the student will be able to:
11.01	Evaluate the organization and management styles utilized by various golf courses.
11.02	Classify, by use, the various equipment used on a typical 18-hole golf course.
11.03	List the equipment needed to properly maintain an 18-hole golf course.
11.04	Design and organize a golf course maintenance complex.
11.05	Develop an equipment budget for an 18-hole golf course.
12.0	Develop preventive maintenance programs for turf care equipment – the student will be able to:
12.01	Use equipment manufacturers' manuals to implement proper service procedures.
12.02	Develop a recordkeeping system to record equipment use.
12.03	Develop a recordkeeping system to record service work performed on equipment.

13.0	Develop human relations skills – the student will be able to:
13.01	Demonstrate appropriate work habits.
13.02	Identify traits that promote good human relations and increase job performance.
13.03	Develop an understanding of the role of the golf course superintendent and turf equipment service manager in the overall successful operations of the golf course.
14.0	Perform decision-making activities – the student will be able to:
14.01	Develop the ability to solve problems in a logical sequence.
14.02	Demonstrate the ability to determine proper work priorities.
14.03	Prepare a day's work schedule for the superintendent.
14.04	Choose appropriate action in situations requiring following a chain of command.
14.05	Choose appropriate action in situations requiring effective time management.
14.06	Choose appropriate action in situations requiring application of business ethics.
14.07	Identify ways to assign work to others.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Basic Skills**

In PSAV programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C. the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 10, and Reading 10. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

### **Program Length**

In accordance with Rule 6A-10.024, F.A.C. an ATD program consists of a course of study that is part of an AS or AAS degree program, is less than 60 credit hours, is approximately 50% of the technical component (non-general education), and leads to employment in a specific occupation. An ATD program may consist of either technical credit or college credit.

Students must have a high school diploma, a GED, or a certificate of completion to be admitted to an ATD program. Within six weeks of entry, students in ATD programs of 450 or more hours must be tested pursuant to Rule 6A-10.040, F.A.C. and if below minimum standards for completion from the program, must receive remedial instruction. The minimum standards must be at least the equivalent of a score of ten (10) on all sections of basic skills test approved in Rule 6A-10.040, F.A.C. Students must successfully complete all remedial instruction before completing the ATD.

Community Colleges may offer either college or career credit toward the ATD. A Career Center in a public school district may offer an ATD program only as technical credit, with college credit awarded to a student upon articulation to a community college (Section 1004.02, F.S.)

When offered at a community college the standard length of this program is 38 credits. When offered at a technical center the standard length of this program is 1140 clock hours.

In accordance with Rule 6A-10.024, F.A.C. all faculty providing instruction must have at least a baccalaureate degree or an associate degree with demonstrated competencies in the specific instructional program as defined by the Southern Association of Colleges and Schools.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Hazardous Materials Specialist  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0703010403
Program Type	College Credit Certificate (CCC)
Program Length	14 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	19-4091 - Environmental Science and Protection Technicians, Including Health
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This certificate program is part of the Environmental Science Technology AS degree program (1703010401).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to analysis, handling, storage, and dispensing of hazardous materials in accordance with appropriate federal, state, and local laws and regulations governing proper chemical management. The certificate will cover industry standards such as those included in the Occupational Health and Safety Administration (OSHA) 29CFR1910.120 [Hazardous Waste Operations and Emergency Response](#) (HAZWOPER) Standard, the Oil Pollution Act of 1990, the Clean Air Act, the Clean Water Act, and the Department of Transportation (DOT) regulations. Graduates of this certificate program should be able to research applicable local, state, and federal regulations and implement methods and strategies to ensure compliance; to maintain records as required by OSHA, the Environmental Protection Agency (EPA), and the DOT; to develop and implement hazardous materials handling procedures; to plan for emergency response to hazardous materials incidents; and to protect employees/workers/communities from hazardous material exposures.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate knowledge of the principles of managing and remediation of water pollution.
- 02.0 Demonstrate knowledge of the principles of managing and remediation of air pollution.
- 03.0 Demonstrate awareness of environmental noise sources and their monitoring.
- 04.0 Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants.
- 05.0 Sample, analyze, and calculate data related to air and water pollutants.
- 06.0 Demonstrate an awareness of radiation monitoring and radioactive contamination control.
- 07.0 Demonstrate an awareness of solid waste, the problems engendered by solid waste accumulation, and disposal and solutions to those problems.
- 08.0 Demonstrate employability skills.

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Hazardous Materials Specialist  
**CIP Number:** 0703010403  
**Program Length:** 14 credit hours  
**SOC Code(s):** 19-4091

**This certificate program is part of the Environmental Science Technology AS degree program (1703010401). At the completion of this program, the student will be able to:**

01.0	Demonstrate knowledge of the principles of managing and remediation of water pollution--The student will be able to:
01.01	Determine chemical and physical properties of water.
01.02	Describe microbial systems.
01.03	Describe surface water, groundwater systems, hydrologic cycle, and potable water treatment processes.
01.04	Identify types and sources of water contamination.
01.05	Collect water samples for analysis.
01.06	Identify the accepted water quality standards for effluent from wastewater treatment plants.
01.07	Identify the correct and accepted water quality standards for industrial waste effluent.
02.0	Demonstrate knowledge of the principles of managing and remediation of air pollution--The student will be able to
02.01	Collect and analyze air samples.
02.02	Measure the air pollutant of a specific source.
02.03	Record, interpret, and report laboratory analyses.
03.0	Demonstrate awareness of environmental noise sources and their monitoring--The student will be able to:
03.01	Define and discuss the physical properties of sound.
03.02	Discuss the threshold of hearing, tolerance, and hearing loss.
03.03	Discuss environmental noise, its effect on humans, and solutions to noise pollution.
04.0	Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants--The student will be able to:



04.01	Demonstrate knowledge of basic laboratory operation.
04.02	Operate and calibrate selected laboratory instruments.
04.03	Operate and calibrate selected field instruments and equipment.
05.0	Sample, analyze, and calculate data related to air and water pollutants--The student will be able to:
05.01	Gather and analyze selected samples.
05.02	Manipulate data and reach firm conclusions.
05.03	Write selected formal technical reports.
05.04	Identify and perform the correct analysis for selected air pollutants listed with state and federal regulations.
05.05	Identify and perform the correct analysis for selected parameters listed with state and federal regulations for wastewater effluent.
06.0	Demonstrate an awareness of radiation monitoring and radioactive contamination control--The student will be able to:
06.01	Discuss nuclear power plant design, nuclear power hazards, and safety features.
06.02	Discuss nuclear fuel reprocessing and storage.
07.0	Demonstrate an awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems--The student will be able to:
07.01	Discuss the composition, sources, and quantity of solid waste.
07.02	Discuss methods of solid waste disposal.
07.03	Discuss various solutions to solid waste accumulations and disposal.
07.04	Identify a sanitary landfill.
07.05	Discuss the construction features of a safe landfill.
07.06	Discuss the possibilities of contaminants (leachates) seeping into the groundwater.
07.07	Discuss the need to have monitoring well located around a sanitary landfill.
07.08	Discuss those wastes that are permitted by state and federal regulation to be disposed at a landfill site.
08.0	Demonstrate employability skills--The student will be able to:
08.01	Secure information about a job.

08.02 Identify documents that may be required when applying for a job.

08.03 Demonstrate competence in job interview techniques.

08.04 Demonstrate knowledge of how to make job changes appropriately.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Environmental Science Technician  
**Career Cluster:** Agriculture, Food and Natural Resources

CCC	
CIP Number	0703010407
Program Type	College Credit Certificate (CCC)
Program Length	30 credit hours
CTSO	Collegiate FFA & Skills USA
SOC Codes (all applicable)	29-9012 - Occupational Health and Safety Technicians 13-1041 - Compliance Officers
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>

**Purpose**

This certificate program is part of the Environmental Science Technology AS degree program (1703010401).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in worker health and safety, transportation of hazardous materials, and a focus on federal regulations for environmental protection. Instruction includes the analysis, handling, storage, transportation, and dispensing of hazardous materials in accordance with appropriate regulations and the planning for the protection of employees/workers/communities from hazardous material exposures.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate knowledge of the principles of managing and remediation of water pollution.
- 02.0 Demonstrate knowledge of the principles of managing and remediation of air pollution.
- 03.0 Demonstrate awareness of environmental noise sources and their monitoring.
- 04.0 Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants.
- 05.0 Sample, analyze and calculate data related to air and water pollutants.
- 06.0 Demonstrate an awareness of radiation monitoring and radioactive contamination control.
- 07.0 Demonstrate and awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems.
- 08.0 Demonstrate employability skills.

Florida Department of Education  
Student Performance Standards

Program Title: Environmental Science Technician  
 CIP Numbers: 0703010407  
 Program Length: 30 credit hours  
 SOC Code(s): 29-9012, 13-1041

**This certificate program is part of Environmental Science Technology AS degree program (1703010401). At the completion of this program, the student will be able to:**

01.0	Demonstrate knowledge of the principles of managing and remediation of water pollution – the student will be able to:
01.01	Determine chemical and physical properties of water.
01.02	Describe legal aspects and consequences of pollution.
02.0	Demonstrate knowledge of the principles of managing and remediation of air pollution – the student will be able to:
02.01	Identify natural and manmade pollutants; their sources, effects, and control techniques.
02.02	Collect and analyze air samples.
02.03	List the regulated parameters of emission for selected industrial sources.
02.04	Record, interpret and report laboratory analyses.
03.0	Demonstrate awareness of environmental noise sources and their monitoring – the student will be able to:
03.01	Define and discuss the physical properties of sound.
03.02	Discuss the threshold of hearing, tolerance, and hearing loss.
03.03	Discuss environmental noise, its effect on humans, and solutions to noise pollution.
03.04	Select the regulatory agency that controls noise sources.
04.0	Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants – the student will be able to:
04.01	Demonstrate knowledge of basic laboratory operation.
04.02	Operate and calibrate selected laboratory instruments.

04.03	Operate and calibrate selected field instruments and equipment.
05.0	Sample, analyze and calculate data related to air and water pollutants – the student will be able to:
05.01	Manipulate data and reach firm conclusions.
05.02	Write selected formal technical reports.
05.03	Identify and perform the correct analysis for selected air pollutants listed with state and federal regulations.
06.0	Demonstrate an awareness of radiation monitoring and radioactive contamination control – the student will be able to:
06.01	Discuss types and sources of radiation.
06.02	Discuss the immediate and long range effects of radiation on animals and plants.
06.03	Discuss nuclear power plant design, nuclear power hazards, and safety features.
07.0	Demonstrate an awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems – the student will be able to:
07.01	Discuss the composition, sources and quantity of solid waste.
07.02	Discuss methods of solid waste disposal.
07.03	Identify the solid wastes from domestic households, municipalities and industry.
07.04	Discuss those wastes that are permitted by state and federal regulation to be disposed at a landfill site.
08.0	Demonstrate employability skills – the student will be able to:
08.01	Secure information about a job.
08.02	Identify documents that may be required when applying for a job.
08.03	Complete a job application.
08.04	Demonstrate competence in job interview techniques.
08.05	Identify acceptable work habits.
08.06	Demonstrate knowledge of how to make job changes appropriately.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>



Florida Department of Education  
Curriculum Framework

**Program Title:** Agricultural Production Technology  
**Career Cluster:** Agriculture, Food and Natural Resources

**AS**

CIP Number	1101000000
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	11-9013 - Farmers, Ranchers, and Other Agricultural Managers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to manage land, water, machinery, financing, crops and/or livestock, labor and facilities as well as make contracts, manage taxes, keep records, analyze records and technical reports, and demonstrate leadership, employability, communication and human relations skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 60 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Obtain and dispose of an agricultural enterprise.
- 02.0 Manage and supervise labor.
- 03.0 Manage crops.
- 04.0 Manage livestock.
- 05.0 Manage machinery and equipment.
- 06.0 Manage facilities.
- 07.0 Select sources and methods of financing the operation.
- 08.0 Keep and analyze financial, production and personnel records.
- 09.0 Market crops/livestock.
- 10.0 Interpret technical information and incorporate it into managerial practices.
- 11.0 Integrate state and federal regulations into the operation.
- 12.0 Demonstrate leadership, communication, employability and human relations skills.

Florida Department of Education  
Student Performance Standards

**Program Title:** Agricultural Production Technology  
**CIP Number:** 1101000000  
**Program Length:** 60 credit hours  
**SOC Code(s):** 11-9013

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0	Obtain and dispose of agricultural enterprise – the student will be able to:
01.01	Determine land capability classes of farm or ranch.
01.02	List steps in obtaining title to real estate.
01.03	Determine advantage of using services of Soil Conservation Service (SCS).
01.04	Develop a farm or ranch rental/lease agreement.
01.05	Determine value of property.
01.06	Develop a will for transfer or disposal of property.
02.0	Manage and supervise labor – the student will be able to:
02.01	Train and supervise workers.
02.02	Obtain information from workers necessary for employment.
02.03	List responsibilities and liability of employer regarding workers rights, safety and welfare.
02.04	List local, state and federal regulations regarding employment of workers.
02.05	Develop an employee work schedule.
03.0	Manage crops – the student will be able to:
03.01	Prepare a land use plan.
03.02	Determine long-range conservation practices.
03.03	Prepare soil for crops.

03.04	Select crop varieties best suited for land, market and type of farm operation.
03.05	Determine seeding/planting rate and spacing.
03.06	Calibrate and adjust planting equipment.
03.07	Plant crops.
03.08	Select appropriate cultural practices including cultivation, fertilization and irrigation.
03.09	Identify and control diseases, insects and pests.
03.10	Determine maturity of crops.
03.11	Harvest crops.
03.12	Store crops.
03.13	Determine the most advantageous method of marketing crops.
04.0	Manage livestock – the student will be able to:
04.01	Select and/or breed livestock.
04.02	Determine nutritional requirements and balance livestock rations.
04.03	Prepare a feeding schedule.
04.04	Determine quality of pasture range or forage.
04.05	Provide for winter rations and supplements.
04.06	Maintain pasture fertility and quality.
04.07	Develop a breeding/marketing plan for operation.
04.08	Cull unproductive animals.
04.09	Provide aid for animals with parturition problems.
04.10	Care for newborn livestock.
04.11	List causes of livestock infertility.
04.12	Provide mineral supplement for animals.

04.13	Determine most advantageous method of marketing livestock.
04.14	Transport livestock.
04.15	Identify and treat disorders, diseases and pests of livestock.
05.0	Manage machinery and equipment – the student will be able to:
05.01	Assess needs for the purchases of new or replacement equipment.
05.02	Maintain oil, fuel and hydraulic levels in equipment.
05.03	Maintain tires, batteries and coolant system on all equipment and vehicles.
05.04	Operate and service small gasoline engines.
05.05	Replace hoses, belts and lines.
05.06	Cut and weld with oxy-acetylene and arc welding equipment.
05.07	Observe safety procedures when operating farm equipment.
05.08	Develop a general maintenance schedule.
06.0	Manage facilities – the student will be able to:
06.01	Safely operate and maintain general farm shop tools and equipment.
06.02	Install and maintain electrical wiring and equipment.
06.03	Square and build a farm structure.
06.04	Determine a bill of materials for a farm construction project.
06.05	Form and pour concrete.
06.06	Build and repair fences, gates and pens.
06.07	Develop a general maintenance schedule for facilities and equipment.
07.0	Select sources and methods of financing the operation – the student will be able to:
07.01	List major sources of production credit.
07.02	List sources of credit for capital items and real estate.

07.03	Prepare a case using accepted forms for obtaining credit from farm lending institutions.
08.0	Keep and analyze financial, production and personnel records – the student will be able to:
08.01	Keep fertilization and pesticide use records.
08.02	Keep equipment maintenance and service records.
08.03	Record cultural and production information.
08.04	Determine cost efficiency of operations.
08.05	Maintain labor and personnel records.
08.06	Prepare a farm tax return.
08.07	Prepare an annual budget
08.08	Determine credit, cash flow and investment returns.
08.09	Review sources and kinds of farm insurance.
09.0	Market crops/livestock – the student will be able to:
09.01	Secure and interpret market information.
09.02	Select marketing channels for greatest profit.
09.03	Interpret elements of marketing agreements.
09.04	Market crops/livestock.
09.05	Provide for transportation of product to market.
10.0	Interpret technical information and incorporate it into managerial practices – the student will be able to:
10.01	Keep and maintain a file of current technical information from universities, governmental and commercial agencies.
10.02	Maintain a reference file for periodicals and other publications.
10.03	Attend seminars and workshops to update skills and knowledge.
10.04	Determine sources and advantages of using computer networking.
11.0	Integrate state and federal regulations into operation – the student will be able to:

11.01	List agencies responsible for inspecting and regulating operation of product.
11.02	Secure necessary inspection certificates and registrations.
11.03	List reasons for the necessity of inspections, certifications and registrations.
12.0	Demonstrate leadership, communication, employability and human relations skills – the student will be able to:
12.01	Develop citizenship awareness and responsibility.
12.02	Demonstrate knowledge in organizing and conducting meetings.
12.03	Demonstrate effective communication skills.
12.04	Complete an employment application
12.05	Conduct a job search.
12.06	Demonstrate job interview skills.
12.07	Recognize appropriate work habits.
12.08	Identify associations and societies associated with occupation or profession.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. Whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>



**Florida Department of Education  
Curriculum Framework**

**Program Title:** Agribusiness Management  
**Career Cluster:** Agriculture, Food and Natural Resources

AS	
CIP Number	1101010100
Program Type	College Credit
Standard Length	60 credit hours (primary) / 63 credit hours (secondary)
CTSO	Collegiate FFA
SOC Codes (all applicable)	11-9013 - Farmers, Ranchers, and Other Agricultural Managers 45-4011 - Forest and Conservation Workers 37-3011 - Landscaping and Groundskeeping Workers 37-1012 - First-Line Supervisors/Managers of Landscaping, Lawn Service, and Groundskeeping Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to apply the economic and business principles involved in the organization, operation and management of farms and agricultural business. Subject matter includes finance, laws, labor, machinery, facilities, and marketing, as well as leadership, communication, employability and human relations skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 60-63 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Obtain and dispose of an agricultural enterprise.
- 02.0 Prepare and administer an agricultural oriented plan (manage the crop/livestock plan).
- 03.0 Supervise and manage the operation, maintenance and repair of equipment.
- 04.0 Manage facilities and structures.
- 05.0 Select sources and methods of financing operation.
- 06.0 Interpret and apply state and federal rules and regulations.
- 07.0 Perform accounting activities.
- 08.0 Perform communication activities.
- 09.0 Develop human relations skills.
- 10.0 Demonstrate employability skills.
- 11.0 Develop leadership skills.
- 12.0 Identify, classify, and demonstrate management activities.
- 13.0 Demonstrate a basic understanding of legal and ethical issues in a business environment.
- 14.0 Demonstrate basic computer skills.

**In addition, students will complete the objectives in one of the following specializations:**

### **Forest Operations**

- Forest Operations – SOC Code: 45-4011 – Forest and Conservation Workers

- 15.0 Prepare and administer forest management plans.
- 16.0 Plan and administer forest inventories.
- 17.0 Assist registered land surveyor in location of property corners and boundary lines, road construction and drainage projects.
- 18.0 Prepare and administer forest fire and smoke management plans and assist in forest fire suppression and control.
- 19.0 Identify major southeastern forest tree species.
- 20.0 Identify and control major southeastern forest insects and diseases.
- 21.0 Evaluate forest ecosystems.
- 22.0 Evaluate forest soils with respect to chemical and fertilizer applications and hydrology.
- 23.0 Collect, maintain and/or analyze data and records.
- 24.0 Prepare, analyze and enforce contracts and other legal documents.
- 25.0 Administer the purchase, sale and/or marketing of forest products.

### **Irrigation Technology**

- Irrigation Technology -- SOC Code: 37-3011 – Landscaping and Groundskeeping Workers

- 26.0 Demonstrate an understanding of the use of communications in an irrigation business environment.

- 27.0 Demonstrate an understanding of the types of pipe installation common to irrigation systems.
- 28.0 Demonstrate an understanding of irrigation system components.
- 29.0 Demonstrate an understanding of basic design principles used in irrigation systems.
- 30.0 Demonstrate an understanding of basic irrigation system maintenance and operation.
- 31.0 Demonstrate an understanding of distribution systems used in the irrigation industry.
- 32.0 Demonstrate an understanding of control systems used in irrigation installation and repair.
- 33.0 Demonstrate an understanding of water supply.
- 34.0 Demonstrate an understanding of sprinkler performance.
- 35.0 Demonstrate an understanding of site analysis in residential and commercial irrigation systems.
- 36.0 Demonstrate an understanding of and practice in design principles used in residential and commercial irrigation systems.
- 37.0 Demonstrate an understanding of job preparation necessary in residential and commercial irrigation systems.
- 38.0 Demonstrate an understanding of installation techniques used in residential and commercial irrigation systems.
- 39.0 Demonstrate an understanding of how to obtain site information necessary in the residential irrigation system design process.
- 40.0 Demonstrate an understanding of selection and safe use of equipment for residential irrigation system installation.
- 41.0 Demonstrate an understanding of how to select pipe sizes and valves appropriate for specific residential irrigation system installations.
- 42.0 Demonstrate an understanding of microcomputer applications used to design residential irrigation systems.
- 43.0 Demonstrate an understanding of the role of "the green industry."
- 44.0 Demonstrate an understanding of the basic principles of plant growth.
- 45.0 Demonstrate an understanding of the role of plant nutrients and fertilizers.
- 46.0 Demonstrate an understanding of pest management practices.
- 47.0 Demonstrate an understanding of the role of irrigation.
- 48.0 Demonstrate an understanding of the role of soil science.
- 49.0 Demonstrate an understanding of plants used in urban and suburban landscapes.
- 50.0 Demonstrate an understanding of the basic safety issues involved in the "green industry."
- 51.0 Demonstrate an understanding of the water cycle.
- 52.0 Demonstrate an understanding of the uses of water resources.
- 53.0 Demonstrate an understanding of water resource policies in Florida.
- 54.0 Demonstrate an understanding of surface water supplies.
- 55.0 Demonstrate an understanding of groundwater supplies.
- 56.0 Demonstrate an understanding of drip system components.
- 57.0 Demonstrate an understanding of the characteristics of water emission devices.
- 58.0 Demonstrate an understanding of basic design principles for low volume irrigation systems.
- 59.0 Demonstrate an understanding of procedures involved in installation of low volume irrigation systems.
- 60.0 Demonstrate an understanding of irrigation system computer software currently used in industry.
- 61.0 Demonstrate an understanding of materials selection and costing needed for sales presentations.
- 62.0 Develop an understanding of the breadth of the irrigation industry.
- 63.0 Demonstrate an understanding of irrigation water requirements.
- 64.0 Demonstrate an understanding of economic analysis as applied to irrigation investment decisions.
- 65.0 Demonstrate an understanding of methods of develop overall operating and maintenance procedures.
- 66.0 Demonstrate an understanding of analysis of irrigation systems.
- 67.0 Demonstrate an understanding of how to obtain site information necessary in the commercial irrigation system design process.

- 68.0 Demonstrate an understanding of selection and safe use of equipment for a commercial irrigation system installation.
- 69.0 Demonstrate an understanding of how to select pipe sizes and valves appropriate for specific commercial irrigation system installations.
- 70.0 Demonstrate an understanding of writing irrigation specifications.
- 71.0 Demonstrate an understanding of advanced hydraulic and head lay out concepts.

### **Horticulture Technician**

- Horticulture Technician – SOC Code: 37-1012 -- First-Line Supervisors/Managers of Landscaping, Lawn Service, and Groundskeeping Workers

- 72.0 Demonstrate an understanding of plant physiology and growth.
- 73.0 Classify plants.
- 74.0 Select, operate, and maintain tools and equipment.
- 75.0 Fertilize plants.
- 76.0 Manage a pest-control program.
- 77.0 Prune and shape plants.
- 78.0 Maintain landscape plants.
- 79.0 Demonstrate employability skills.
- 80.0 Determine drainage system needs and design a drainage system.
- 81.0 Maintain and analyze records.
- 82.0 Prepare growing media and seedbeds.
- 83.0 Propagate plants.
- 84.0 Grow plants.
- 85.0 Harvest, process, and ship plants.
- 86.0 Market plants.
- 87.0 Design, install, and maintain nursery irrigation systems.

### **Golf Course Technician**

- Golf Course Technician – SOC Code: 37-1012.00 -- First-Line Supervisors/Managers of Landscaping, Lawn Service, and Groundskeeping Workers

- 88.0 Supervise and manage the operation, maintenance and repair of golf course equipment.
- 89.0 Schedule irrigation and manage the design, installation and maintenance of golf course irrigation systems.
- 90.0 Prescribe, supervise and manage the application of agricultural chemicals for the prevention and control of pests.
- 91.0 Prescribe, supervise and manage the fertilization of the turf and landscape.
- 92.0 Train and supervise employees in grooming and maintaining greens, tees, fairways, roughs and other areas.
- 93.0 Provide a safe environment for workers and patrons.
- 94.0 Keep and analyze maintenance, employee, equipment and inventory records.
- 95.0 Observe local, state and federal laws and regulations.
- 96.0 Demonstrate leadership, communication, public relations, employability and human relations skills.

- 97.0 Demonstrate an understanding of the types of pipe installation common to irrigation system.
- 98.0 Demonstrate an understanding of irrigation system components.
- 99.0 Demonstrate an understanding of basic design principles used in irrigation systems.
- 100.0 Demonstrate an understanding of basic irrigation system maintenance and operation.
- 101.0 Demonstrate an understanding of sprinkler performance.
- 102.0 Demonstrate an understanding of the basic principles of plant growth.
- 103.0 Demonstrate an understanding of the role of plant nutrients and fertilizers.
- 104.0 Demonstrate an understanding of pest management practice.
- 105.0 Demonstrate an understanding of the role of irrigation.
- 106.0 Demonstrate an understanding of the basic safety issues involved in the "green industry".
- 107.0 Demonstrate an understanding of the drip system components.
- 108.0 Demonstrate an understanding of basic design principles for low volume irrigation systems.
- 109.0 Demonstrate an understanding of procedures involved in installation of low volume irrigation systems.
- 110.0 Demonstrate an understanding of plant physiology and growth.
- 111.0 Classify plants.
- 112.0 Select, operate and maintain tools and equipment.
- 113.0 Fertilize plants.
- 114.0 Manage a pest-control program.

Florida Department of Education  
Student Performance Standards

Program Title: Agribusiness Management  
CIP Number: 1101010100  
Program Length: 60 credit hours (primary) / 63 credit hours (secondary)  
SOC Code(s): 11-9011

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0 Obtain and dispose of an agricultural enterprise – the student will be able to:

01.01 Develop plan for type and size of agricultural enterprise.

01.02 Obtain title to real estate.

01.03 Complete farm rental/lease Agreement.

01.04 Purchase building insurance.

01.05 Purchase liability insurance.

01.06 Transfer agribusiness ownership.

02.0 Prepare and administer an agricultural oriented plan – the student will be able to:

02.01 Prepare land development plan.

02.02 Prepare agricultural plan in one of the following: crop or product program, irrigation, fertilization, pesticide, plant.

02.03 Enroll in Agricultural Stabilization Conservation Service Program if applicable.

02.04 Enroll in and review Soil Conservation Service Practices if applicable.

02.05 Contract for custom services.

02.06 Develop plan for purchase and operation of irrigation system.

02.07 Develop fertilization plan.

02.08 Develop pesticide plan.

02.09 Develop plan to meet seed/plant needs.

02.10	Develop marketing plan.
02.11	Market livestock/livestock products.
02.12	Purchase insurance.
03.0	Supervise and manage the operation, maintenance and repair of equipment – the student will be able to:
03.01	Develop budgets for changing the machinery and equipment program.
03.02	Prepare inventory of farm machinery and equipment; harvest, fuel, and lubricants.
03.03	Obtain machinery and equipment by purchase, rent, lease or trade.
03.04	Develop plan for machinery and equipment maintenance program.
04.0	Manage facilities and structures – the student will be able to:
04.01	Plan for the expansion of existing facilities or construction of new facilities.
04.02	Develop plan for repairing, remodeling, improving facilities.
04.03	Acquire buildings by purchase, rental or lease.
04.04	Purchase building supplies.
05.0	Select sources and methods of financing operation – the student will be able to:
05.01	Analyze major sources of agricultural production credit.
05.02	Analyze and select sources of credit for capital items and real estate.
05.03	Prepare a case using accepted forms for obtaining credit from an agricultural lending institution.
05.04	Analyze contracts, leases and other legal documents.
05.05	Analyze and interpret land use maps.
05.06	Interpret a real estate legal description.
05.07	Identify major elements in lease agreements.
05.08	Identify major elements in contracts.
05.09	Secure legal services.

06.0	Interpret and apply state and federal rules and regulations to enterprise – the student will be able to:
06.01	List agencies responsible for inspecting and regulating operation or product.
06.02	Secure necessary inspections, certifications and registrations.
06.03	Maintain a file of current rules and regulations relative to operation.
06.04	List reasons for the necessity of inspections, certification and regulations.
07.0	Perform accounting activities – the student will be able to:
07.01	Record and post transactions in a general journal.
07.02	Prepare an income statement and payroll records.
07.03	Prepare a balance sheet.
07.04	Prepare a cash flow statement.
07.05	Journalize and post-closing entries.
07.06	Demonstrate knowledge of petty case records.
07.07	Demonstrate knowledge of checking account records and bank reconciliation.
07.08	Interpret financial statements.
07.09	Demonstrate knowledge of the accounting cycle.
07.10	Demonstrate knowledge of budget principles and interpret budgets.
07.11	Demonstrate accounting operations on a computer.
07.12	Calculate and record depreciation, net worth, and income.
07.13	Complete a comparative trend analysis table.
07.14	Complete a profit and loss statement.
07.15	Calculate and record capital gains and losses, monthly/yearly receipts, operating expenses.
07.16	Balance bank statement.
07.17	Develop plan for bestowing the estate.



07.18	Complete IRS income or loss schedule, Capital gains and losses schedule, Investment credit schedule, 1040 schedule.
08.0	Perform communication activities – the student will be able to:
08.01	Demonstrate effective telephone usage and courtesy.
08.02	Demonstrate effective listening skills.
08.03	Give, follow, and Interpret oral and written communication.
08.04	Demonstrate knowledge of e-mail etiquette and ethics.
08.05	Compose business correspondence and related documents and demonstrate correct spelling, grammar, punctuation, and work choice.
08.06	Prepare, outline, and deliver an effective short oral presentation.
08.07	Participate in a group discussion as a member and as a leader.
08.08	Obtain appropriate information from graphics and other visual media.
08.09	Research and interpret information retrieved from print and electronic resources.
08.10	Annotate letters, reports, and news articles.
08.11	Proofread and edit documents.
08.12	Research and compose a document containing statistical information.
08.13	Prepare visual material, including electronic media, to support an oral presentation.
08.14	Demonstrate ability to communicate effectively with diverse populations.
09.0	Develop human relation skills – the student will be able to:
09.01	Analyze and develop written solutions to behavior problems affecting job performance.
09.02	Demonstrate ability to work effectively as part of a team.
09.03	Demonstrate conflict resolution skills.
09.04	Demonstrate punctuality, initiative, courtesy, dependability, flexibility, and honesty.
09.05	Develop and demonstrate the unique human relations skills needed for success in the business sector.
09.06	Recognize different personality styles and how to interact effectively with them in the workplace.

09.07	Differentiate between an acceptable and unacceptable code of ethical conduct in business.
09.08	Discuss how values and attitudes influence behavior.
09.09	Explain how understanding of self-concept and self-esteem impacts human relations skills.
09.10	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
10.0	Demonstrate employability skills – the student will be able to:
10.01	Demonstrate understanding of acceptable hygiene and grooming habits.
10.02	Identify sources of employment opportunities.
10.03	Identify appropriate attire and grooming for a business office.
10.04	Identify documents that may be required when applying for a job.
10.05	Complete a resume and cover letter.
10.06	Complete a job application form correctly.
10.07	Prepare a plain-text resume for electronic distribution.
10.08	Demonstrate effective job interview techniques.
10.09	Demonstrate understanding of different types of interviews.
10.10	Prepare a thank you letter for an interview.
10.11	Identify and demonstrate appropriate responses to feedback from supervisors.
10.12	Identify and demonstrate acceptable work habits.
10.13	Demonstrate knowledge of how to make job and career changes appropriately.
10.14	Demonstrate basic knowledge of employment law.
10.15	Demonstrate ability to adapt to change.
10.16	Demonstrate effective time management skills.
10.17	Prepare a letter of resignation.
10.18	Identify methods for securing an employment reference.

10.19	Conduct a job search.
10.20	Secure information about a job.
10.21	Demonstrate competence in job interview techniques.
11.0	Develop leadership skills – the student will be able to:
11.01	Demonstrate an understanding of how to plan and lead an effective meeting.
11.02	Define effective leadership.
11.03	Identify and explain key leadership behaviors.
11.04	Compare different styles of leadership.
11.05	Relate leadership to other management and communication skills.
11.06	Examine ways effective leaders develop, coach, and motivate.
11.07	Define organization vision and mission.
11.08	Identify characteristics of effective goals.
11.09	Describe personal leadership style.
11.10	Explain how effective leaders identify problems and make decisions.
11.11	Compare different styles of managing conflict.
11.12	Identify acceptable work habits.
11.13	Demonstrate knowledge of how to make job changes appropriately.
12.0	Identify, classify and demonstrate management activities – the student will be able to:
12.01	Compare management styles.
12.02	Identify the major functions of management.
12.03	Demonstrate understanding of basic management concepts such as authority, responsibility, delegation, empowerment, and hiring and firing.
12.04	Demonstrate knowledge of the relationship between authority and responsibility to task accomplishment.
12.05	Select the most effective communication systems.

12.06	Identify problems and make appropriate decisions.
12.07	Demonstrate understanding of organizational culture and its impact on communication.
12.08	Identify and discuss current management issues in business and other organizations.
12.09	Describe activities associated with the management functions of planning, organizing, staffing, leading and controlling.
12.10	Manage and supervise labor
12.11	Develop labor supply plan.
12.12	Hire and dismiss employees.
12.13	Establish and record pay scale and benefits.
12.14	Train workers using demonstration performance method.
12.15	Develop employee work schedules
12.16	Prepare payroll records.
13.0	Demonstrate a basic understanding of legal and ethical issues in a business environment – the student will be able to:
13.01	Demonstrate basic understanding of contracts.
13.02	Demonstrate basic understanding of human resource issues.
13.03	Demonstrate basic understanding of negotiable instruments.
13.04	Demonstrate basic understanding of intellectual property rights.
13.05	Demonstrate basic understanding of appropriate use of employer property.
13.06	Demonstrate basic understanding of confidentiality.
13.07	Demonstrate basic understanding of role of ethical decision making in dealing with stakeholders.
13.08	Demonstrate knowledge of social responsibilities.
13.09	Demonstrate knowledge of legal and privacy issues regarding e-mail, voice mail, internet, telephone, and other communication methods.
14.0	Demonstrate basic computer skills – the student will be able to:
14.01	Demonstrate Keyboarding Techniques.

14.02	Demonstrate basic proficiency in spreadsheet, word processing, database, and presentation software and e-mail communication.
14.03	Perform research using the internet and intranet.
<b>Forest Operations</b>	
15.0	Prepare and administer forest management plans – the student will be able to:
15.01	Prepare and conduct a statistically based forest inventory.
15.02	Calculate, analyze and evaluate forest inventory data.
15.03	Write an approximate management plan for tract based on landowner objectives including timber volumes, harvesting schedules, regeneration schedules, stand maps, stand and stock tables and recommendations for multiple-use and for future management.
15.04	Select and execute appropriate silvicultural system for tract.
15.05	Conduct a prescribed burn including pre-planning, permitting, firing systems, smoke management and suppression techniques.
15.06	Plan and execute timber stand improvement when needed.
15.07	Plan and execute appropriate site preparation, tree planting and harvesting.
15.08	Demonstrate knowledge of ordinances related to harvesting and regeneration activities.
16.0	Plan and administer forest inventories – the student will be able to:
16.01	Prepare and conduct a statistically based forest inventory using area samples, i.e. fixed-radius plot inventory.
16.02	Prepare and conduct a statistically based forest inventory using point sample, i.e. prism inventory.
16.03	Operate dendrometers such as tree calipers and diameter tape.
16.04	Operate hypsometers such as altimeter, clinometers and relaskop.
16.05	Operate hand-held magnetic compass and demonstrate proper pacing procedure in forested situations.
16.06	Locate forest tracts using legal description, maps, aerial photos and atlases.
16.07	Select and use appropriate volume tables.
16.08	Calculate timber volumes by forest products.
16.09	Calculate and prepare valuation of forest tract based on product and current market prices.
16.10	Prepare "lump sum" timber bid.

16.11	Prepare "per unit" timber bid.
16.12	Calculate and prepare stand and stock tables.
16.13	Calculate and prepare growth projections and regeneration stocking.
16.14	Calculate tract averages using maps, aerial photos and/or pacing.
17.0	Assist registered land surveyor in location of property corners and boundary lines, road construction and drainage projects – the student will be able to:
17.01	Identify forest tracts based on legal description and write proper legal description for given forest tract.
17.02	Locate and mark forest tract corners and boundary lines.
17.03	Determine forest road location and identify on the ground.
17.04	Determine drainage patterns for watershed and locate proper stream crossing points.
17.05	Obtain proper permits for stream crossings, i.e. culverts, bridges.
18.0	Prepare and administer forest fire and smoke management plans and assist in forest fire suppression and control – the student will be able to:
18.01	Demonstrate knowledge of various firing techniques.
18.02	Demonstrate knowledge of weather conditions as related to forest fire-prescribed and wildfire - and smoke management.
18.03	Select proper firing techniques based on landowner objectives and weather conditions.
18.04	Demonstrate knowledge of fire suppression tools and equipment, both hand tools and mechanical.
18.05	Demonstrate knowledge of pre-suppression forest fire activities.
18.06	Evaluate acreage and damages of wildfire and recommend future forest management activities to renew resource.
18.07	Plan and administer a fire and smoke management plan including proper burning authorizations.
18.08	Complete U.S. Forest Service S-190, Introduction to Fire Behavior, and S-130, Basic Fire Fighter course with passing scores and, when possible, receive Incident Qualification Card ("Red Card").
19.0	Identify major southeastern forest tree species – the student will be able to:
19.01	Identify major commercial forest species of the southeast United States by scientific name, common name, habitat and commercial products derived from species.
19.02	Identify major commercial forest species of Florida, with or without foliage, by personal observation using the five senses.
19.03	Use dichotomous key to identify unfamiliar species.

20.0	Identify and control major southeastern forest insects and diseases – the student will be able to:
20.01	Identify major forest insects and diseases of the southeastern United States by scientific name, common name and damage inflicted.
20.02	Identify major forest insects and diseases of the southeastern United States by scientific name, common name, symptoms, and damage inflicted and recommendations for control.
20.03	Identify major forest insects and diseases of Florida in the forest by personal observation and recommend appropriate controls.
20.04	Demonstrate knowledge of chemical and biological control of forest pests.
20.05	Evaluate damages by forest insects and diseases and make recommendations for future forest management.
21.0	Evaluate forest ecosystems – the student will be able to:
21.01	Demonstrate knowledge of the major forest ecosystems of the United States.
21.02	Identify the major forest ecosystems of Florida.
21.03	Identify the relationship between human activities and forest flora and fauna.
21.04	Identify endangered species of Florida and associated regulations and/or recommended forest practices.
21.05	Demonstrate knowledge of threatened species of Florida and associated regulations and/or recommended forest practices.
21.06	Demonstrate knowledge of forest ecosystem practices on both private and public lands.
22.0	Evaluate forest soils with respect to chemical and fertilizer applications and hydrology – the student will be able to:
22.01	Demonstrate knowledge of the major forest soil types in the southeastern United States.
22.02	Identify and classify the major forest soil types of Florida.
22.03	Identify types, uses and application rates of approved forest herbicides.
22.04	Prepare and execute a herbicide plan.
22.05	Identify fertilizer formulations applicable to Florida forest soils.
22.06	Identify proper fertilizer formulations rates with proper soil type on Florida forest soils.
22.07	Define major watersheds and hydrology of a given forest area.
22.08	Demonstrate knowledge of Best Management Practices (BMP), especially special management zones (SMZ).
22.09	Identify and locate SMZ on the ground.

22.10	Obtain proper permits relating to stream crossings, ditching, cut and fill and wetland harvesting.
23.0	Collect, maintain and/or analyze data and records – the student will be able to:
23.01	Collect field data from forest inventory
23.02	Setup and maintain files of technical forestry information.
23.03	Demonstrate knowledge of federal, state and local regulations related to forestry practices.
24.0	Prepare, analyze and enforce contracts and other legal document – the student will be able to:
24.01	Demonstrate knowledge of types of contracts and legal documents related to forestry practices.
24.02	Select proper timber sale contract for given situation and prepare and execute same under supervision of forester and/or legal counsel.
24.03	Obtain and maintain proper licensure, certifications and registrations.
25.0	Administer the purchase, sale and/or marketing of forest products – the student will be able to:
25.01	Demonstrate knowledge of various forest products and markets.
25.02	Identify Florida forest products and current market valuations.
25.03	Identify timber harvesting systems used in southeastern United States.
25.04	Prepare and execute a timber sale, either lump sum or per unit.
25.05	Supervise timber harvesting activities.
25.06	Scale forest products.
<b>Irrigation Technology</b>	
26.0	Demonstrate an understanding of the use of communications in an irrigation business environment – the student will be able to:
26.01	Explain the communications patterns used in the irrigation industry, including connected network and chain of command.
26.02	Define common irrigation vocabulary terms.
26.03	Locate specific engineering information from print and on-line sources.
27.0	Demonstrate an understanding of the types of pipe installation common to irrigation systems – the student will be able to:
27.01	List the different types and schedules of available Polyvinyl Chloride (PVC) pipes.



27.02	Describe the different types of available fittings including solvent weld, o-rings, and mechanical joint (MJ) joints.
27.03	Describe the basic chemical reactions that occur in the manufacture of PVC pipe.
27.04	Explain the process of connecting PVC pipe by using solvent weld chemicals.
27.05	Explain the process of connecting o-ring pipe by using push-on fittings.
28.0	Demonstrate an understanding of irrigation system components – the student will be able to:
28.01	Identify various irrigation system types such as rotors, sprays, and drip.
28.02	Explain the process of time clock selection.
28.03	Explain the process of valve selection.
28.04	Explain the process of sprinkler head selection.
28.05	Explain the process of low-voltage wire selection.
29.0	Demonstrate an understanding of basic design principles used in irrigation systems – the student will be able to:
29.01	Calculate the static or working water pressure at a given point in the system.
29.02	Determine the velocity for certain type and size pipe at a given flow.
29.03	Select appropriate sprinkler heads for specific applications.
29.04	Group irrigation heads to form irrigation zones complying with proper design criteria.
29.05	Calculate specific friction loss through piping.
29.06	Compute the precipitation rate for various sprinkler types and spacing patterns.
30.0	Demonstrate an understanding of basic irrigation system maintenance and operation – the student will be able to:
30.01	Determine the watering time needed per week per station.
30.02	Develop a water schedule based on proper design principles.
30.03	Read and explain an as-built drawing.
30.04	Explain the process of remove and install sprinkler heads.
30.05	Describe introductory the process of automatic control valve repair.

30.06	Describe the process of automatic controller repair.
30.07	Diagnose and correcting wiring problems.
31.0	Demonstrate an understanding of distribution systems used in the irrigation industry – the student will be able to:
31.01	Diagnose low and high pressure conditions that result from damaged piping, faulty installation, and clogged piping.
31.02	Repair zone lines using solvent weld fittings.
31.03	Repair main lines using mechanical joint (MJ) couplings.
32.0	Demonstrate an understanding of control systems used in irrigation installation and repair – the student will be able to:
32.01	Develop watering schedules and setting control timers.
32.02	Diagnose control system using test meters and wire tracking equipment.
32.03	Isolate problems into one of three areas for repair: control timer, field wiring, and control valve.
32.04	Repair or replacing an automatic control timer.
32.05	Repair/splicing field wiring.
32.06	Repair/replacing faulty parts on the irrigation control valve.
33.0	Demonstrate an understanding of water supply – the student will be able to:
33.01	Diagnose problems of water supply interruption.
33.02	Diagnose problems with water quality.
33.03	Repair or adjusting pump control systems.
33.04	Repair adjusting backflow prevention devices.
33.05	Clean filter media or screens.
34.0	Demonstrate an understanding of sprinkler performance – the student will be able to:
34.01	Diagnose sprinkler distribution problems.
34.02	Measure and analyze precipitation rates.
34.03	Remove, clean, and reinstall heads.

34.04	Repair and adjust heads.
34.05	Adjust sprinkler head spacing if required.
35.0	Demonstrate an understanding of site analysis in residential and commercial irrigation systems – the student will be able to:
35.01	Complete an accurate site drawing.
35.02	Determine the watering requirements in view of the site plan.
35.03	Identify unique site conditions that might affect installation.
35.04	Identify the appropriate water source.
36.0	Demonstrate an understanding of and practice in design principles used in residential and commercial irrigation systems – the student will be able to:
36.01	Lay out heads on a print utilizing graphic symbol.
36.02	Select/sizing control valve.
36.03	Select/sizing zone lines.
36.04	Select/sizing main line.
37.0	Demonstrate an understanding of job preparation necessary in residential and commercial irrigation systems – the student will be able to:
37.01	List the different types of underground utilities and how to locate them.
37.02	Prepare a list of materials necessary to install the class designed irrigation system.
37.03	Identify the tools and equipment needed to install the class designed irrigation system.
38.0	Demonstrate an understanding of installation techniques used in residential and commercial irrigation systems – the student will be able to:
38.01	Use a walk behind trencher to excavate trenches.
38.02	Hand digs a trench.
38.03	Backfill and compact a trench.
38.04	Measure, cut, clean, prime, and glue solvent weld PVC pipe.
38.05	Cut and install o-ring pipe and fittings.
38.06	Install spray heads and/or rotor heads.

38.07	Install control valves.
38.08	Install nozzles, adjusting flow rates, and setting pattern.
38.09	Identify and Install low voltage direct burial wire.
38.10	Produce an “as-built” drawing.
39.0	Demonstrate an understanding of how to obtain site information necessary in the residential irrigation system design process – the student will be able to:
39.01	Develop an accurate plot plan or site drawing.
39.02	Determine the type of landscaping and water requirement for a specific site.
39.03	Identify environmental traits such as soil type and weather for a specific site.
39.04	Identify unique site conditions that might affect design or installation.
39.05	Identify possible water sources and select appropriate source.
40.0	Demonstrate an understanding of selection and safe use of equipment for residential irrigation system installation – the student will be able to:
40.01	Select appropriate sprinkler heads for each area.
40.02	Lay out heads on print utilizing graphic symbols in an irrigation design.
40.03	Group irrigation heads to form irrigation zones.
41.0	Demonstrate an understanding of how to select pipe sizes and valves appropriate for specific residential irrigation system installations – the student will be able to:
41.01	Determine the water volume and pressure available from the water supply.
41.02	Select and sizing a control valve for each zone.
41.03	Select and sizing pipe main line.
41.04	Select and sizing pipe for zone lines.
42.0	Demonstrate an understanding of microcomputer applications used to design residential irrigation systems – the student will be able to:
42.01	Enter the elements of a site plan into the computer.
42.02	Use a scanner to enter a site plan into a microcomputer application.
42.03	Lay out heads using a microcomputer application.

42.04	Use a microcomputer application to group heads together to form irrigation zones.
42.05	Use a microcomputer application to select pipe size.
43.0	Demonstrate an understanding of the role of “the green industry” – the student will be able to:
43.01	Describe the importance of the “green industry” to local, state, and national economies.
43.02	Explain the importance and impact of local, state and federal regulations.
43.03	Describe the relationship of the “green industry” to the environment.
44.0	Demonstrate an understanding of the principles of plant growth – the student will be able to:
44.01	Describe the functions of plant parts including roots, stems, leaves, flowers and fruits.
44.02	Describe the processes of plant growth including photosynthesis, respiration, nutrient uptake and respiration.
44.03	Describe the growth characteristics, and use of subtropical and tropical landscape plants.
44.04	Identify various landscape designs, natural systems and the plants associated with them.
44.05	Describe the process of effective establishment of plants in the landscape.
44.06	Describe the influences of the environment on the landscape including pollutants.
45.0	The student will demonstrate an understanding of the role of plant nutrients and fertilizers – the student will be able to:
45.01	Identify the nutrients required for plant growth and the role of each.
45.02	Identify the types and kinds of fertilizers.
45.03	Read and interpreting fertilizer labels.
45.04	Describe the application of various fertilizer formulations.
45.05	Identify symptoms of nutritional deficiencies and toxicities of plants.
46.0	The student will demonstrate an understanding of pest management practices – the student will be able to:
46.01	Describe the principles and benefits of integrated pest management.
46.02	Explain the nature of physical and chemical damage to plants.
46.03	Describe the selection process involved in the use of horticultural chemicals for arthropod pest control and subsequent implications of their usage.

46.04	Explain the role of efficient irrigation in pest control.
46.05	Explain the role of plant health in pest control.
47.0	Demonstrate an understanding of the role of irrigation – the student will be able to:
47.01	List the components of Florida’s fresh water systems.
47.02	Explain evaporation transpiration rate.
47.03	Explain hydro zoning/precipitation rate.
47.04	Identify the water needs of plants.
47.05	Explain the role of mulches in the landscape.
47.06	Describe soil moisture retention and movement for various soil types.
48.0	Demonstrate an understanding of the role of soil science – the student will be able to:
48.01	Identify soil types and textures.
48.02	Explain the role of soil pH and soluble salts on plant growth.
48.03	Explain the physical properties of fill soil.
48.04	Explain the role of soil type as it affects water retention.
48.05	Interpret soil test information.
48.06	Read and understanding soil survey maps.
49.0	Demonstrate an understanding of plants used in urban and suburban landscapes – the student will be able to:
49.01	Describe the process of binomial nomenclature.
49.02	Describe the use of bedding plants and other herbaceous perennials.
49.03	Describe the use of ground covers, shrubs, trees, and vines including angiosperms and gymnosperms.
49.04	Describe the use of palms, grasses, and other monocots.
50.0	Demonstrate an understanding of the basic safety issues involved in the “green industry” – the student will be able to:
50.01	List the most common causes of accidents in the “green industry.”

50.02	Discuss the importance of following proper safety precautions.
50.03	Describe the symptoms of pesticide poisoning.
50.04	Extract pertinent information from material safety data sheets.
51.0	Demonstrate an understanding of the water cycle – the student will be able to:
51.01	Describe the role of precipitation.
51.02	Explain the effects of evaporation and transpiration.
51.03	Describe the effects of runoff on water supply and quality.
51.04	Explain the process of ground water infiltration.
51.05	Describe how different ecosystems affect the water supply.
52.0	Demonstrate an understanding of the uses of water resources – the student will be able to:
52.01	List the uses and quantity of water used on a global scale.
52.02	List the uses and quantity of water used in the United States.
52.03	List the uses and quantity of water used in Florida.
53.0	Demonstrate an understanding of water resource policies in Florida – the student will be able to:
53.01	Explain the role that planning agencies have on water supply and quality.
53.02	Explain the effect the current legislation has on water supply and quality.
53.03	List the pending legislation that may affect the water supply and quality.
54.0	Demonstrate an understanding of surface water supplies – the student will be able to:
54.01	Explain the role of rivers, lakes and reservoirs.
54.02	Explain the importance of flood damage reduction planning.
54.03	Explain the issues involved in ensuring that surface water supplies are properly managed.
55.0	Demonstrate an understanding of groundwater supplies – the student will be able to:
55.01	Describe groundwater's role as a water source.

55.02	Describe the effect of pollutants on groundwater.
55.03	Describe the role of the aquifer and the regional aquifer characteristics.
55.04	Describe the effect that water pumped from the ground has on the water table.
56.0	Demonstrate an understanding of drip system components – the student will be able to:
56.01	Identify the various types of water emitters.
56.02	Identify and explain the use of drip lateral materials.
56.03	Identify and explain the use of pressure regulators.
56.04	Identify and explain the use of valves including flush valves, control valves and air vents.
57.0	Demonstrate an understanding of the characteristics of water emission devices – the student will be able to:
57.01	Identify and explain the operation of orifice emitters.
57.02	Identify and explain the operation of laminar flow emitters.
57.03	Identify and explain the operation of turbulent flow emitters.
57.04	Identify and explain the operation of vortex emitters.
57.05	Identify and explain the operation of pressure compensating emitters.
57.06	Explain emission uniformity and quality.
58.0	Demonstrate an understanding of basic design principles for low volume irrigation systems – the student will be able to:
58.01	Analyze the irrigation site and gathering appropriate site data.
58.02	Identify point or line source area.
58.03	Determine the appropriate irrigation method for each area.
58.04	Determine the number of water emitters required per plant per area.
58.05	Adapt irrigation requirements to available water supply.
59.0	Demonstrate an understanding of procedures involved in installation of low volume irrigation systems – the student will be able to:
59.01	Connect the main water line to a point of connection.



59.02	Run lateral lines.
59.03	Run distribution tubing.
59.04	Install emitters.
59.05	Develop an irrigation schedule.
60.0	Demonstrate an understanding of irrigation system computer software currently used in industry – the student will be able to:
60.01	Participate in seminars presented by industry professionals.
60.02	Identify the basic concepts of computerized control systems.
61.0	Demonstrate an understanding of materials selection and costing needed for sales presentations – the student will be able to:
61.01	Research materials costs for an irrigation project.
61.02	Visit wholesale supply houses.
62.0	Develop an understanding of the breadth of the irrigation industry – the student will be able to:
62.01	Describe an irrigation company.
62.02	Describe an irrigation supply wholesale business.
62.03	Describe the use of irrigation in a greenhouse.
62.04	Describe the use of irrigation in a golf course.
62.05	Describe the use of irrigation in a park.
62.06	Describe the use of irrigation in a commercial irrigation installation.
62.07	Describe the use of irrigation in a residential irrigation installation.
63.0	Demonstrate an understanding of irrigation water requirements – the student will be able to:
63.01	Explain common system components and their effective water use.
63.02	Explain basic concepts such as application rates, sprinkler spacing, and distribution uniformity.
63.03	Explain matched precipitation rates.
63.04	List the different types of soils and their infiltration rates.

64.0	Demonstrate an understanding of economic analysis as applied to irrigation investment decisions – the student will be able to:
64.01	Describe the procedure for determining equipment and installation cost.
64.02	Explain the process of computing ownership costs.
64.03	Explain the process of determining total system cost.
65.0	Demonstrate an understanding of methods of develop overall operating and maintenance procedures – the student will be able to:
65.01	Develop an efficient site watering schedule.
65.02	Obtain product maintenance information.
65.03	Explain how to develop an “as-built” drawing.
66.0	Demonstrate an understanding of analysis of irrigation systems – the student will be able to:
66.01	List the different levels of evaluation.
66.02	Describe and performing a visual inspection of an irrigation system.
66.03	Describe and performing a flow inspection.
66.04	Describe and performing a catch can test.
67.0	Demonstrate an understanding of how to obtain site information necessary in the commercial irrigation system design process – the student will be able to:
67.01	Develop an accurate site drawing.
67.02	Determine the type of landscaping and water requirement for a specific site.
67.03	Identify environmental traits such as soil type and weather for a specific site.
67.04	Identify unique site conditions that might affect design or installation.
67.05	Identify possible water sources and select appropriate source.
68.0	Demonstrate an understanding of selection and safe use of equipment for a commercial irrigation system installation – the student will be able to:
68.01	Select appropriate sprinkler heads for each area.
68.02	Lay out heads on print utilizing graphic symbols in an irrigation design.
68.03	Group irrigation heads to form irrigation zones.

69.0	Demonstrate an understanding of how to select pipe sizes and valves appropriate for specific commercial irrigation system installations – the student will be able to:
69.01	Determine the water volume and pressure available from the water supply.
69.02	Select and sizing a control valve for each zone.
69.03	Select and sizing pipe main line.
69.04	Select and sizing pipe for zone lines.
70.0	Demonstrate an understanding of writing irrigation specifications – the student will be able to:
70.01	Review manufacturing and engineering data sheets and downloading from websites detailed drawings in preparation for an irrigation project.
70.02	Conform to the Florida Irrigation Society Guidelines for landscape irrigation systems.
70.03	Write specifications for a commercial irrigation project.
71.0	Demonstrate an understanding of advanced hydraulic and head layout concepts – the student will be able to:
71.01	Describe the factors that determine system flow requirements.
71.02	Explain the concepts of uniformity and efficiency.
71.03	Explain the concepts of uniformity indicators.
71.04	Demonstrate the ability to read sprinkler profiles.
71.05	Demonstrate the ability to read sprinkler dens grams.
<b>Horticulture Technician</b>	
72.0	Demonstrate an understanding of plant physiology and growth – the student will be able to:
72.01	Describe the process of photosynthesis.
72.02	Identify and describe the functions of all parts of the plant.
72.03	Describe an asexual reproduction process.
72.04	Explain the differences between angiosperms and gymnosperms.
72.05	Identify the differences between woody and herbaceous plants.
73.0	Classify plants – the student will be able to:

73.01	Identify and group shade and flowering trees.
73.02	Identify and group fruit trees and plants.
73.03	Identify and group annuals, vegetables, and herbs.
73.04	Identify and group woody ornamentals, vines, and ground covers.
73.05	Identify and group tropical foliage plants.
73.06	Identify and group turf and ornamental grasses.
74.0	Select, operate, and maintain tools and equipment – the student will be able to:
74.01	Select and operate equipment for the job.
74.02	Maintain an inventory of parts and supplies.
75.0	Fertilize plants – the student will be able to:
75.01	Evaluate influences of nutrients on plant growth.
75.02	Apply fertilizers, using appropriate methods (dry, liquid, slow-release, injection, etc.).
75.03	Demonstrate proper handling and storage of fertilizers, observing safety precautions.
76.0	Manage a pest-control program – the student will be able to:
76.01	Develop an integrated pest management program or schedule.
76.02	Train employees in the safe use of pesticides.
76.03	Obtain a pesticide license.
77.0	Prune and shape plants – the student will be able to:
77.01	Train employees in pruning techniques.
77.02	Identify and use tools for pruning.
77.03	Prune plants to achieve desired growth.
77.04	Demonstrate sanitation and safety practices when pruning.
77.05	Develop a pruning program and time schedule.

77.06	Select and use chemical growth regulators.
77.07	Root and prune ornamental plants and trees.
78.0	Maintain landscape plants – the student will be able to:
78.01	Determine water requirements and apply at proper rates.
78.02	Identify weeds and apply herbicides safely.
78.03	Determine fertilization requirements and apply at proper rates.
78.04	Regulate growth of landscape plants through chemical or mechanical needs.
78.05	Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).
78.06	Identify plant pest problems and apply corrective measures.
78.07	Cultivate and mulch plants.
78.08	Brace and repair trees.
79.0	Demonstrate employability skills – the student will be able to:
79.01	Conduct a job search.
79.02	Secure information about a job.
79.03	Identify documents that may be required when applying for a job.
79.04	Complete a job application form.
79.05	Demonstrate competency in job interview techniques.
79.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
79.07	Identify acceptable work habits.
79.08	Demonstrate knowledge of how to make job changes.
79.09	Demonstrate acceptable employee health habits.
80.0	Determine drainage system needs and design a drainage system – the student will be able to:
80.01	Determine the texture and percolation characteristics of the soil.

81.0	Maintain and analyze records – the student will be able to:
81.01	Maintain fertilizer and pesticide application records.
81.02	Use computers in the landscape and horticulture operations.
82.0	Prepare growing media and seedbeds – the student will be able to:
82.01	Identify media materials.
82.02	Mix rooting and growing media according to plant requirements.
82.03	Sterilize rooting, potting, and growing media.
82.04	Collect and test a soil sample from field and potting media.
82.05	Adjust pH and nutritional levels of media.
82.06	Prepare planting beds and sites.
82.07	Fill and level benches and pots with media.
82.08	Demonstrate sanitation practices when handling and storing plant media materials.
83.0	Propagate plants – the student will be able to:
83.01	Collect propagation materials at proper time (seeds, cuttings, scions, bulbs, etc.).
83.02	Demonstrate propagation by grafting, budding, layering, separating, dividing, cutting, and tissue culturing.
83.03	Prepare flats and a seedbed and plant seeds.
83.04	Prepare a rooting bed.
83.05	Prepare propagation materials (seeds, cuttings, scions, etc.)
83.06	Apply growth stimulants to propagation materials.
83.07	Transplant rooted propagation materials including tissue culture transplants.
83.08	Demonstrate sanitation and safety practices when propagating.
84.0	Grow plants – the student will be able to:
84.01	Prepare media for containers.

84.02	Prepare field site for transplants.
84.03	Select plant containers.
84.04	Determine plant spacing in the field and on container beds.
84.05	Transplant propagated materials to various containers and to the field.
84.06	Determine and provide light requirements of various plant types.
85.0	Harvest, process, and ship plants – the student will be able to:
85.01	Grade and harvest field-grown plants (ball, burlap, bare-root, “grow-bags”).
85.02	Select, grade, and assemble container-grown plants.
85.03	Prepare for shipment, loading, and transporting harvested plant materials.
86.0	Market plants – the student will be able to:
86.01	Identify, inventory, and label marketable plants.
87.0	Design, install, and maintain nursery irrigation systems – the student will be able to:
87.01	Determine irrigation requirements.
87.02	Assess quality of irrigation water.
87.03	Operate and service various types of irrigation systems.
<b>Golf Course Technician</b>	
88.0	Supervise and manage the operation, maintenance and repair of golf course equipment – the student will be able to:
88.01	Define the role of the golf course equipment mechanic in relation to the organization.
88.02	Determine the essential power, shop and hand tools required in a golf course mechanics shop.
88.03	Design a shop layout.
88.04	Compile a list of equipment required in the operation of an 18-hole golf course.
88.05	Demonstrate knowledge and use of golf course equipment.
88.06	Develop and supervise a system of preventive maintenance.

88.07	Sharpen and grind blades and cutting surfaces on all mowing equipment.
88.08	Monitor and record the use of fuel, lubricants and consumable shop supplies.
88.09	Maintain a safe clean shop.
88.10	Maintain current catalogs for supplies and equipment.
88.11	Maintain tires and tire pressure on golf course equipment.
88.12	Train and supervise employees in the safe use of tools and equipment.
89.0	Schedule irrigation and manage the design, installation and maintenance of golf course irrigation systems – the student will be able to:
89.01	Determine water requirements for a particular turf.
89.02	Illustrate the design, computations, pumping capacity and pipe sizing needed to irrigate a given operation.
89.03	Schedule irrigation as required.
89.04	Store and handle chemicals safely.
89.05	Recognize symptoms of agricultural chemical poisoning and apply first aid.
89.06	Dispose of chemical containers.
89.07	Read and interpret safety precautions provided on equipment and pesticide containers.
90.0	Prescribe, supervise and manage the application of agricultural chemicals for the prevention and control of pests – the student will be able to:
90.01	Instruct employees in the safe use of agricultural chemicals.
90.02	Prepare proper proportions of chemicals and carrying agents.
90.03	Compute amounts of active ingredients of chemicals to be used.
90.04	Calibrate volume, pressure and output of equipment.
90.05	Weigh and measure chemicals.
90.06	Adjust height and width of equipment to achieve desired spray pattern.
90.07	Recognize symptoms of pesticide damage.
90.08	Identify fungi and bacteria.



90.09	Recognize symptoms of insects and nematodes.
90.10	Identify common insects, weeds, diseases and other pests common to golf courses.
90.11	Clean and store sprayers.
91.0	Prescribe, supervise and manage the fertilization of the turf and landscape – the student will be able to:
91.01	Take soil and leaf samples for chemical analysis.
91.02	Adjust pH level of soil.
91.03	Interpret soil and tissue chemical analysis results.
91.04	Apply fertilizer in liquid form.
91.05	Interpret labels on fertilizer containers.
91.06	Apply dry fertilizers.
91.07	Identify nutrient deficiency symptoms in turf and landscape plants.
91.08	Determine kind and type of fertilizer to apply to a given area.
91.09	Determine the nutrient requirements of various plants.
91.10	Determine amount of fertilizer to apply to a given area.
91.11	Analyze cost of various formulations and methods of application.
91.12	Recognize fertilizer injury to plant materials.
92.0	Train and supervise employees in grooming and maintaining greens, tees, fairways, roughs and other areas – the student will be able to:
92.01	Supervise the mowing of greens, collars, roughs, aprons, and fairways.
92.02	Determine the placement and location of cups and tees.
92.03	Supervise the repair of divots.
92.04	Determine conditions necessary for verticutting and aerifying turf.
92.05	Supervise the care and maintenance of sand traps.
92.06	Prune trees and shrubs.

92.07	Develop maintenance schedule for grooming golf courses.
92.08	Train and supervise employees in the care of golf courses.
92.09	Follow written and verbal instructions.
93.0	Provide a safe environment for workers and patrons – the student will be able to:
93.01	Provide instruction for the safe use of chemicals, tools and equipment.
93.02	Inspect tools and equipment for safe operation.
93.03	Apply emergency first aid.
93.04	Monitor employees work habits.
93.05	Maintain safety awareness.
94.0	Keep and analyze maintenance, employee, equipment and inventory records – the student will be able to:
94.01	Maintain equipment use and maintenance records.
94.02	Maintain pesticide use information.
94.03	Keep inventory records.
94.04	Prepare a written report or summary based on records.
94.05	Observe and make recommendations based on records.
94.06	Evaluate employees, equipment and practices based on records.
95.0	Observe local, state and federal laws and regulations – the student will be able to:
95.01	Observe OSHA rules and regulations.
95.02	Observe EPA rules and regulations.
95.03	Maintain a list of agencies responsible for regulating the industry.
96.0	Demonstrate leadership, communication, public relations, employability and human relations skills – the student will be able to:
96.01	Conduct a job search.
96.02	Secure information about a job.

96.03	Identify documents that may be required when applying for a job.
96.04	Complete a job application form correctly.
96.05	Demonstrate competence in job interview techniques.
96.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
96.07	Demonstrate acceptable employee health habits.
97.0	Demonstrate an understanding of the types of pipe installation common to irrigation systems – the student will be able to:
97.01	List the different types and schedules of available Polyvinyl Chloride (PVC) pipes.
97.02	Describe the different types of available fittings including solvent weld, o-rings, and mechanical joint (MJ) joints.
97.03	Describe the basic chemical reactions that occur in the manufacture of PVC pipe.
97.04	Explain the process of connecting PVC pipe by using solvent weld chemicals.
97.05	Explain the process of connecting o-ring pipe by using push-on fittings.
98.0	Demonstrate an understanding of irrigation system components – the student will be able to:
98.01	Identify various irrigation system types such as rotors, sprays, and drip.
98.02	Explain the process of time clock selection.
98.03	Explain the process of valve selection.
98.04	Explain the process of sprinkler head selection.
98.05	Explain the process of low-voltage wire selection.
99.0	Demonstrate an understanding of basic design principles used in irrigation systems – the student will be able to:
99.01	Calculate the static or working water pressure at a given point in the system.
99.02	Determine the velocity for certain type and size pipe at a given flow.
99.03	Select appropriate sprinkler heads for specific applications.
99.04	Group irrigation heads to form irrigation zones complying with proper design criteria.
99.05	Calculate specific friction loss through piping.

99.06	Compute the precipitation rate for various sprinkler types and spacing patterns.
100.0	Demonstrate an understanding of basic irrigation system maintenance and operation – the student will be able to:
100.01	Determine the watering time needed per week per station.
100.02	Develop a water schedule based on proper design principles.
100.03	Read and explain an as-built drawing.
100.04	Explain the process of remove and install sprinkler heads.
100.05	Describe introductory the process of automatic control valve repair.
100.06	Describe the process of automatic controller repair.
100.07	Diagnose and correcting wiring problems.
101.0	Demonstrate an understanding of sprinkler performance – the student will be able to:
101.01	Diagnose sprinkler distribution problems.
101.02	Measure and analyze precipitation rates.
101.03	Remove, clean, and reinstall heads.
101.04	Repair and adjust heads.
101.05	Adjust sprinkler head spacing if require
102.0	Demonstrate an understanding of the principles of plant growth – the student will be able to:
102.01	Describe the functions of plant parts including roots, stems, leaves, flowers and fruits.
102.02	Describe the processes of plant growth including photosynthesis, respiration, nutrient uptake and respiration.
102.03	Describe the growth characteristics, and use of subtropical and tropical landscape plants.
102.04	Identify various landscape designs, natural systems and the plants associated with them.
102.05	Describe the process of effective establishment of plants in the landscape.
102.06	Describe the influences of the environment on the landscape including pollutants.
103.0	The student will demonstrate an understanding of the role of plant nutrients and fertilizers – the student will be able to:

103.01	Identify the nutrients required for plant growth and the role of each.
103.02	Identify the types and kinds of fertilizers.
103.03	Read and interpreting fertilizer labels.
103.04	Describe the application of various fertilizer formulations.
103.05	Identify symptoms of nutritional deficiencies and toxicities of plants.
104.0	The student will demonstrate an understanding of pest management practices – the student will be able to:
104.01	Describe the principles and benefits of integrated pest management.
104.02	Explain the nature of physical and chemical damage to plants.
104.03	Describe the selection process involved in the use of horticultural chemicals for arthropod pest control and subsequent implications of their usage.
104.04	Explain the role of efficient irrigation in pest control.
104.05	Explain the role of plant health in pest control.
105.0	Demonstrate an understanding of the role of irrigation – the student will be able to:
105.01	List the components of Florida’s fresh water systems.
105.02	Explain evaporation transpiration rate.
105.03	Explain hydro zoning/precipitation rate.
105.04	Identify the water needs of plants.
105.05	Explain the role of mulches in the landscape.
105.06	Describe soil moisture retention and movement for various soil types.
106.0	Demonstrate an understanding of the basic safety issues involved in the “green industry” – the student will be able to:
106.01	List the most common causes of accidents in the “green industry.”
106.02	Discuss the importance of following proper safety precautions.
106.03	Describe the symptoms of pesticide poisoning.
106.04	Extract pertinent information from material safety data sheets.

107.0	Demonstrate an understanding of drip system components – the student will be able to:
107.01	Identify the various types of water emitters.
107.02	Identify and explain the use of drip lateral materials.
107.03	Identify and explain the use of pressure regulators.
107.04	Identify and explain the use of valves including flush valves, control valves and air vents.
108.0	Demonstrate an understanding of basic design principles for low volume irrigation systems – the student will be able to:
108.01	Analyze the irrigation site and gathering appropriate site data.
108.02	Identify point or line source area.
108.03	Determine the appropriate irrigation method for each area.
108.04	Determine the number of water emitters required per plant per area.
108.05	Adapt irrigation requirements to available water supply.
109.0	Demonstrate an understanding of procedures involved in installation of low volume irrigation systems – the student will be able to:
109.01	Connect the main water line to a point of connection.
109.02	Run lateral lines.
109.03	Run distribution tubing.
109.04	Install emitters.
109.05	Develop an irrigation schedule.
110.0	Demonstrate an understanding of plant physiology and growth – the student will be able to:
110.01	Describe the process of photosynthesis.
110.02	Identify and describe the functions of all parts of the plant.
110.03	Describe an asexual reproduction process.
110.04	Explain the differences between angiosperms and gymnosperms.
110.05	Identify the differences between woody and herbaceous plants.

111.0 Classify plants – the student will be able to:
111.01 Identify and group shade and flowering trees.
111.02 Identify and group fruit trees and plants.
111.03 Identify and group annuals, vegetables, and herbs.
111.04 Identify and group woody ornamentals, vines, and ground covers.
111.05 Identify and group tropical foliage plants.
111.06 Identify and group turf and ornamental grasses.
112.0 Select, operate, and maintain tools and equipment – the student will be able to:
112.01 Select and operate equipment for the job.
112.02 Maintain an inventory of parts and supplies.
113.0 Fertilize plants – the student will be able to:
113.01 Evaluate influences of nutrients on plant growth.
113.02 Apply fertilizers, using appropriate methods (dry, liquid, slow-release, injection, etc.).
113.03 Demonstrate proper handling and storage of fertilizers, observing safety precautions.
114.0 Manage a pest-control program – the student will be able to:
114.01 Develop an integrated pest management program or schedule.
114.02 Train employees in the safe use of pesticides.
114.03 Obtain a pesticide license.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The AS degree in Agribusiness Management is a degree into which various agricultural certificates or ATDs can articulate. Up to 30 credits of an approved college credit certificate can be articulated into the 60 credit AS giving the student a “specialty” in various agricultural areas such as: irrigation, forestry, horticulture or golf course operations.

It is also recommended that students be members of professional organizations associated with the selected agricultural specialty (example: Florida Nursery Growers and Landscape Association, Florida Forestry Association, Florida Irrigation Society, Florida Turfgrass Association)

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.



## **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Horticulture Specialist (0101010102) – 15 hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

## **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Aquaculture Management  
**Career Cluster:** Agriculture, Food and Natural Resources

AS	
CIP Number	1101030301
Program Type	College Credit
Standard Length	63 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	11-9013 - Farmers, Ranchers, and Other Agricultural Managers 45-1011 - First-Line Supervisors of Farming, Fishing, and Forestry Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to apply the economic and business principles involved in the organization, operation and management of aquaculture farms and businesses. Content includes, but is not limited to, instruction in ichthyology, fish breeding, fish nutrition, pond maintenance, diagnosis and treatment of diseases in fish, economic and marketing principles for the production of an aquatic crop, business management of a fish farm, and field experience necessary to operate an aquaculture operation.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 63 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Identify important aquaculture plants and animals and describe their culture in various production units.
- 02.0 Perform general aquaculture production unit operations.
- 03.0 Determine methods of fish identification.
- 04.0 Demonstrate an understanding of water quality and aquaculture.
- 05.0 Maintain optimal nutrition for aquaculture organisms.
- 06.0 Diagnose and control common aquaculture maladies.
- 07.0 Operate and maintain aquaculture equipment.
- 08.0 Assist in the maturation, spawning, larval and juvenile rearing of aquaculture organisms.
- 09.0 Perform general aquaculture nursery systems operations.
- 10.0 Demonstrate an ability to manage aquatic species in multiple production units over time.
- 11.0 Apply business, economic and marketing principles to the production of an aquatic crop.
- 12.0 Demonstrate management skills required to operate an aquaculture farm.
- 13.0 Manage a pond operation.

Florida Department of Education  
Student Performance Standards

Program Title: Aquaculture Management  
CIP Number: 1101030301  
Program Length: 63 credit hours  
SOC Code(s): 11-9013, 45-1011

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0	Identify important aquaculture plants and animals and describe their culture in various production units – the student will be able to:
01.01	Define aquaculture and describe the historical important of aquaculture to local, state, national and international economies.
01.02	List occupations in aquaculture production, processing, distribution, marketing, and service.
01.03	Identify important aquatic species and products produced by aquatic farmers in Florida, U. S., and foreign countries.
01.04	List the types of production units and systems employed by aquaculturist in Florida, U. S. and foreign countries.
01.05	Outline basic techniques for constructing ponds, tanks, raceways, net pens and cages.
01.06	Describe basic production techniques for the culture of plants, mollusks, crustaceans, and finfish.
01.07	List and describe the major factors in growth of aquaculture species.
01.08	List important criteria in selecting a site for an aquaculture farm.
01.09	Describe natural fisheries and aquaculture production trends.
02.0	Perform general aquaculture production unit operations – the student will be able to:
02.01	Identify and describe the general anatomy, biology and life cycles for aquaculture species studied in this program.
02.02	Identify and describe the general morphology of aquatic macro and microalgae.
02.03	List methods to help determine aquatic animal health and behavior for various aquaculture production units.
02.04	List techniques for routine maintenance of aquaculture ponds, cage culture systems, and submerged lands.
02.05	Identify common aquaculture predators and list predator control techniques
02.06	Record production data such as water quality parameters, feed amounts, mortality and other routine information required for a specific operation on data sheets and enter into a computer.

03.0	Determine methods of fish identification – the student will be able to:
03.01	Identify the major families of fish.
03.02	Describe the complexities of fish anatomy for the following systems: <ul style="list-style-type: none"> <li>• Skeletal systems</li> <li>• Musculature</li> <li>• Nervous system</li> <li>• Vascular system</li> <li>• Respiratory system</li> <li>• Urogenital system</li> <li>• Digestive system</li> <li>• Reproductive system</li> </ul>
03.03	Identify the major anatomical fish structures.
03.04	Describe the physiological characteristics of fish for the following: <ul style="list-style-type: none"> <li>• Color</li> <li>• Bioluminescence</li> <li>• Sound production</li> <li>• Sensory systems</li> <li>• Osmoregulation</li> </ul>
03.05	Classify fish.
03.06	Describe the aquatic environment.
03.07	Discuss the basics of fish behavior.
03.08	Identify the muscles of a fish.
03.09	Measure the physical characteristics of fish.
03.10	Use a taxonomic key to identify fish.
03.11	Identify the major taxa of fish.
04.0	Demonstrate an understanding of water quality and aquaculture – the student will be able to:
04.01	Define environmental variables and list ranges important for survival and growth of important aquaculture species.
04.02	Demonstrate an understanding of aquifers, water quantity and management, and agricultural water use in Florida.
04.03	Identify water quality measurements necessary for accurately culturing aquaculture organisms.

04.04	Measure water quality parameters in aquaculture production units, record data in logs and computers, and interpret results.
04.05	Describe the nitrogen cycle and identify system equipment and/or processes which reduce nitrogenous wastes.
04.06	Discuss the importance of oxygen to the maintenance of production units and aquatic animal health and the effect of temperature on oxygen concentration.
04.07	Describe processes in aquaculture production units that effect pH, alkalinity, carbon dioxide, oxygen, ammonia, and other environmental parameters.
04.08	Measure primary productivity and discuss its importance in various aquaculture production units.
04.09	Calculate water volumes for various sizes of aquaculture production units.
04.10	List potential sources of aquaculture pollution and describe methods of preventing or abating these problems.
04.11	Identify Best Management Practices for treating waste water from various aquaculture production units.
05.0	Maintain optimal nutrition for aquaculture organisms – the student will be able to:
05.01	Explain the digestive anatomy of fish.
05.02	Explain fish metabolic rates.
05.03	Identify fish food additives
05.04	Outline the basic concepts of nutrition for plants, mollusks, crustaceans, and fish.
05.05	Discuss the importance of nutrition to growth and survival of various aquaculture species.
05.06	Identify feeding habits and practices of a variety of aquaculture species.
05.07	List common ingredients and additives of aquatic feeds and identify practices in feeds formulation and manufacturing.
05.08	Demonstrate an ability to culture live feeds including microalgae, rotifers and artemia and discuss their importance.
05.09	Calculate feeding rates, growth and feed conversion ratios for various aquaculture species stocked at different densities and rates.
05.10	List different feeding methods, measure feed and maintain feed records in logs and computers.
05.11	Discuss and differentiate feeding practices for hatchery, nursery and grow out of mollusks.
05.12	Discuss nutrition practices for culturing aquatic plants.
05.13	Discuss the principles of bioenergetics to growth.
06.0	Diagnose and control common aquaculture maladies – the student will be able to:

06.01	Identify the common diseases that infect aquaculture organisms.
06.02	Understand the basic mechanisms for control of disease.
06.03	Identify common bacterial diseases and treatment options.
06.04	Identify common mycotic diseases and treatment options.
06.05	Identify common viral diseases and treatment options.
06.06	Identify common parasitic diseases and treatment options.
06.07	Discuss the relationship of nutrition, water quality and stress how they may cause disease in aquaculture organisms.
06.08	Prepare an aquatic organism for diagnostic examination or shipment.
06.09	Observe various diseases of aquatic organisms and demonstrate use of a microscope.
06.10	List approved drugs available for use in aquaculture.
06.11	Describe approved chemicals and their use in treating diseases.
06.12	Identify common aquatic parasites found in Florida waters.
06.13	Identify toxic environmental diseases in fish.
07.0	Operate and maintain aquaculture equipment – the student will be able to:
07.01	List equipment used in various production units necessary to raise plants, mollusks, crustaceans, and fish.
07.02	Set up and maintain standard aquaria.
07.03	Set up field aquaculture ponds.
07.04	Measure field parameters such as temperature, salinity, and hardness.
07.05	Set up a system to culture aquatic plants.
07.06	Demonstrate an ability to correctly use aquaculture equipment including, but not limited to, a thermometer, oxygen meter, refractometer, pH meter, pump, graduated cylinder, beaker, nets, siphon, scales, sieves, calipers, secchi disk, and a microscope.
07.07	Set up aquaculture filtration systems.
07.08	List equipment options of a recirculating system including solids removal, biofiltration, sterilization and aeration, and explain their basic functions.
07.09	Operate and perform system maintenance on a recirculating system.

07.10	Estimate pumping requirements and select an appropriately sized pump for a given system and water volume.
07.11	Layout a PVC plumbing scheme for a given aquaculture system with a sufficient number of valves to allow for bypass and isolation and then measure, cut and assemble that water system.
07.12	Layout and put together an aeration system operated on airlift technology.
07.13	Replace and install a pump.
07.14	Perform simple calculations related to water volume, water flow and system loading.
07.15	Use and operate tools and equipment safely.
07.16	Measure productivity in aquaculture systems.
08.0	Assist in the maturation, spawning, larval and juvenile rearing of aquaculture organisms – the student will be able to:
08.01	Describe the reproductive anatomy, function of reproductive organs, and reproductive cycles of selected aquaculture organisms.
08.02	Differentiate between males and females of the same species.
08.03	Relate environmental factors to successful reproduction of various aquaculture species.
08.04	Explain the use of hormones, anesthetics, chemicals, antibiotics, and other techniques to manage broodstock and accelerate reproductive cycles and contrast the difference between environmental conditioning and induced spawning techniques.
08.05	Maintain and care for broodstock and prepare spawning tanks and/or systems.
08.06	Describe maturation, spawning, hatching, and larval rearing techniques for selected aquaculture species.
08.07	Discuss the importance of nutrition at various stages of the larval rearing cycle for selected aquaculture species.
08.08	Use a microscope to examine the stages and condition of eggs and larvae.
08.09	Prepare, stock, feed and maintain larval rearing tanks.
08.10	Culture live feeds and calculate feeding rates.
08.11	Outline a maturation system design for selected aquatic species.
08.12	List important practices and tasks in hatchery management.
08.13	Estimate production numbers from a given spawn of a given species.
08.14	Record hatching date in logs and computers and interpret results.
09.0	Perform general aquaculture nursery systems operations – the student will be able to:



09.01	Maintain, clean and operate a broodstock tank and list important practices in managing broodstock.
09.02	Start, maintain, count and harvest live feeds.
09.03	Maintain a nursery system by demonstrating an ability to clean tanks and filtration equipment, adjust water flow and volume, set aeration, and monitor water quality and feeding levels.
09.04	Describe and differentiate between land-based and field-based nursery systems, equipment and operations.
09.05	Monitor and record routine data such as feed amounts and times, temperature, oxygen, salinity, and ammonia and enter data into a computer or log book.
09.06	List and describe nursery production systems and larval husbandry techniques for fish, crustaceans, and mollusks.
09.07	Demonstrate practical hands-on experience in handling a variety of juvenile aquaculture organisms and operating nursery production units.
10.0	Demonstrate an ability to manage aquatic species in multiple production units over time – the student will be able to:
10.01	Identify routine management techniques involved in aquaculture.
10.02	Calculate system volume and stocking strategies for given aquaculture production units.
10.03	Develop a written protocol and design data sheets for daily feeding, water quality measuring, system maintenance, and other factors for various aquaculture production units culturing a given species.
10.04	Periodically sample or otherwise determine growth and production unit biomass/density and adjust feeding rates accordingly.
10.05	List methods of harvesting aquatic crops from various aquaculture production units and preparing them for shipment to market.
10.06	Acclimate and transfer aquatic animals from one water source to another.
10.07	Design, layout, build, and plumb a simple aquaculture recirculating or other aquaculture production unit system.
10.08	Calculate production area or volume, stocking rates, densities, feeding rates, conversion and growth of a given species for a given aquaculture production unit system being supervised.
10.09	Demonstrate an understanding of management principles and use of management decision-making tools, including a computer.
10.10	List communication skills and identify work habits necessary for supervising employees.
11.0	Apply business, economic and marketing principles to the production of an aquatic crop – the student will be able to:
11.01	Describe aquaculture production and value of selected species in Florida, domestically, and internationally.
11.02	List and access sources of market information and statistics for selected aquaculture species.
11.03	Identify sources of competition both locally and globally.
11.04	Identify critical risk factors which may limit success of a farm.

11.05	Itemize fixed and variable costs of an aquaculture venture.
11.06	Explain the principles of production economics to include costs, taxes, interest, depreciation, record keeping, cash flow and financial statements.
11.07	Write a hypothetical business plan and a production plan for an aquaculture venture.
11.08	Describe factors and variables in selecting a site for an aquaculture facility, including land, water, proximity of markets, labor and community acceptance.
11.09	Link culture system options to a given site and water resources.
11.10	Predict hypothetical production numbers for a given facility with given variables.
11.11	Outline a simple operating budget for an aquaculture facility including cash flow and financial statement.
11.12	Describe characteristics of a well-planned aquaculture facility.
11.13	Demonstrate use of a computer for record keeping, production and decision-making.
11.14	Evaluate techniques for aquaculture marketing.
12.0	Demonstrate management skills required to operate an aquaculture farm – the student will be able to:
12.01	List rules, state statutes and federal regulations important to aquaculture.
12.02	Explain the regulations that govern aquaculture on the local, state and national levels.
12.03	Describe permitting procedures for various species, sites and aquaculture production units.
12.04	List Best Management Practices necessary to operate and permit selected aquaculture facilities.
12.05	Develop a production plan and budget for a given aquaculture facility, design a record keeping system, establish operating procedures, harvest schedules and determine potential profitability.
12.06	Demonstrate an ability to maintain farm records including property, insurance, personnel, payroll, permits and licenses, equipment and tangible property, aquatic animal inventory, accounts receivable, accounts payable, and others.
12.07	Define HACCP and discuss its importance to both processing and aquaculture.
12.08	List management skills necessary for effective supervision of employees.
13.0	Manage a pond operation – the student will be able to:
13.01	Explain the basic techniques for building aquaculture ponds.
13.02	Explain the aquifer water quality in Florida.
13.03	Perform water chemistry quality measurements and explain their importance.

13.04 Produce aquatic plants in an aquaculture environment.
13.05 Identify filtration systems for aquaculture.
13.06 Manage water quality.
13.07 Explain water treatments.
13.08 Perform plankton analysis.
13.09 Describe the value of aeration systems.
13.10 Set up a closed system.
13.11 Set up cage systems.
13.12 Measure primary productivity.
13.13 Explain the importance of pond fertilization.
13.14 Explain the feeding techniques for large pond operations.
13.15 Measure density of organisms per acre.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. Whenever the cooperative method of instruction is offered, the following is required for each student: a training plan signed by the student, teacher, and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; and a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

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### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Aquaculture Technology (0101030302) – 26 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

**Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Equine Studies (60)  
**Career Cluster:** Agriculture, Food and Natural Resources

AS	
CIP Number	1101050701
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	45-1011 - First-Line Supervisors of Farming, Fishing, and Forestry Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to prepare students for employment in equine industry occupations under one of two different specializations. **Equine Farm Management** includes careers such as entry level equine farm supervisory and management positions, assistant farm manager, broodmare/foal manager, yearling manager in a variety of equine enterprises, or First-Line Supervisors/Managers of Animal Husbandry and Animal Care Workers (45-1011.08). Additional positions include entry level managerial positions in equine retail sales, managerial positions in service based sectors of the equine industry or entrepreneurial opportunities in the equine industry. **Equine Exercise Physiology** trains students in the emerging field of equine athletic management, providing students with expertise in conditioning techniques, management of the equine athlete and rehabilitation techniques. Graduates will be employed as assistant trainers, rehabilitation technicians, grooms for high performance horses or independent contractors in horse care.

The content for both specializations includes instruction to individuals in the areas of planning, organizing, directing and controlling of an equine operation with dual emphasis on:

- The science and care of equine species and the knowledge and understanding necessary for managing equine operations and husbandry and disease.
- Business skills such as financial management, marketing, employee relations, computer applications and business plan development.

The Equine Studies Associate in Science degree program should include the requirements specified in the statewide Articulation Manual.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

### **Program Structure**

This program is a planned sequence of instruction consisting of 60-64 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

### **A. Equine Science Core Learning Outcomes:**

- 01.0 Identify veterinary terminology and illustrate equine health practices.
- 02.0 Analyze equine nutrient requirements and evaluate equine diets.
- 03.0 Identify, analyze and apply basic concepts related to normal and abnormal equine behaviors.
- 04.0 Perform safe horse handling techniques.
- 05.0 Evaluate equine management systems for appropriate animal welfare, including housing, care and regulations.
- 06.0 Demonstrate employability skills including interpersonal skills, ethics, communication and responsibility through work based learning activities and a portfolio.

### **B. Business Management Specialization Learning Outcomes:**

- 07.0 Identify equine industry sectors and business opportunities in a business plan.
- 08.0 Demonstrate techniques in evaluation, selection and breeding of horses.
- 09.0 Demonstrate ability to plan, schedule and maintain records and contracts, using appropriate technical information systems.
- 10.0 Perform equine marketing and sales management functions.
- 11.0 Demonstrate leadership and effective communication in employee management.

### **C. Exercise Physiology Learning Outcomes:**

- 12.0 Design and manage physiological conditioning programs for the equine athlete.
- 13.0 Apply manual therapies for maintenance and therapeutic applications.
- 14.0 Identify and apply rehabilitation techniques using state-of-the-art equipment.
- 15.0 Evaluate hoof care, tack and equipment for different equine athletic endeavors.



Florida Department of Education  
Student Performance Standards

Program Title: Equine Studies  
CIP Number: 1101050701  
Program Length: 60 credit hours  
SOC Code(s): 45-1011

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

<b>Equine Science Core Learning Outcomes:</b>	
01.0	Identify veterinary terminology and illustrate equine health practices – the student will be able to:
01.01	Understand equine diseases and establish appropriate wellness programs for equine populations.
01.02	Comprehend equine anatomy and form to function concepts.
01.03	Anticipate typical problems of performance and reproductive horses to prevent injury or poor health; effectively follow veterinarian orders to restore health and productivity.
01.04	Identify and describe equine anatomy, with special emphasis on physiology and function.
01.05	Provide first aid for horses.
01.06	Identify equine medications and demonstrate ability to administer as per veterinarian instructions.
02.0	Analyze equine nutrient requirements and evaluate equine diets – the student will be able to:
02.01	Evaluate equine diets according to nutrient requirements for different classes of horses (working, growing, lactating).
02.02	Determine economic impact of feedstuff purchasing decisions.
02.03	Maintain safe feeding management programs for enhanced equine health.
02.04	Prepare a typical diet for horses of different classes.
02.05	Understand feed manufacturing techniques and feed analysis systems.
03.0	Identify, analyze and apply basic concepts related to normal and abnormal equine behaviors – the student will be able to:
03.01	Understand and recognize natural horse behaviors.
03.02	Identify and resolve abnormal equine behaviors.

03.03	Utilize horse learning behaviors to improve management and safe handling of horses.
04.0	Perform safe horse handling techniques – the student will be able to:
04.01	Safely catch, lead, tie, groom, restrain and work around horses of various levels of training.
04.02	Safely administer health and medical practices, such as leg wraps, vital signs, injections and restraint for such treatments.
04.03	Evaluate safe transportation techniques and equipment for transportation.
04.04	Evaluate training equipment and demonstrate application of training equipment.
05.0	Evaluate equine management systems for appropriate animal welfare, including housing, care and regulations – the student will be able to:
05.01	Describe housing designs for different equine management systems.
05.02	Identify appropriate levels of care and welfare for equines.
05.03	Develop a health care program for an equine farm including vaccination protocols, deworming schedules/programs, biosecurity and first aid.
06.0	Demonstrate employability skills including interpersonal skills, ethics, communication and responsibility through work based learning activities and a portfolio – the student will be able to:
06.01	Demonstrate punctuality, initiative, courtesy, dependability, flexibility and honesty.
06.02	Demonstrate ability to work as part of a team.
06.03	Conduct a job search, write a resume and practice interview techniques.
06.04	Understand legal requirements for employees including hiring, firing, and documentation.
06.05	Develop managerial skills such as mentoring, management by objectives, balanced feedback, critical appraisal and promotion.
<b>Business Management Specialization Learning Outcomes:</b>	
07.0	Identify equine industry sectors and business opportunities in a business plan – the student will be able to:
07.01	Identify breeds of horses and describe typical uses.
07.02	Understand evolution and the role horses have played in history and cultural development.
07.03	Develop awareness of critical issues to the horse industry such as legislative, regulatory, ethical and environmental responsiveness.
07.04	Identify business opportunities in various equine sectors by evaluating market opportunity and profit potential.
07.05	Develop a business plan for a typical equine business specifically aimed at a financial institution for funding.

08.0	Demonstrate techniques in evaluation, selection and breeding of horses – the student will be able to:
08.01	Evaluate equine conformation according to use and purpose.
08.02	Understand basic genetics and selection techniques for effective animal breeding.
08.03	Show ability to manage reproductive health and efficiency.
08.04	Develop appropriate management techniques for equine breeding farm, including stallion management, estrus detection, breeding, foaling and foal management.
09.0	Demonstrate ability to plan, schedule and maintain records and contracts, using appropriate technical information systems – the student will be able to:
09.01	Maintain and analyze equine records and basic business records (health, breeding, inventory, equipment, purchases, and depreciation).
09.02	Understand contract language and different types of contracts.
09.03	Maintain machinery, equipment and facility inventory records.
09.04	Understand legal requirements, rules and regulations concerning horses and agribusiness.
09.05	Manage farm inventory (horses, feed, equipment) for optimum efficiency and profitability.
10.0	Perform equine marketing and sales management functions – the student will be able to:
10.01	Perform market analysis and collect market information.
10.02	Develop a marketing plan, including advertising, communications, promotional goals and budget.
10.03	Actively participate in marketing activities, such as public speaking, demonstrations, clinics, shows, group activities and community service.
11.0	Demonstrate leadership and effective communication in employee management – the student will be able to:
11.01	Demonstrate punctuality, initiative, courtesy, dependability, flexibility and honesty.
11.02	Select and hire farm managers who will work with various levels of farm workers, work well in a team environment and care about equine.
11.03	Develop effective oral and written communication skills.
<b>Exercise Physiology Learning Outcomes:</b>	
12.0	Design and manage physiological conditioning programs for the equine athlete – the student will be able to:
12.01	Understand and apply different training/conditioning techniques for various equine athletics.
12.02	Understand equine biomechanics and how they influence equine performance.

12.03	Develop optimum conditioning programs to minimize risk of injury to the horse.
13.0	Apply manual therapies for maintenance and therapeutic applications – the student will be able to:
13.01	Understand different manual therapies that can be applied by non-veterinarians for the health and well-being of the horse.
13.02	Develop expertise in the application of different manual therapies for the horse.
14.0	Identify and apply rehabilitation techniques using state-of-the-art equipment – the student will be able to:
14.01	Understand concepts of rehabilitation for horses, including different therapeutic modalities and equipment.
14.02	Work in a rehabilitation center to gain familiarity with different equipment and rehabilitation strategies.
15.0	Evaluate hoof care, tack and equipment for different equine athletic endeavors – the student will be able to:
15.01	Understand different farrier techniques for various equine athletic endeavors.
15.02	Understand action of bits and hackamores in the control and training of horses.
15.03	Evaluate saddle fit.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The cooperative method of instruction is appropriate for this program. Whenever the cooperative method is offered, the following is required for each student: a training plan, signed by the student, teacher, and employer, which includes instructional objectives and a list of on-the-job and in-school learning experiences and a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student may receive compensation for work performed.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Equine Assistant Management (0101050701) – 24 credit hours

Equine Technician (0101050703) – 15 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

**Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Landscape and Horticulture Technology  
**Career Cluster:** Agriculture, Food and Natural Resources

AS	
CIP Number	1101060502
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	37-1012 - First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction pertaining to an understanding of plant physiology and growth, plant nutrition and fertilization, plant classification and identification, propagation, pest control, pruning and shaping plants, maintenance of landscape plants, drainage and irrigation systems, equipment management, marketing, cultural and environmental management, business management, design, and employability and human relations skills. This program also prepares for certification and licensure as a horticulture professional, landscape technician, or landscape contractor and designer.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 64 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate an understanding of plant physiology and growth.
- 02.0 Classify plants.
- 03.0 Determine drainage system needs and design a drainage system.
- 04.0 Select, operate, and maintain tools and equipment.
- 05.0 Fertilize plants.
- 06.0 Manage a pest-control program.
- 07.0 Prune and shape plants.
- 08.0 Plan and install a drainage system.
- 09.0 Protect plants and equipment from adverse weather.
- 10.0 Maintain and analyze records.
- 11.0 Demonstrate employability skills.
- 12.0 Demonstrate managerial and supervisory skills.

### **A. Horticulture Specialization:**

- 13.0 Prepare growing media and seedbeds.
- 14.0 Propagate plants.
- 15.0 Grow plants.
- 16.0 Protect plants and equipment from adverse weather.
- 17.0 Harvest, process, and ship plants.
- 18.0 Market plants.
- 19.0 Design horticulture facilities.
- 20.0 Design, install, and service nursery irrigation systems.

### **B. Landscape Specialization:**

- 21.0 Analyze and design the project (landscape and interiorscape).
- 22.0 Prepare, estimate, and establish contracts.
- 23.0 Analyze and organize the project.
- 24.0 Lay out and install landscape.
- 25.0 Plan and install a drainage system.
- 26.0 Maintain customer relations and observe follow-up procedures.
- 27.0 Maintain landscape plants.
- 28.0 Select, operate, and maintain landscape tools and equipment.
- 29.0 Plan, install, and service landscape irrigation systems.



Florida Department of Education  
Student Performance Standards

Program Title: Landscape and Horticulture Technology  
CIP Number: 1101060502  
Program Length: 60 credit hours  
SOC Code(s): 37-1012

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0	Demonstrate an understanding of plant physiology and growth – the student will be able to:
01.01	Describe the process of photosynthesis.
01.02	Identify and describe the functions of all parts of the plant.
01.03	Describe an asexual reproduction process.
01.04	Explain the differences between angiosperms and gymnosperms.
01.05	Identify the differences between woody and herbaceous plants.
02.0	Classify plants – the student will be able to:
02.01	Identify and group shade and flowering trees.
02.02	Identify and group fruit trees and plants.
02.03	Identify and group annuals, vegetables, and herbs.
02.04	Identify and group woody ornamentals, vines, and ground covers.
02.05	Identify and group tropical foliage plants.
02.06	Identify and group turf and ornamental grasses.
03.0	Determine drainage system needs and design a drainage system – the student will be able to:
03.01	Determine the natural slope/grade of an area.
03.02	Determine the texture and percolation characteristics of the soil.
03.03	Identify techniques for constructing ditches and culverts.

03.04	Direct the movement of water away from structures and installations.
03.05	Design and underground drainage system.
04.0	Select, operate, and maintain tools and equipment – the student will be able to:
04.01	Determine equipment needs for the company.
04.02	Select and operate equipment for the job.
04.03	Supervise the service and maintenance of power equipment.
04.04	Supervise the repair and maintenance of facilities.
04.05	Instruct and supervise employees in the safe use of tools and equipment.
04.06	Maintain an inventory of parts and supplies.
05.0	Fertilize plants – the student will be able to:
05.01	Evaluate influences of nutrients on plant growth.
05.02	Collect soil and leaf tissue samples for analysis.
05.03	Interpret and evaluate the results of soil and leaf tissue analysis.
05.04	Apply fertilizers, using appropriate methods (dry, liquid, slow-release, injection, etc.).
05.05	Demonstrate proper handling and storage of fertilizers, observing safety precautions.
06.0	Manage a pest-control program – the student will be able to:
06.01	Develop an integrated pest management program or schedule.
06.02	Train employees in the safe use of pesticides.
06.03	Obtain a restricted-use pesticide license.
07.0	Prune and shape plants – the student will be able to:
07.01	Train employees in pruning techniques.
07.02	Develop a pruning program and time schedule.
07.03	Identify and use tools for pruning.

07.04	Prune plants to achieve desired growth.
07.05	Prune plans with unique cultural requirements (roses, fruit trees, etc.).
07.06	Prune specialty items (topiary, espalier, bonsai, etc.).
07.07	Select and use chemical growth regulators.
07.08	Root-prune plants and trees.
07.09	Demonstrate sanitation and safety practices when pruning.
08.0	Plan and install a drainage system – the student will be able to:
08.01	Determine the natural slope/grade of an area.
08.02	Determine the texture and percolation characteristics of the soil.
08.03	Identify techniques for constructing ditches and culverts.
08.04	Direct the movement of water away from installations.
09.0	Protect plants and equipment from adverse weather – the student will be able to:
09.01	Monitor and interpret weather forecasts.
09.02	Supervise procedures for protecting plants and equipment from adverse weather.
09.03	Compare cost and efficiency of various methods of protecting plants and equipment from adverse weather.
10.0	Maintain and analyze records – the student will be able to:
10.01	Maintain fertilizer and pesticide application records.
10.02	Keep equipment maintenance and service records.
10.03	Maintain sales and production records.
10.04	Record labor and personnel information.
10.05	Keep inventory records.
10.06	Analyze cost and effectiveness of management practices.
10.07	Determine plant production cost.

10.08	Determine insurance needs.
10.09	Prepare an annual budget.
10.10	Prepare a five-year projection plan.
10.11	Maintain accounts-receivable and accounts-payable records.
10.12	Use computers in the landscape and horticulture operations.
11.0	Demonstrate employability skills – the student will be able to:
11.01	Conduct a job search.
11.02	Secure information about a job.
11.03	Identify documents that may be required when applying for a job.
11.04	Complete a job application form.
11.05	Demonstrate competency in job interview techniques.
11.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
11.07	Identify acceptable work habits.
11.08	Demonstrate knowledge of how to make job changes.
11.09	Demonstrate acceptable employee health habits.
12.0	Demonstrate managerial and supervisory skills – the student will be able to:
12.01	Instruct employees in their tasks.
12.02	Prepare daily work plans.
12.03	Enforce safety regulations.
12.04	Develop an outline for a policy manual.
12.05	Organize and conduct employee training.
12.06	Conduct employee grievance procedures.
12.07	Evaluate performance of employees.

12.08	Prepare job descriptions.
12.09	Conduct job interviews.
12.10	Demonstrate effective communication skills.
12.11	Demonstrate computer literacy as related to landscape and horticulture operations.
<b>Horticulture Specialization:</b>	
13.0	Prepare growing media and seedbeds – the student will be able to:
13.01	Identify media materials.
13.02	Mix rooting and growing media according to plant requirements.
13.03	Sterilize rooting, potting, and growing media.
13.04	Collect and test a soil sample from field and potting media.
13.05	Adjust pH and nutritional levels of media.
13.06	Prepare planting beds and sites.
13.07	Fill and level benches and pots with media.
13.08	Demonstrate sanitation practices when handling and storing plant media materials.
14.0	Propagate plants – the student will be able to:
14.01	Collect propagation materials at proper time (seeds, cuttings, scions, bulbs, etc.).
14.02	Demonstrate propagation by grafting, budding, layering, separating, dividing, cutting, and tissue culturing.
14.03	Prepare flats and a seedbed and plant seeds.
14.04	Prepare a rooting bed.
14.05	Prepare propagation materials (seeds, cuttings, scions, etc.)
14.06	Apply growth stimulants to propagation materials.
14.07	Control propagation facility environment (moisture, temperature, light).
14.08	Transplant rooted propagation materials including tissue culture transplants.

14.09	Describe advanced propagation techniques (tissue, culture, pre-germination, see irradiation, tree cuttings).
14.10	Demonstrate sanitation and safety practices when propagating.
15.0	Grow plants – the student will be able to:
15.01	Prepare media for containers.
15.02	Prepare field site for transplants.
15.03	Select plant containers.
15.04	Determine plant spacing in the field and on container beds.
15.05	Transplant propagated materials to various containers and to the field.
15.06	Determine and provide light requirements of various plant types.
15.07	Determine water requirements and apply water at proper rates.
15.08	Identify weeds and apply herbicides.
15.09	Determine fertilization requirements.
15.10	Identify insect and insect-like disease problems and apply pesticides.
15.11	Demonstrate safety practices when applying pesticides.
16.0	Protect plants and equipment from adverse weather – the student will be able to:
16.01	Monitor and interpret weather forecasts.
16.02	Supervise procedures for protecting plants and equipment from adverse weather.
16.03	Compare cost and efficiency of various methods of protecting plants and equipment from adverse weather.
16.04	List plants according to environmental tolerances (light, temperature, moisture, wind, salt, etc.).
17.0	Harvest, process, and ship plants – the student will be able to:
17.01	Grade and harvest field-grown plants (ball, burlap, bare-root, “grow-bags”).
17.02	Identify mechanical techniques for harvesting field-grown plants (tree spade and mechanical digger).
17.03	Select, grade, and assemble container-grown plants.

17.04	Prepare for shipment, loading, and transporting harvested plant materials.
17.05	Use proper methods for preserving plant viability.
17.06	Comply with regulation regarding the inspection and movement of plant materials.
17.07	Demonstrate safety practices when harvesting, processing, and shipping nursery stock.
18.0	Market plants – the student will be able to:
18.01	Identify, inventory, and label marketable plants.
18.02	Identify market segments (commercial, residential, wholesale, retail, etc.)
18.03	Identify methods of marketing (advertising, public relations, sales personnel, trade shows, etc.).
18.04	Develop a marketing program (budget, displays, sales aids, price lists, etc.).
18.05	Develop sales training program (product knowledge, customer relations, sales techniques, resource materials, etc.)
18.06	Develop an annual sales calendar (seasonal sales, special promotion, etc.).
19.0	Design horticulture facilities – the student will be able to:
19.01	Design a facility for propagating plants.
19.02	Design a bedding-plants growing facility.
19.03	Design a container growing facility.
19.04	Design a field growing facility.
19.05	Design a tropical foliage growing facility.
19.06	Design a retail facility.
20.0	Design, install, and service nursery irrigation systems – the student will be able to:
20.01	Determine irrigation requirements.
20.02	Assess quality of irrigation water.
20.03	Design and set up an irrigation system for propagation area, greenhouse or enclosed structure, shade house, retail display area, and field-growing area.
20.04	Maintain electric and engine-driven pumps.

20.05	Operate and service various types of irrigation systems.
20.06	Calculate cost efficiency of irrigation system.
<b>Landscape Specialization:</b>	
21.0	Analyze and design the project (landscape and interiorscape) – the student will be able to:
21.01	Determine the purpose, problems, or desired effect of the project.
21.02	Analyze the environmental conditions of the landscape or interiorscape.
21.03	Determine site analysis problems.
21.04	Demonstrate working knowledge of Computer-Assisted Drafting (CAD) system.
21.05	Design hardscape plan.
21.06	Design and select appropriate plant materials for desired effect and function.
21.07	Determine the method and form of presentation of the project.
22.0	Prepare, estimate, and establish contracts – the student will be able to:
22.01	Develop a list of materials required for the project.
22.02	Determine equipment needs.
22.03	Estimate time and man hours.
22.04	Determine cost of materials, equipment, and labor.
22.05	Prepare a price for customer, based on specifications.
22.06	Establish terms of a contract.
23.0	Analyze and organize the project – the student will be able to:
23.01	Interpret plans and specifications.
23.02	Identify safety requirements.
23.03	Organize site preparation.
23.04	Locate project materials.



23.05	Determine personnel needs.
23.06	Determine equipment needs.
23.07	Establish project schedule.
24.0	Lay out and install landscape – the student will be able to:
24.01	Locate existing utilities.
24.02	Rough grade site.
24.03	Install large materials.
24.04	Install irrigation system.
24.05	Construct hardscape (walls, walks, patio, drives, etc.)
24.06	Lay out and install plants.
24.07	Prepare interiorscape.
24.08	Prepare final grade.
24.09	Install lawns.
24.10	Install mulch.
24.11	Perform final clean up.
25.0	Plan and install a drainage system – the student will be able to:
25.01	Plan the construction of an underground drainage system.
25.02	Estimate and order appropriate fill materials.
25.03	Establish proper elevations and grade a landscape site.
25.04	Read soil and contour maps.
26.0	Maintain customer relations and observe follow-up procedures – the student will be able to:
26.01	Conduct walk-through of project with client to ensure satisfaction.
26.02	Identify current and future maintenance requirements.

26.03	Analyze project records for profitability and employee performance.
27.0	Maintain landscape plants – the student will be able to:
27.01	Determine water requirements and apply at proper rates.
27.02	Identify weeds and apply herbicides safely.
27.03	Determine fertilization requirements and apply at proper rates.
27.04	Regulate growth of landscape plants through chemical or mechanical needs.
27.05	Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).
27.06	Identify plant pest problems and apply corrective measures.
27.07	Cultivate and mulch plants.
27.08	Brace and repair trees.
28.0	Select, operate, and maintain landscape tools and equipment – the student will be able to:
28.01	Determine equipment needs for the company.
28.02	Select and operate equipment for the job.
28.03	Supervise the service and maintenance of service equipment.
28.04	Supervise the repair and maintenance of facilities.
28.05	Instruct and supervise employees in the safe use of tools and equipment.
28.06	Maintain an inventory of parts and supplies.
29.0	Plan, install, and service landscape irrigation systems – the student will be able to:
29.01	Determine irrigation requirements.
29.02	Assess quality of irrigation water.
29.03	Plan an irrigation system.
29.04	Supervise the installation of irrigation equipment.
29.05	Service and maintain electric engine-driven pumps.

29.06 Operate and service low-volume irrigation system.

29.07 Operate and service overhead irrigation system.

29.08 Operate and maintain automatic system.

29.09 Calculate cost efficiency of an irrigation system.

29.10 Design and underground drainage system.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Planned and supervised occupational activities must be provided through directed laboratory experience, practicum or cooperative/internship experience. Whenever the cooperative method is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student may receive compensation for work performed.

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### **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

- Landscape and Horticulture Professional (0101060504) – 18 credit hours
- Landscape and Horticulture Specialist (0101060503) – 12 credit hours

Landscape and Horticulture Technician (0101060505) – 30 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

**Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Golf Course Operations  
**Career Cluster:** Agriculture, Food and Natural Resources

**AS**

CIP Number	1101060701
Program Type	College Credit
Standard Length	69 credit hours
CTSO	N/A
SOC Codes (all applicable)	37-1012 - First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to supervise and manage the operations of a golf course. Instruction includes equipment management, pest control, fertilization, care, irrigation, record keeping, safety, laws and regulations, as well as leadership, public relations, human relations, employability and communication skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 69 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Supervise and manage the operation, maintenance and repair of golf course equipment.
- 02.0 Schedule irrigation and manage the design, installation and maintenance of golf course irrigation systems.
- 03.0 Prescribe, supervise and manage the application of agricultural chemicals for the prevention and control of pests.
- 04.0 Prescribe, supervise and manage the fertilization of turf and landscape.
- 05.0 Train and supervise employees in grooming and maintaining greens, tees, fairways, roughs and other areas.
- 06.0 Provide a safe environment for workers and patrons.
- 07.0 Keep and analyze maintenance, employee, equipment and inventory records.
- 08.0 Analyze and incorporate technical information into management practices
- 09.0 Observe local, state and federal laws and regulations.
- 10.0 Demonstrate leadership, communication, public relations, employability and human relations skills.

Florida Department of Education  
Student Performance Standards

Program Title: Golf Course Operations  
 CIP Number: 1101060701  
 Program Length: 69 credit hours  
 SOC Code(s): 37-1012

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0	Supervise and manage the operation, maintenance and repair of golf course equipment--The student will be able to:
01.01	Define the role of the golf course equipment mechanic in relation to the organization.
01.02	Determine the essential power, shop and hand tools required in a golf course mechanics shop.
01.03	Design a shop layout.
01.04	Compile a list of equipment required in the operation of an 18-hole golf course.
01.05	Demonstrate knowledge and use of golf course equipment.
01.06	Develop and supervise a system of preventive maintenance.
01.07	Sharpen and grind blades and cutting surfaces on all mowing equipment.
01.08	Trouble-shoot and repair golf course equipment.
01.09	Demonstrate gas and electric arc welding techniques on golf course equipment.
01.10	Compile, stock and manage a parts inventory.
01.11	Monitor and record the use of fuel, lubricants and consumable shop supplies.
01.12	Maintain a safe clean shop.
01.13	Maintain current catalogs and online resources for supplies and equipment.
01.14	Maintain tires and tire pressure on golf course equipment.
01.15	Train and supervise employees in the safe use of tools and equipment.
02.0	Schedule irrigation and manage the design, installation and maintenance of golf course irrigation systems--The student will be able to:



02.01	Determine water requirements for a particular turf.
02.02	Analyze soil textures regarding their moisture holding capacities.
02.03	Analyze yearly, monthly and weekly rainfall amounts and distribution in various areas of Florida.
02.04	List the major water sources for irrigation purposes.
02.05	Operate and maintain hydraulically controlled, electrically controlled and thermo-hydraulically controlled irrigation valves.
02.06	Select and operate pumps used in sprinkler irrigation systems.
02.07	Illustrate the design, computations, pumping capacity and pipe sizing needed to irrigate a given operation.
02.08	Prepare a schedule for maintaining an irrigation system.
02.09	Schedule irrigation as required.
02.10	Manage drainage and run-off of excess rainfall.
03.0	Prescribe, supervise and manage the application of agricultural chemicals for the prevention and control of pests--The student will be able to:
03.01	Store and handle chemicals safely.
03.02	Recognize symptoms of agricultural chemical poisoning and apply first aid.
03.03	Dispose of chemical containers.
03.04	Read and interpret safety precautions provided on equipment and pesticide containers.
03.05	Instruct employees in the safe use of agricultural chemicals.
03.06	Select and check personal safety equipment.
03.07	Prepare proper proportions of chemicals and carrying agents.
03.08	Check application equipment for malfunction and wear.
03.09	Compute amounts of active ingredients of chemicals to be used.
03.10	Calibrate volume, pressure and output of equipment.
03.11	Weigh and measure chemicals.
03.12	Adjust height and width of equipment to achieve desired spray pattern.

03.13	Recognize symptoms of pesticide damage.
03.14	Identify fungi and bacteria.
03.15	Recognize symptoms of insects and nematodes.
03.16	Identify common insects, weeds, diseases and other pests common to golf courses.
03.17	Clean and store sprayers.
03.18	Develop a pest control management program following best management practices.
04.0	Prescribe, supervise and manage the fertilization of turf and landscape--The student will be able to:
04.01	Take soil and leaf samples for chemical analysis.
04.02	Adjust pH level of soil.
04.03	Interpret soil and tissue chemical analysis results.
04.04	Apply fertilizer in liquid form.
04.05	Interpret labels on fertilizer containers.
04.06	Apply dry fertilizers.
04.07	Identify nutrient deficiency symptoms in turf and landscape plants.
04.08	Determine kind and type of fertilizer to apply to a given area.
04.09	Determine the nutrient requirements of various plants.
04.10	Determine amount of fertilizer to apply to a given area.
04.11	Analyze cost of various formulations and methods of application.
04.12	Recognize fertilizer injury to plant materials.
05.0	Train and supervise employees in grooming and maintaining greens, tees, fairways, roughs and other areas--The student will be able to:
05.01	Supervise the mowing of greens, collars, roughs, aprons, and fairways.
05.02	Determine the placement and location of cups and tees.
05.03	Supervise the repair of divots.

05.04	Determine conditions necessary for verticutting and aerifying turf.
05.05	Supervise the care and maintenance of sand traps.
05.06	Prune trees and shrubs.
05.07	Supervise the maintenance of water hazards.
05.08	Develop maintenance schedule for grooming golf courses.
05.09	Train and supervise employees in the care of golf courses.
05.10	Follow written and verbal instructions.
06.0	Provide a safe environment for workers and patrons--The student will be able to:
06.01	Provide instruction for the safe use of chemicals, tools and equipment.
06.02	Inspect tools and equipment for safe operation.
06.03	Apply emergency first aid.
06.04	Post safety hazards.
06.05	Monitor employees work habits.
06.06	Maintain safety awareness.
07.0	Keep and analyze maintenance, employee, equipment and inventory records--The student will be able to:
07.01	Maintain equipment use and maintenance records.
07.02	Keep and file personnel records and information.
07.03	Record and analyze time-on-task information.
07.04	Maintain pesticide use information.
07.05	Keep inventory records.
07.06	Prepare a written report or summary based on records.
07.07	Observe and make recommendations based on records.
07.08	Evaluate employees, equipment and practices based on records.

07.09	Develop annual budget for complete operation.
07.10	Keep and file guarantees, warranties, service contracts and operators manuals.
08.0	Analyze and incorporate technical information into management practices--The student will be able to:
08.01	Maintain a current file of technical information.
08.02	Update skills and knowledge through workshops and seminars.
08.03	Analyze data relative to operation.
08.04	Assess new materials, chemicals and procedures based on research or technical information.
08.05	Interpret technical information relative to operation.
09.0	Observe local, state and federal laws and regulations--The student will be able to:
09.01	Observe OSHA rules and regulations.
09.02	Observe EPA rules and regulations.
09.03	Secure and maintain permits, certificates and licenses appropriate to operation.
09.04	Observe stream and groundwater regulations.
09.05	Recognize responsibilities and liabilities of occupation or position.
09.06	Maintain a list of agencies responsible for regulating the industry.
10.0	Demonstrate leadership, communication, public relations, employability and human relations skills--The student will be able to:
10.01	Conduct a job search.
10.02	Secure information about a job.
10.03	Identify documents that may be required when applying for a job.
10.04	Complete a job application form correctly.
10.05	Demonstrate competence in job interview techniques.
10.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
10.07	Identify acceptable work habits.

10.08 Demonstrate knowledge of how to make job changes appropriately.

10.09 Demonstrate acceptable employee health habits.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. Whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Zoo Animal Technology  
**Career Cluster:** Agriculture, Food and Natural Resources

AAS	
CIP Number	1101099900
Program Type	College Credit
Standard Length	66 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	39-2011 - Animal Trainers 19-1023 - Zoologists and Wildlife Biologists 39-2021 - Nonfarm Animal Caretakers 45-2021 - Animal Breeders 33-9011 - Animal Control Officers 45-2093 - Farmworkers, Farm, Ranch, and Aquacultural Animals
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the zoo animal sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to supervise and coordinate the activities of workers engaged in the care and exhibition of birds and animals. Subject matter also includes safety, diseases and parasites, feeding and nutrition, maintenance and repair, animal behavior, as well as leadership, communications, employability, human and public relations skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 66 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Prevent, treat and control diseases and parasites of animals.
- 02.0 Demonstrate interpretation and guest service skills
- 03.0 Develop and maintain Animal Management Techniques
- 04.0 Manage animal nutrition and feeding.
- 05.0 Operate and maintain instruments and equipment.
- 06.0 Provide first aid for animals.
- 07.0 Collect laboratory specimens.
- 08.0 Analyze and keep records.
- 09.0 Manage animal, visitor and worker safety.
- 10.0 Identify animal species.
- 11.0 Interpret and observe laws, rules and regulations relative to operation.
- 12.0 Dispense medicine and supplies.
- 13.0 Manage, maintain and repair facilities.
- 14.0 Demonstrate leadership, employability, communication, human and public relations skills.
- 15.0 Observe and interpret animal behavior.



Florida Department of Education  
Student Performance Standards

Program Title: Zoo Animal Technology  
 CIP Number: 1101099900  
 Program Length: 66 credit hours  
 SOC Code(s): 19-1023, 39-2011, 39-2021

**The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0	Prevent, treat and control diseases and parasites of animals – the student will be able to:
01.01	Observe animals daily for symptoms of disease and parasites.
01.02	Recognize signs of disease requiring the quarantine or isolation of animals.
01.03	Vaccinate animals.
01.04	Provide special nutritional care for animals as required.
01.05	Maintain a quarantine program for new animal populations.
01.06	Perform pest control program.
01.07	Identify and treat trauma, nutritional disorders, infections, poisoning and genetic diseases.
01.08	Properly handle mortality cases for disposal or necropsy.
01.09	Practice basic cleanliness and orderliness in and around animal enclosures.
01.10	Identify specific sanitation procedures applicable to managing the collection and the various situations they would be used: quarantine, medical building, kitchen, public areas, storage buildings.
01.11	Properly dispose of animal waste, used food items and plant material.
01.12	Maintain a quarantine program for new animal populations.
01.13	Understand injury, nutritional disorders, infections, poisoning, genetic, and zoonotic diseases.
02.0	Demonstrate interpretation and guest service skills – the student will be able to:
02.01	Handle guest questions and situations.
02.02	Interact with zoo guests in a positive and enthusiastic manner.

02.03	Understand their audience based on age, interest level and learning style.
02.04	Communicate appropriately to all audiences.
02.05	Uses and understands interpretative techniques.
02.06	Demonstrate passion and professionalism.
02.07	Create and deliver oral presentations.
02.08	Interpret zoo policies to non-zoo staff.
03.0	Develop and maintain Animal Management Techniques – the student will be able to:
03.01	Maintain environmental conditions required by species.
03.02	Provide pre-natal and post-partum care for animals.
03.03	Facilitate the breeding of various species.
03.04	Identify and use techniques and equipment for the capture and restraint of animals.
03.05	Identify circumstances justifying the capture and restraint of animals.
03.06	Transport animals safely.
03.07	Accurately collect and record various animal measurements.
04.0	Manage animal nutrition and feeding – the student will be able to:
04.01	Identify and feed appropriate plant material.
04.02	Prepare and dispense appropriate diets to maintain various species in captivity.
04.03	Properly store, inventory and maintain animal food supplies.
04.04	Recognize the need to adjust animal diets based on various factors such as breeding season, environmental changes, census changes and life stage.
04.05	Present food to animals in the appropriate manner.
04.06	Understand basic nutritional requirements of various animal species in the wild and in captivity.
05.0	Operate and maintain instruments and equipment – the student will be able to:
05.01	Operate and maintain scales and balances.

05.02	Identify, operate and maintain clinical instruments.
05.03	Use and maintain capture and restraint equipment.
05.04	Operate communications equipment.
05.05	Identify and safely use hand and power tools.
06.0	Provide first aid for animals – the student will be able to:
06.01	Identify injuries requiring first aid and provide emergency treatment.
06.02	Prepare and maintain first aid equipment and supplies.
06.03	Identify injuries requiring services of a veterinarian.
07.0	Collect laboratory specimens – the student will be able to:
07.01	Collect urine specimens.
07.02	Collect fecal specimens.
07.03	Collect environmental samples.
07.04	Properly package and handle specimens for shipment or analysis.
08.0	Analyze and keep records – the student will be able to:
08.01	Keep exhibit maintenance records.
08.02	Keep personnel records.
08.03	Keep and maintain animal medical records.
08.04	Keep record of animal feeding and diet.
08.05	Maintain animal behavioral records.
08.06	Keep records of chemical, pesticide and medication use.
09.0	Manage animal, visitor and worker safety – the student will be able to:
09.01	Maintain the safety of animals.
09.02	Manage and maintain safety of visitors.

09.03	Handle animals in a safe and cautious manner.
09.04	Operate tools and equipment in a safe manner.
09.05	Prepare for and respond to emergencies.
10.0	Identify animal species – the student will be able to:
10.01	Classify animals according to habitat and nutritional requirements.
10.02	Recognize morphological characteristics of major animal groups.
10.03	Identify animals to genus and species.
10.04	Identify species of animals in specific collections.
11.0	Interpret and observe laws, rules and regulations relative to operation – the student will be able to:
11.01	Observe local, state, federal and international laws and regulations.
11.02	Maintain facilities up to standards of licenses, certificates, bonds and permits.
11.03	Describe the regulation process.
11.04	Identify agencies regulating the profession.
11.05	Identify agencies accrediting the facility.
12.0	Dispense medicine and supplies – the student will be able to:
12.01	Follow verbal and written instructions when administering medications.
12.02	Interpret instructions and warnings on the labels of medicines and chemicals.
12.03	Maintain security of medicines and chemicals.
12.04	Identify medicines and chemicals commonly used in the profession.
12.05	Carefully mix, measure and dispense medications.
12.06	Maintain inventory of supplies and medications.
13.0	Manage, maintain and repair facilities – the student will be able to:
13.01	Maintain grounds, facilities and exhibits according to master plan.

13.02	Operate grounds keeping equipment.
13.03	Paint wood, metal and masonry surfaces.
13.04	Perform repairs on wooden structures.
13.05	Observe safety precautions.
14.0	Demonstrate leadership, employability, communication, human and public relations skills – the student will be able to:
14.01	Conduct a job search.
14.02	Secure information about a job.
14.03	Identify documents that may be required when applying for a job.
14.04	Complete a job application form correctly.
14.05	Demonstrate competence in job interview techniques.
14.06	Respond positively to criticism from employer, supervisor, or other persons.
14.07	Establish acceptable work habits.
14.08	Practice acceptable employee health habits.
15.0	Observe and interpret animal behavior – the student will be able to:
15.01	Recognize animal breeding behavior.
15.02	Provide appropriate breeding environment for animals.
15.03	Adjust animal diet during breeding season.
15.04	Distinguish between instinctive and learned behavior.
15.05	Identify behavior of pre and post parturition animals.
15.06	Describe behavioral changes due to aging.
15.07	Recognize normal behavioral characteristics of animals through observations.
15.08	Identify behavioral problems.
15.09	Describe training of animals and correction of behavior problems.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. Whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation the student has chosen as a career goal.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

Program Title: Biomass Cultivation  
Career Cluster: Agriculture, Food and Natural Resources

AS	
CIP Number	1101110302
Program Type	College Credit
Standard Length	60 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	19-4011 - Agricultural and Food Science Technicians 45-2092 - Farmworkers and Laborers, Crop, Nursery, and Greenhouse 19-4099 - Precision Agriculture Technicians 45-2091 - Agricultural Equipment Operators 11-9013 - Farmers, Ranchers, and Other Agricultural Managers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agricultural production sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to manage land, water, machinery, financing, crops and facilities as well as make contracts, manage taxes, keep records, analyze records and technical reports, and demonstrate leadership, employability, communication and human relations skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 60 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Distinguish varieties of energy grasses.
- 02.0 Manage crops.
- 03.0 Manage machinery and equipment.
- 04.0 Demonstrate safe chemical handling and chemical waste removal.
- 05.0 Manage facilities.
- 06.0 Select sources and methods of financing the operation.
- 07.0 Keep and analyze production and financial records.
- 08.0 Market crops.
- 09.0 Interpret technical information and incorporate it into managerial practices.
- 10.0 Integrate state and federal regulations into operation.
- 11.0 Demonstrate leadership, communication, employability and human relations skills.



Florida Department of Education  
Student Performance Standards

Program Title: Biomass Cultivation  
 CIP Number: 1101110302  
 Program Length: 60 credit hours  
 SOC Code(s): 19-4011, 45-2092, 19-4099, 45-2091, 11-9013

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0	Distinguish varieties of energy grasses – the student will be able to:
01.01	List species used as bioenergy feedstock.
01.02	Compare and contrast morphology and anatomy of energy grass species.
01.03	Explain how biological features of energy grasses are important for cellulosic bioethanol production.
02.0	Manage crops – the student will be able to:
02.01	Prepare a land use plan.
02.02	Determine long-range conservation practices.
02.03	Prepare soil for crops.
02.04	Select crop varieties best suited for land, market and type of farm operation.
02.05	Determine seeding/planting rate and spacing.
02.06	Calibrate and adjust planting equipment.
02.07	Plant crops.
02.08	Select appropriate cultural practices including cultivation, fertilization and irrigation.
02.09	Identify and control diseases, insects and pests.
02.10	Determine maturity of crops.
02.11	Harvest crops.
02.12	Store crops.

02.13	Determine the most advantageous method of marketing crops.
03.0	Manage machinery and equipment – the student will be able to:
03.01	Assess needs for the purchases of new or replacement equipment.
03.02	Maintain oil, fuel and hydraulic levels in equipment.
03.03	Maintain tires, batteries and coolant system on all equipment and vehicles.
03.04	Operate and service small gasoline engines.
03.05	Replace hoses, belts and lines.
03.06	Cut and weld with oxy-acetylene and arc welding equipment.
03.07	Observe safety procedures when operating farm equipment.
03.08	Develop a general maintenance schedule.
04.0	Demonstrate safe chemical handling and chemical waste removal – the student will be able to:
04.01	Maintain records per state and federal regulations.
04.02	Know and practice chemical handling according to the guidelines established by Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA).
04.03	Demonstrate safe waste disposal practices.
05.0	Manage facilities – the student will be able to:
05.01	Safely operate and maintain general farm shop tools and equipment.
05.02	Install and maintain electrical wiring and equipment.
05.03	Determine a bill of materials for a farm construction project.
05.04	Build and repair fences.
05.05	Develop a general maintenance schedule for facilities and equipment.
06.0	Select sources and methods of financing the operation – the student will be able to:
06.01	List major sources of production credit.
06.02	List sources of credit for capital items and real estate.

06.03	Prepare a case using accepted forms for obtaining credit from farm lending institutions.
07.0	Keep and analyze financial and production records – the student will be able to:
07.01	Keep fertilization and pesticide use records.
07.02	Keep equipment maintenance and service records.
07.03	Record cultural and production information.
07.04	Determine cost efficiency of operations.
07.05	Prepare a farm tax return.
07.06	Prepare an annual budget.
07.07	Determine credit, cash flow and investment returns.
07.08	Review sources and kinds of farm insurance.
08.0	Market crops – the student will be able to:
08.01	Secure and interpret market information.
08.02	Select marketing channels for greatest profit.
08.03	Interpret elements of marketing agreements.
08.04	Sell crops.
08.05	Provide for transportation of product to market.
09.0	Interpret technical information and incorporate it into managerial practices – the student will be able to:
09.01	Keep and maintain a file of current technical information from universities, governmental and commercial agencies.
09.02	Maintain a reference file for periodicals and other publications.
09.03	Attend seminars and workshops to update skills and knowledge.
09.04	Determine sources and advantages of using computer networking.
10.0	Integrate state and federal regulations into operation – the student will be able to:
10.01	List agencies responsible for inspecting and regulating crop farming.

10.02	Secure necessary inspection certificates and registrations.
10.03	Identify reasons for the necessity of inspections, certifications and registrations.
11.0	Demonstrate leadership, communication, employability and human relations skills – the student will be able to:
11.01	Develop citizenship awareness and responsibility.
11.02	Demonstrate knowledge in organizing and conducting meetings.
11.03	Demonstrate effective communication skills.
11.04	Complete an employment application.
11.05	Conduct a job search.
11.06	Demonstrate job interview skills.
11.07	Recognize appropriate work habits.
11.08	Identify associations and societies associated with occupation.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. Whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Biomass Cultivation Specialist (0101110301) – 21 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

**Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Citrus Production Technology  
**Career Cluster:** Agriculture, Food and Natural Resources

**AS**

CIP Number	1101110303
Program Type	College Credit
Standard Length	60 credit hours
CTSO	N/A
SOC Codes (all applicable)	45-2092 - Farmworkers and Laborers, Crop, Nursery, and Greenhouse
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to produce citrus trees and fruit and manage services associated with citrus production. Subject matter includes pest control, propagation, nutrition, irrigation, equipment management and marketing, as well as leadership, communication, employability and human relations skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 62 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Classify and select citrus rootstocks and scions.
- 02.0 Identify varieties of citrus.
- 03.0 Manage the propagation of citrus.
- 04.0 Analyze nutritional disorders and develop a fertilization program.
- 05.0 Identify insects, diseases and other pathogens of citrus and develop a pest control management program.
- 06.0 Identify and control citrus weed problems.
- 07.0 Protect citrus from frost and freeze damage.
- 08.0 Calculate the irrigation requirements of citrus and manage an irrigation program.
- 09.0 Select, manage and maintain citrus production equipment.
- 10.0 Determine maturity and quality of citrus fruits.
- 11.0 Keep production, financial, personnel and maintenance records.
- 12.0 Market citrus nursery and grove products.
- 13.0 Manage the growth and culture of citrus.
- 14.0 Harvest citrus.
- 15.0 Interpret and incorporate technical information into management practices.
- 16.0 Demonstrate leadership, employability, communications and human relations skills.



Florida Department of Education  
Student Performance Standards

Program Title: Citrus Production Technology  
CIP Number: 1101110303  
Program Length: 60 credit hours  
SOC Code(s): 45-2092

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0	Classify and select citrus rootstocks and scions – the student will be able to:
01.01	Classify citrus rootstocks and scions according to taxonomy.
01.02	Select scion varieties best suited for specific soil types, rootstock compatibility, disease resistance, insect resistance, cold resistance and specific marketing purposes.
01.03	Select rootstocks best suited for specific soil types, scion compatibility, nematode resistance, insect resistance, cold resistance, disease and virus resistance and specific marketing purposes.
02.0	Identify varieties of citrus – the student will be able to:
02.01	Identify citrus fruit varieties by color, shape, texture, maturity, seeds and leaves.
02.02	Identify rootstock varieties by characteristic of fruit, leaves and stems.
03.0	Manage the propagation of citrus – the student will be able to:
03.01	Select a site for seedbeds and apply for site approval.
03.02	Supervise the preparation of site and plant certified seed.
03.03	Manage the culture and care of seedlings.
03.04	Select and cut certified budwood.
03.05	Manage the budding and wrapping of seedlings.
03.06	Train and supervise workers to maintain accurate records and counts in tagging and labeling rootstocks and scion varieties.
03.07	Supervise the culture and care of young budded nursery stock.
03.08	Supervise the digging and handling of nursery stock for potting or bareroot shipment.
03.09	Maintain strict nursery sanitation practices.

04.0	Analyze nutritional disorders and develop a fertilization program – the student will be able to:
04.01	Collect soil and plant tissue samples for analysis.
04.02	Interpret results of soil and tissue analysis.
04.03	Develop a fertilization program or schedule for grove and nursery.
04.04	Identify nutritional disorders and deficiencies in grove and nursery.
04.05	Calculate fertilization rates for citrus.
04.06	Compare advantages and disadvantages of different sources and forms of plant nutrients.
04.07	Calibrate fertilization equipment.
04.08	Supervise application of fertilizer.
04.09	Supervise cleaning and storage of fertilizer application equipment.
05.0	Identify insects, diseases and other pathogens of citrus and develop a pest control management program – the student will be able to:
05.01	Identify insects, diseases and other pathogens of citrus.
05.02	Determine extent and severity of pest infestation.
05.03	Select and supervise the application of pesticides.
05.04	Calibrate and adjust pesticide applications.
05.05	Determine effectiveness of application or spray program.
05.06	Develop a pest management program or schedule.
05.07	Train workers in the safe use of pesticides.
05.08	Recognize symptoms of pesticide poisoning and provide first aid.
05.09	Safely dispose of pesticide containers.
05.10	Observe and maintain grove and nursery sanitation practices.
05.11	Supervise the cleaning and maintenance of pesticide application equipment.
06.0	Identify and control citrus weed problems – the student will be able to:

06.01	Identify noxious weeds and vines of citrus.
06.02	Select appropriate herbicide and supervise the application.
06.03	Calibrate and adjust herbicide applicators.
06.04	Develop a weed/vine control program or schedule.
06.05	Determine appropriate conditions for effective and safe application of herbicides.
06.06	Supervise mechanical weed and vine control.
07.0	Protect citrus from frost and freeze damage – the student will be able to:
07.01	Monitor and interpret weather forecasts.
07.02	Supervise the preparation and maintenance of grove, nursery and equipment for frost and freeze.
07.03	Supervise procedures for protecting citrus from cold damage.
07.04	Protect young trees from cold damage.
07.05	Compare cost and efficiency of various methods of cold protection.
08.0	Calculate the irrigation requirements of citrus and manage an irrigation program – the student will be able to:
08.01	Determine irrigation requirements.
08.02	Plan an irrigation system.
08.03	Supervise the installation of irrigation equipment.
08.04	Service and maintain electric and engine driven pumps.
08.05	Operate and service low volume irrigation system.
08.06	Operate and service overhead irrigation system.
08.07	Calculate cost efficiency of irrigation system.
09.0	Select, manage and maintain citrus production equipment – the student will be able to:
09.01	Determine the equipment requirements for the citrus operation.
09.02	Compare cost, efficiency and maintenance requirements of various models and makes of equipment.

09.03	Determine equipment replacement schedule.
09.04	Develop a schedule for servicing of equipment.
09.05	Instruct workers in the safe and efficient use of equipment.
09.06	Supervise the maintenance and repair of citrus equipment.
09.07	Keep maintenance records.
10.0	Determine maturity and quality of citrus fruit – the student will be able to:
10.01	Determine solids using refractometer.
10.02	Interpret results of citrus juice analysis.
10.03	Estimate quality grade of product.
10.04	Estimate date of maturity of fruit.
11.0	Keep production, financial, personnel and maintenance records – the student will be able to:
11.01	Maintain fertilizer and pesticide application records.
11.02	Make grove plats.
11.03	Keep equipment maintenance and service records.
11.04	Keep inventory records.
11.05	Record production information.
11.06	Record labor and personnel information.
11.07	Analyze cost and effectiveness of management practices.
11.08	Prepare written reports.
11.09	Determine insurance needs.
12.0	Market citrus nursery and grove products – the student will be able to:
12.01	Determine market for product.
12.02	Maintain customer service relations.

12.03	Arrange for transportation of product.
12.04	Evaluate market.
12.05	Interpret and analyze marketing contracts.
12.06	Locate sources of marketing information services.
13.0	Manage the growth and culture of citrus – the student will be able to:
13.01	Supervise daily operations.
13.02	Determine work schedules.
13.03	Inspect grove/nursery properties.
13.04	Hire, train and dismiss employees.
13.05	Determine cultural practices.
13.06	Implement instructions and requests.
14.0	Harvest citrus – the student will be able to:
14.01	Make arrangements for harvesting crop.
14.02	Interpret and analyze harvesting contract.
14.03	Monitor harvesting operation.
14.04	Prepare contingency plans for harvesting citrus.
15.0	Interpret and incorporate technical information into management practices – the student will be able to:
15.01	Observe local, state and federal pesticide regulations.
15.02	Observe grove and nursery site regulations.
15.03	Observe and interpret marketing restrictions and agreements.
15.04	Interpret and observe certification, licensing and inspection requirements.
15.05	List agencies responsible for the regulation of the citrus industry.
15.06	Attend workshops and seminars to upgrade skills and knowledge.

15.07	Maintain a file for technical information, periodicals and other publications.
15.08	Determine sources of up-to-date information and services.
15.09	List societies, organizations and associations related to occupation or profession.
16.0	Demonstrate leadership, employability, communications and human relations skills – the student will be able to:
16.01	Conduct a job search.
16.02	Secure information about a job.
16.03	Identify documents that may be required when applying for a job.
16.04	Complete a job application form correctly.
16.05	Demonstrate competence in job interview techniques.
16.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
16.07	Identify acceptable work habits.
16.08	Demonstrate knowledge of how to make job changes appropriately.
16.09	Demonstrate acceptable employee health habits.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. Whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Pest Control Technology  
**Career Cluster:** Agriculture, Food and Natural Resources

AS	
CIP Number	1101110500
Program Type	College Credit
Standard Length	62 credit hours
CTSO	N/A
SOC Codes (all applicable)	37-3012 - Pesticide Handlers, Sprayers, and Applicators, Vegetation
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to supervise and manage the sales and application of agricultural chemicals and pesticides. Subject matter includes business management sales, equipment use management, safety, pest identification, recordkeeping, leadership, employability skills, communications and human and public relations.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 62 credit hours.



## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Manage and supervise the application of pesticides and agricultural chemicals.
- 02.0 Supervise and train personnel in the safe and efficient use of pesticides and agricultural chemicals.
- 03.0 List and interpret laws and regulations relative to the safe application of pest control materials.
- 04.0 Manage the maintenance of equipment used to apply pest control materials.
- 05.0 Qualify for appropriate certification to apply pest control materials.
- 06.0 Keep accurate records required by law and for business management purposes.
- 07.0 Classify and identify pests and the appropriate chemicals used to control them.
- 08.0 Apply business practices.
- 09.0 Market and merchandise goods and services.
- 10.0 Demonstrate leadership, communication, employability, and human and public relations skills.

Florida Department of Education  
Student Performance Standards

Program Title: Pest Control Technology  
 CIP Number: 1101110500  
 Program Length: 62 credit hours  
 SOC Code(s): 37-3012

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0	Manage and supervise the application of pesticides and agricultural chemicals – the student will be able to:
01.01	Recognize pesticide and chemical poisoning symptoms.
01.02	Read and interpret packaging labels and guidelines for safety.
01.03	Read and interpret packaging labels for application rates and instructions.
01.04	Recommend kinds of pesticides and agricultural chemicals to be used in specific situations.
01.05	Use protective clothing and equipment when handling agricultural chemicals.
01.06	Recognize symptoms of pesticide, chemical and residue damage.
01.07	Calculate coverage of chemical.
01.08	Assess compatibility of selected chemicals.
01.09	Determine rate and volume of chemical to be applied.
01.10	Select time of chemical application.
01.11	Select and match nozzles for equipment type, chemical used and pattern of application.
01.12	Safely store chemicals.
01.13	Mix chemicals and carrying agents.
01.14	Apply granular or dry chemical materials.
01.15	Apply liquid materials.
01.16	Adjust ground speed of chemical application equipment.

01.17	Dispose of used chemical containers.
01.18	Recognize and respond to pesticide spills.
01.19	Read and interpret MSDS information.
02.0	Supervise and train personnel in the safe and efficient use of pesticides and agricultural chemicals – the student will be able to:
02.01	Develop a labor supply plan.
02.02	Hire and dismiss employees.
02.03	Establish and record pay scale and benefits for workers.
02.04	Instruct employees in the safe and efficient use of chemicals and equipment.
02.05	Observe and evaluate employees.
02.06	Maintain safety standards in the application of agricultural chemicals.
02.07	Observe rights and needs of employees.
02.08	Post appropriate health and safety announcements.
02.09	Give and take verbal and written instructions.
02.10	Maintain a safe working environment.
03.0	List and interpret laws and regulations relative to the safe application of pest control materials – the student will be able to:
03.01	Observe local, state and federal pesticide and agricultural chemical regulations.
03.02	Observe EPA regulations.
03.03	List agencies responsible for the regulation of the pest control and chemical application industry.
03.04	Attend workshops and seminars to upgrade skills and knowledge.
03.05	Maintain a file for technical information, periodicals and other information.
03.06	Determine sources of up-to-date information and services.
03.07	List societies, organizations and associations relative to the occupation or profession.
04.0	Manage the maintenance of equipment used to apply pest control materials – the student will be able to:

04.01	Inspect safety equipment for cleanliness, effectiveness and proper fit.
04.02	Inspect equipment for leaks, clogs, and other malfunctions, and determine appropriateness of equipment for a specific job.
04.03	Adjust pressure and spray patterns.
04.04	Adjust equipment height and width.
04.05	Adjust mixing apparatus.
04.06	Repair or replace hoses, nozzles and cut-off valves.
04.07	Prepare equipment for storage.
04.08	Order replacement parts and supplies.
04.09	Supervise and/or perform maintenance and repairs.
04.10	Lubricate equipment.
04.11	Follow operators manual.
04.12	Repair and/or maintain dusters.
04.13	Repair and/or maintain fumigators.
04.14	Supervise and/or maintain vehicle maintenance records.
04.15	Maintain and use shop equipment and tools.
04.16	Clean and flush chemical application equipment.
04.17	Describe compatibility of equipment with chemicals used.
05.0	Qualify for appropriate certification to apply pest control materials – the student will be able to:
05.01	Interpret certification and licensing requirements.
05.02	Identify qualification needed for various certificates or licensure.
05.03	Apply for license or certificate.
05.04	Maintain license or certificate.
06.0	Keep accurate records required by law and for business management purposes – the student will be able to:

06.01	Maintain personnel records.
06.02	Maintain health and accident records.
06.03	Maintain equipment maintenance records.
06.04	Keep and maintain complete pesticide application records.
06.05	Keep records of employee training and licensure.
06.06	File required local, state and federal reports.
06.07	Maintain inventory control of pesticides and chemicals.
07.0	Classify and identify pests and appropriate chemicals used to control them – the student will be able to:
07.01	Identify fungi and bacteria and their symptoms.
07.02	Recognize symptoms of insects and nematodes.
07.03	Classify feeding habits and life cycles of insects.
07.04	Describe life cycles of bacteria and fungi.
07.05	Consider the pest, host being attacked and chemical when recommending chemical control measures.
07.06	Assess environmental impact when recommending chemical control measures.
07.07	Identify insect, weed and other pests.
07.08	Assess economic and aesthetic thresholds to determine if pesticide applications are warranted.
08.0	Apply business practices – the student will be able to:
08.01	Maintain ledger of accounts.
08.02	Determine cost efficiency of operation.
08.03	Prepare a tax return.
08.04	Prepare a budget.
08.05	Determine credit, cash flow and investment returns.
08.06	Review sources and kinds of insurance required.

08.07	Review bonding needs and procedures.
08.08	List major sources of business credit and loans.
09.0	Market and merchandise goods and services – the student will be able to:
09.01	Display goods.
09.02	Manage sales.
09.03	Open and close office daily.
09.04	Update price list for goods and services.
09.05	Prepare advertising.
09.06	Handle customer complaints and questions.
09.07	Take order for goods and services by telephone.
09.08	Inspect and follow-up quality of services performed for customer.
09.09	Advise customer in the selection of goods or services.
10.0	Demonstrate leadership, communication, employability, human and public relations skills – the student will be able to:
10.01	Conduct a job search.
10.02	Secure information about a job.
10.03	Identify documents that may be required when applying for a job.
10.04	Complete a job application form correctly.
10.05	Demonstrate competence in job interview techniques.
10.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
10.07	Identify acceptable work habits.
10.08	Demonstrate knowledge of how to make job changes appropriately.
10.09	Demonstrate acceptable employee health habits.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. Whenever the cooperative method is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Marine Environmental Technology  
**Career Cluster:** Agriculture, Food and Natural Resources

AS	
CIP Number	1103060100
Program Type	College Credit
Standard Length	62 credit hours
CTSO	Collegiate FFA
SOC Codes (all applicable)	19-2041 - Environmental Scientists and Specialists, Including Health
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

This degree is designed to prepare students for a diverse set of employment opportunities in the field of marine environmental technology and other marine-oriented careers. During the program students will acquire the skills and knowledge necessary to enter the work force in a variety of marine oriented careers including technicians at environmental or research laboratories, environmental consulting industries, aquaculture/mariculture facilities, ecotourism, or marine conservation and restoration projects.

The purpose of this program is to provide technician level training and supply skilled employees for the growing workforce demand in marine related environmental industries. Graduates of this program will obtain the fundamental academic skills necessary to be successful at the technician level and demonstrate an understanding of the fundamental concepts behind marine environmental science. Graduates will demonstrate the ability to: (1) collect marine related data above and below the water (i.e. on scuba), (2) write technical reports, (3) navigate and operate marine vessels, and (4) understand basic business and management concepts.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 62 credit hours.



## **Standards**

After successfully completing this program, the student will be able to perform the following:

### **A. MET Core Learning Outcomes:**

- 01.0 Demonstrate proficiency in underwater scientific research and marine data collection methods.
- 02.0 Demonstrate an understanding of the basic knowledge and practices that form the foundation of the marine sciences.
- 03.0 Compose scientific and/or technical reports.
- 04.0 Demonstrate basic knowledge and skills necessary to operate and maintain marine vessels.
- 05.0 Demonstrate an understanding of marine ecosystems, environmental management, and resource conservation
- 06.0 Demonstrate an understanding of the fundamental principles of biology.
- 07.0 Comprehension of fundamental principles governing business and entrepreneurship.
- 08.0 Demonstrate an understanding of the fundamental principles of marine aquaculture.

### **B. Marine Assessment and Restoration Specialization Learning Outcomes:**

- 09.0 Demonstrate a basic knowledge and understanding of specific marine habitat assessment protocols.
- 10.0 Demonstrate a basic knowledge and understanding of several marine habitat restoration protocols.

### **C. Marine Mammal Specialization Learning Outcomes:**

- 11.0 Demonstrate an understanding of the fundamental principles of marine mammal anatomy and evolution.
- 12.0 Demonstrate basic knowledge of marine mammal social structure and culture.
- 13.0 Demonstrate proficiency of basic marine mammal training and husbandry techniques.
- 14.0 Demonstrate knowledge of principle marine mammal laws and regulations.
- 15.0 Describe and discuss research focused on marine mammals.
- 16.0 Demonstrate knowledge of conservation issues involving marine mammals
- 17.0 Demonstrate an understanding of the guiding principles and practices of marine mammals in human care.

### **D. Marine Aquaculture Specialization Learning Outcomes:**

- 18.0 Demonstrate a thorough knowledge of aquaculture best management practices.
- 19.0 Identify and diagnose common diseases and parasites that infect marine aquaculture organisms.
- 20.0 Demonstrate a moderate understanding of marine aquaculture systems.
- 21.0 Recognize appropriate nutritional requirements for the most common marine aquaculture organisms.
- 22.0 Demonstrate a basic understanding of marine aquaculture husbandry principles and practices.

Florida Department of Education  
Student Performance Standards

Program Title: Marine Environmental Technology  
 CIP Number: 1103030100  
 Program Length: 62 credit hours  
 SOC Code(s): 19-2041

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

<b>MET Core Learning Outcomes:</b>	
01.0	Demonstrate proficiency in underwater scientific research and marine data collection methods – the student will be able to:
01.01	Demonstrate knowledge and competence at research diving techniques and procedures to support scientific research projects.
01.02	Demonstrate the use of transects and quadrants to quantify the distribution and abundance of sessile marine organisms within a defined research area.
01.03	Demonstrate methods for conducting quantitative surveys the distribution and abundance of fishes within a defined research area.
01.04	Demonstrate state-of-the-art underwater data collection, recording and preservation procedures necessary to support biological and archaeological research.
01.05	Demonstrate the basic knowledge necessary to conduct statistical analysis of the scientific data collected.
01.06	Synthesize what was learned about research diving and other data collection techniques through a presentation, project or case study.
02.0	Demonstrate an understanding of the basic knowledge and practices that form the foundation of the marine sciences – the student will be able to:
02.01	Define plate tectonic theory and distinguish between types of plate boundaries.
02.02	Illustrate the features of the sea floor that arise from tectonic activity.
02.03	Identify key oceanographic terms and apply them in discussion.
02.04	Describe the processes that created the earth and the ocean.
02.05	Explain how the physical and chemical properties of seawater are important in understanding the ocean.
02.06	Compare the physical, chemical and biological processes that affect the origin, transport and deposition of sediment.
02.07	Summarize the role of the ocean in weather and climate.

02.08	Explain the mechanisms that create both surface and sub-surface ocean currents.
02.09	Define four types of ocean waves and identify the forces that generate them.
02.10	Explain how the ocean determines the shape, features and composition of the coast line.
02.11	Describe the Scientific Method, and explain the nature and limitations of scientific investigation.
02.12	Recognize and explain the basic features that define and differentiate major marine phyla.
02.13	Describe the role of microbes in the ocean.
02.14	Describe the major anatomical features and physiologic systems of bony and cartilaginous fishes.
02.15	Explain the functional role of marine reptiles, seabirds and mammals in the marine environment.
03.0	Compose scientific and/or technical reports – the student will be able to:
03.01	List the typical components of a peer-reviewed scientific article.
03.02	Explain the peer-review process of publishing a scientific article.
03.03	Explain the function of each section of a scientific paper or technical report.
03.04	Critically analyze a scientific paper describing its thesis, methods, results and conclusions.
03.05	Create at least two reports formatted according to a scientific publishing format.
04.0	Demonstrate basic knowledge and skills necessary to operate and maintain marine vessels – the student will be able to:
04.01	Demonstrate coastwise navigation techniques using both dead reckoning and electronic methods.
04.02	Demonstrate competence at using basic knots and marlinspike skills.
04.03	Demonstrate mastery of the navigational “Rules of the Road” through the safe operation of a small vessel.
04.04	Demonstrate proper man-overboard recovery procedures.
04.05	Explain the concepts of stability, trim and hull form as they relate to vessel operation.
04.06	Demonstrate basic safe boat handling skills.
04.07	Demonstrate proper procedures for docking, anchoring, rafting and mooring a vessel.
04.08	Explain the appropriate response to vessel emergencies such as stranding, fire and damage containment.

04.09	Demonstrate proper marine radio operating procedures.
05.0	Demonstrate an understanding of marine ecosystems, environmental management, and resource conservation – the student will be able to:
05.01	Explain the essential components of ecology, and how energy flows through an ecosystem.
05.02	Explain the functional role of primary producers in the marine environment, and identify common species of marine plants and algae.
05.03	Explain the essential components of intertidal ecology, and how energy flows through various types of intertidal ecosystems.
05.04	Describe the features and functional systems in the intertidal, neritic, epipelagic and deep ocean regions.
05.05	Explain the basic functional ecology and energy flow on a coral reef.
05.06	List the various resources humans derived from the sea and what problems this presents.
05.07	Explain how humankind has and continues to impact the marine environment.
05.08	Describe methods and best practices currently in use to conserve marine ecosystems including but not limited to as marine spatial planning, integrated coastal zone management and marine protected areas.
05.09	Explain the concepts of “Tragedy of the Commons” and “Precautionary Principle” as they relate to marine ecosystem and resource conservation.
06.0	Demonstrate an understanding of the fundamental principles of biology – the student will be able to:
06.01	Describe the requirements/ingredients of life, its associated “machinery” and the special challenges of living in the sea.
06.02	Identify biological processes including photosynthesis/chemosynthesis, respiration, and homeostasis.
06.03	Explain the basic structure, growth, metabolism, reproduction, physiology, and genetics of cells and organisms.
06.04	Recognize evolutionary relationships and diversity among living organisms, and appreciate the importance of biodiversity.
06.05	Explain the characteristics and distinctive features of the domains and kingdoms of life.
06.06	Identify and classify organisms within major taxonomic groups.
06.07	Demonstrate basic biological laboratory techniques including the use of a microscope.
06.08	Interpret laboratory data and summarize the results.
06.09	Demonstrate the problem solving and critical thinking skills needed to assess and solve biologically-based questions.
07.0	Comprehension of fundamental principles governing business and entrepreneurship – the student will be able to:
07.01	Demonstrate a familiarity of entrepreneurship by understanding the characteristics and mindset of entrepreneurs.

07.02	Identify and evaluate opportunities within the marketplace, both for new venture creation and within existing organizations.
07.03	Create the tools necessary to act on an entrepreneurial opportunity by writing a business plan, building a management team, financing the opportunity and creating an innovative marketing plan.
07.04	Describe successful strategies and common mistakes made by successful entrepreneurs.
07.05	Describe the legal requirements and obstacles in starting a business venture.
08.0	Demonstrate an understanding of the fundamental principles of marine aquaculture – the student will be able to:
08.01	Demonstrate a basic understanding of marine aquaculture husbandry principles and practices.
08.02	Demonstrate the skills required to culture phytoplankton and zooplankton required for larval rearing.
08.03	Describe the basic types of marine aquaculture systems.
08.04	Describe the various types of common organisms and techniques currently used during marine aquaculture operations.
08.05	Demonstrate a basic knowledge of common diseases and parasites during marine aquaculture and methods for their control.
<b>Marine Assessment and Restoration Specialization Learning Outcomes:</b>	
09.0	Demonstrate a basic knowledge and understanding of specific marine habitat assessment protocols – the student will be able to:
09.01	Describe specific marine habitat assessment methods.
09.02	Demonstrate a basic understanding of biodiversity concepts and assessment methods.
09.03	Identify and quantify marine organisms in specific marine habitats.
09.04	Perform successful marine habitat assessments.
10.0	Demonstrate a basic knowledge and understanding of several marine habitat restoration protocols – the student will be able to:
10.01	Understand the criteria used to identify areas where habitat restoration is required.
10.02	Describe specific marine habitat restoration methods.
10.03	Obtain (e.g. culture) organisms for restoration.
10.04	Perform successful marine habitat restorations.
<b>Marine Mammal Specialization Learning Outcomes:</b>	
11.0	Demonstrate an understanding of the fundamental principles of marine mammal anatomy and evolution – the student will be able to:

11.01	Demonstrate an understanding of the external and internal aspects of dolphin anatomy and physiology, and their role in the successful survival of a mammal in the marine environment.
11.02	Demonstrate knowledge of the anatomy and evolution of various marine mammals including other cetaceans, pinnipeds and sirenians.
11.03	Demonstrate knowledge of the evolution of marine mammals.
12.0	Demonstrate basic knowledge of marine mammal social structure and culture – the student will be able to:
12.01	Demonstrate an understanding of basic dolphin ecology as related to communication, foraging, reproduction, calf rearing and social structure.
12.02	Explain and outline marine mammal maternal characteristics, behaviorism human care and the wild, as well as prenatal care, birthing situations and maternity care of mother and neonate human care facilities.
12.03	Explain how the natural social ecology of dolphins and the importance and impact of it on how they are managed at human care facility.
12.04	Demonstrate an understanding of the basic social structure of other representative marine mammal taxa.
12.05	Demonstrate how the term “culture” has been theorized to apply to certain aspects of cetacean societies and how that impacts our understanding of their cognition.
12.06	Understand the portrayal of marine mammals in the media and how and why it has changed over time.
12.07	Understand the application of animal assistance to humans throughout history and the more recent use of marine mammals in military service and how the latter has greatly contributed to our essential knowledge base of marine mammals overall.
13.0	Demonstrate proficiency of basic marine mammal training and husbandry techniques – the student will be able to:
13.01	Understand the philosophy and techniques of operant (behavioral) conditioning, with a focus on positive reinforcement in training behavior and its application to working with dolphins.
13.02	Demonstrate operant conditioning techniques through the use of learned hand signals in communicating requests for various trained behaviors from the dolphin.
13.03	Apply skills learned in animal care, handling and reinforcement during a live animal presentation for the general public.
13.04	Construct a plan for basic marine mammal care, dietary and medical needs, and animal handling.
13.05	Understand the medical issues unique to marine mammals, methods of treatment of bacterial, viral, fungal and parasitic disease, established preventive care practices.
13.06	Demonstrate the use of operant conditioning in training a new behavior through outlining, developing, implementing and modifying a behavior chain through practical application with the animals.
13.07	To summarize the importance of voluntary medical behavior training, concepts and techniques used to desensitize animals to non-invasive medical equipment and rocedures. Understand the importance of the of trainer/animal relationship with regard to properly maintaining the health and well being of the animals.
13.08	To investigate and understand the purpose and necessity of animal enrichment including cognitive, development, and social aspects. Design and implement enrichment activities to enhance the habitat and activities of the animals.
13.09	To summarize safety precautions and the social issues surrounding enrichment devices, habitat design, safety & maintenance social groupings, training and dolphin & sea lion nutrition & energetics.

13.10	To critique various career pathways and opportunities available in the field of marine mammal care and training, including necessary academics, field experience, trainer forums, further experiential education in the field, networking, etc.
14.0	Demonstrate knowledge of principle marine mammal laws and regulations – the student will be able to:
14.01	Understand and explain the laws and regulating agencies, and their evolution, designed to protect marine mammals in both the wild and human care as well as regulate facilities.
14.02	Understand the separate roles of both NOAA and the Department of Agriculture and how they impact marine mammals and marine mammal facilities.
15.0	Describe and discuss research focused on marine mammals – the student will be able to:
15.01	Describe the historical and current research efforts relating to dolphin cognition, behavior, acoustics, communication, strandings, physiology, reproduction and conservation.
15.02	Sumarize basic medical procedures and the importance and implications of husbandry techniques to marine mammal research.
15.03	Explain how research with dolphins in human care have expanded our understanding of their wild cousins and contributed to their conservation.
15.04	Sumarize trends in basic dolphin ethology, past and ongoing studies related to cognition, behavior and communication and its application in research, as well as an understanding of passive observational data collection and facilitation of active cognitive research.
15.05	Evaluate theories and research on dolphin echolocation and whistle production; implication of anthropogenic noise in the marine environment and ongoing research in the area.
15.06	Conduct independent behavioral observations.
15.07	Review research design and logistics as it applies to marine mammals in human care through a project design exercise conducted collaboratively throughout the course, including an understanding of results analyses and interpretation.
15.08	Critique career pathways and requirements toward becoming a marine mammal research scientist in human care settings (ex situ) and in the field (in situ).
16.0	Demonstrate knowledge of conservation issues involving marine mammals – the student will be able to:
16.01	Understand the current conservation issues of international/domestic concern which affect marine mammals and their environment, cumulative impacts both natural and human induced, as well as ways in which individuals can affect the environment in a positive manner to conserve the species.
16.02	Master the skills in synthesizing new information and experiences with prior conceptions of dolphins and the marine environment to clearly refine their opinions and knowledge base.
16.03	Outline the organization of the Marine Mammal Stranding Network; procedures used in assisting and rehabilitating stranded marine mammals; international and domestic issues concerning threats to dolphins and the marine environment.
16.04	List anthropogenic impacts affecting marine mammals and their environment, and demonstrate an understanding of research needed in this area, implications of impacts and associated research.
16.05	Understand past and present state of whaling operations around the world and the processes and organizations that govern these activities.
16.06	Understand status of certain endangered marine mammal species and conservation measures to sustain their populations.

17.0	Demonstrate an understanding of the guiding principles and practices of marine mammals in human care – the student will be able to:
17.01	To diagram population management, including theories, tools and strategies for maintaining a population’s genetic diversity and demographic stability in order to insure its long term persistence.
17.02	Summarize specific concerns surrounding appropriate design, construction and maintenance of aquatic mammal habitats for marine mammals in human care.
<b>Marine Aquaculture Specialization Learning Outcomes:</b>	
18.0	Demonstrate a thorough knowledge of aquaculture best management practices – the student will be able to:
18.01	Describe the concept of aquaculture Best Management Practices.
18.02	Compile and analyze marine aquaculture industry management data.
18.03	Identify and demonstrate proper use of key Quality Management tools.
18.04	Develop and implement the key components and concepts of an aquaculture management plan.
19.0	Demonstrate a basic understanding of marine aquaculture husbandry principles and practices – the student will be able to:
19.01	Identify the principles of water quality specific to marine aquaculture from a variety of marine taxa.
19.02	Demonstrate a working knowledge of variety of husbandry techniques for most of the known marine species currently being cultured, including temperature and photoperiod control conducive to spawning and species specific life styles.
19.03	Understand basic selective breeding techniques for enhanced phenotypic traits.
20.0	Identify and diagnose common diseases and parasites that infect marine aquaculture organisms – the student will be able to:
20.01	Demonstrate an understanding of the basic principles of disease in marine aquatic systems.
20.02	Demonstrate an understanding of how the culture environment is associated with the occurrence and outbreak of disease and parasites in marine aquaculture systems.
20.03	Identify the differences between environmental, viral, bacterial, parasitic and fungal diseases of marine species.
20.04	Demonstrate a basic understanding of methodologies for treatment of diseases commonly encountered during marine aquaculture operations.
20.05	Demonstrate an understanding of the basic principles of marine aquatic health management and biosecurity.
21.0	Demonstrate a moderate understanding of marine aquaculture systems – the student will be able to:
21.01	Describe the various types of marine aquaculture systems and demonstrate the ability to distinguish the primary components of specific marine aquaculture systems.
21.02	Identify which systems are best for the culture and business model of the target species.



21.03	Recognize the System requirements for Integrated Multi-Trophic Mariculture (IMTM) systems.
21.04	Demonstrate an understanding of the impacts of specific marine aquaculture systems on the environment and especially marine ecosystems.
21.05	Demonstrate basic skills for computer automated drafting.
22.0	Recognize appropriate nutritional requirements for the most common marine aquaculture organism – the student will be able to:
22.01	Recognize basic marine nutrient and biochemical energy fluxes (i.e. trophodynamics and bioenergetics) especially as they relate to species commonly associated with marine aquaculture.
22.02	Demonstrate a rudimentary understanding of biochemistry (e.g. proteins, lipids, carbohydrates, etc.) and nutrient metabolism in common marine aquaculture species.
22.03	Demonstrate an understanding of the metabolic role of vitamins and minerals and recognize symptoms of vitamin deficiency.
22.04	Recognize appropriate feeding management practices based on metabolic requirements of marine aquaculture target species.
22.05	Recognize the impacts of feeding strategies on the environment.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

Collegiate FFA is the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates

- Marine Mammal Care and Basic Training (0103060101) – 15 credit hours
- Tropical Ornamental Mariculture Technician (0103060102) – 30 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Turf Equipment Management  
**Career Cluster:** Agriculture, Food and Natural Resources

AS	
CIP Number	1131030201
Program Type	College Credit
Standard Length	67 credit hours
CTSO	N/A
SOC Codes (all applicable)	49-3053 - Outdoor Power Equipment and Other Small Engine Mechanics
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to, instruction that prepares individuals to manage and maintain turf care equipment and to manage a shop facility. Instruction includes: hand tools, gasoline and diesel mechanics, paints and painting, sharpening and grinding, welding, hydraulics, electrical systems, training on specialized turf care equipment, record keeping, inventory control, safety, laws and regulations, public relations, human relations, shop management, professionalism, employability skills, communications skills, and management skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 67 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Disassemble, reassemble, adjust, repair, and diagnose the problems related to two and four-cycle engines.
- 02.0 Service electrical systems, fuels and lubricating systems, cooling systems, power train/hydraulic drives, and controls on turf equipment.
- 03.0 Adjust, sharpen, grind, and rebuild reel and rotary mowing units.
- 04.0 Demonstrate understanding of governmental regulations and compliances pertaining to golf courses.
- 05.0 Use shop tools and equipment, and organize a shop following appropriate safety, management, and inventory techniques.
- 06.0 Order and stock parts and keep shop records.
- 07.0 Perform basic welding tasks using both gas and arc welding techniques.
- 08.0 Identify and safely operate turf care equipment.
- 09.0 Demonstrate employability skills.
- 10.0 Identify the various professional organizations and publications that pertain to the turf management industry.
- 11.0 Design a functional golf course maintenance facility and select appropriate maintenance equipment.
- 12.0 Develop a preventive maintenance program for turf care equipment.
- 13.0 Develop human relations skills.
- 14.0 Perform decision making activities.
- 15.0 Identify and demonstrate management activities.
- 16.0 Develop a management and training program for new employees.
- 17.0 Identify turfgrasses used in the golf and landscape industry.
- 18.0 Develop a plan for the functional use of turf equipment management personnel.
- 19.0 Develop communications and business management skills.

Florida Department of Education  
Student Performance Standards

Program Title: Turf Equipment Technology  
CIP Number: 1131030201  
Program Length: 67 credit hours  
SOC Code(s): 49-3053

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0	Disassemble, reassemble, adjust, repair, and diagnose the problems related to two-cycle and four-cycle engines – the student will be able to:
01.01	Evaluate horsepower and torque.
01.02	Disassemble and reassemble a two-cycle and four-cycle engine.
01.03	Identify crankcase and cylinder assembly.
01.04	Identify and be able to assemble valves, piston assembly, crankshaft, cooling system, and air filters.
01.05	Identify and assemble parts of the carburetor assembly.
01.06	Identify and assemble the ignition system, governor, alternator, and starter system.
01.07	Identify types of batteries.
01.08	Follow safety rules and precautions when dealing with engines.
02.0	Service electrical systems, fuel and lubricating systems, power train/hydraulic drives, and controls on turf equipment – the student will be able to:
02.01	Identify turf equipment electrical systems.
02.02	Service hydraulic systems on a variety of turf equipment.
02.03	Service turf equipment power train systems.
02.04	Identify and service various lubricating systems and understand types of fuels and lubricants.
02.05	Operate and repair the various mechanical and hydraulic controls on turf equipment.
02.06	Repair the governor, ignition, alternator, and starter system on various pieces of turf equipment.
03.0	Adjust, sharpen, grind, and rebuild reel and rotary mowing units – the student will be able to:

03.01	Repair and sharpen various types of reel mowers.
03.02	Grind reel bedknives with various bedknife grinders.
03.03	Lap reel mower blades.
03.04	Follow safety procedures when using reel and bedknife grinders.
03.05	Adjust reel mowers to produce proper cutting heights.
03.06	Sharpen and balance rotary mower blades.
03.07	Remove and replace rotary mower blades.
04.0	Demonstrate understanding of governmental regulations and compliances pertaining to golf courses – the student will be able to:
04.01	Control pollution.
04.02	Protect water quality.
04.03	Demonstrate fire prevention methods.
04.04	Identify and prevent health hazards and demonstrate proper first aid.
04.05	Identify and manage hazardous waste on the golf course.
04.06	Manage fertilizer storage demonstrating proper handling techniques.
04.07	Demonstrate pesticide safety.
05.0	Use shop tools and equipment and organize a shop following appropriate safety, management and inventory techniques – the student will be able to:
05.01	Follow basic OSHA safety regulations and shop fire prevention techniques.
05.02	Perform basic first aid procedures.
05.03	Establish a file system for shop records.
05.04	Identify and use shop hand tools and equipment that relate to turf equipment maintenance.
05.05	Select the appropriate fasteners, bearings, seals, belts, chains, fuels, and lubricants for various turf equipment.
05.06	Establish and maintain appropriate shop space for specific shop tasks.
05.01	Establish an appropriate equipment inventory system.

06.0	Order and stock parts and keep shop records – the student will be able to:
06.01	Use the various equipment manuals to identify parts and service procedures.
06.02	Order parts properly.
06.03	Establish a system for stocking appropriate turf equipment parts.
06.04	Gather the appropriate forms for establishing a recordkeeping system.
06.05	Maintain computer-based inventory and record-keeping system.
07.0	Perform basic welding tasks using both gas and arc welding techniques – the student will be able to:
07.01	Follow welding symbols, and safety practices.
07.02	Connect and operate oxy-acetylene welding equipment.
07.03	Run beads and weld various types of joints.
07.04	Braze and solder metal.
07.05	Cut metal with and oxy-acetylene torch.
07.06	Select appropriate welding rods.
07.07	Set up an electrical arc welding machine.
07.08	Arc weld various types of joints.
08.0	Identify and safely operate turf care equipment – the student will be able to:
08.01	Identify the appropriate use for commonly used turf care equipment.
08.02	Identify the operation safety procedures for commonly used turf equipment.
08.03	Operate properly all commonly used turf care equipment.
09.0	Demonstrate employability skills – the student will be able to:
09.01	Conduct a job search.
09.02	Secure information about a job.
09.03	Identify documents which may be required when applying for a job interview.

09.04	Complete a job application correctly.
09.05	Demonstrate competence in a job interview.
09.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
09.07	Identify acceptable work habits.
09.08	Demonstrate knowledge or how to make job changes appropriately.
09.09	Demonstrate acceptable employee health habits.
09.10	Identify appropriate attire and grooming to maintain a functional and professional atmosphere in the equipment maintenance facility.
10.0	Identify the various professional organizations and publications that pertain to the turf management industry – the student will be able to:
10.01	Identify major points in the history of the golf course/turf industry.
10.02	Identify and understand various professional turf publications.
10.03	Identify and understand the basic role of professional turf organizations.
10.04	Identify the basics of the seed production and sod production industries.
10.05	Identify the various classes of golf courses and turf maintenance organizations.
11.0	Design a functional golf course maintenance facility and select appropriate maintenance equipment – the student will be able to:
11.01	Evaluate the organization and management styles utilized by various golf courses.
11.02	Classify, by use, the various equipment used on a typical 18-hole golf course.
11.03	List the equipment needed to properly maintain an 18-hole golf course.
11.04	Design and organize a golf course maintenance complex.
11.05	Develop an equipment budget for an 18-hole golf course.
12.0	Develop preventive maintenance programs for turf care equipment – the student will be able to:
12.01	Use equipment manufacturers' manuals to implement proper service procedures.
12.02	Develop a recordkeeping system to record equipment use.
12.03	Develop a recordkeeping system to record service work performed on equipment.



13.0	Develop human relations skills – the student will be able to:
13.01	Demonstrate appropriate work habits.
13.02	Identify traits that promote good human relations and increase job performance.
13.03	Develop an understanding of the role of the golf course superintendent and turf equipment service manager in the overall successful operations of the golf course.
14.0	Perform decision-making activities – the student will be able to:
14.01	Develop the ability to solve problems in a logical sequence.
14.02	Demonstrate the ability to determine proper work priorities.
14.03	Prepare a day's work schedule for the superintendent.
14.04	Choose appropriate action in situations requiring following a chain of command.
14.05	Choose appropriate action in situations requiring effective time management.
14.06	Choose appropriate action in situations requiring application of business ethics.
14.07	Identify ways to assign work to others.
15.0	Identify and demonstrate management activities – the student will be able to:
15.01	Define management.
15.02	Identify different management styles.
15.03	Identify the major functions of management.
15.04	Demonstrate knowledge of the relationship between authority and responsibility to task accomplishment.
15.05	Identify problems and make an appropriate decision.
15.06	Develop an OJT training program for new employees.
16.0	Develop a management and training program for new employees – the student will be able to:
16.01	Train new employees in proper shop management.
16.02	Teach new employees how to properly use equipment manuals.
16.03	Train equipment operators on proper and safe equipment operation.

16.04	Train equipment operators how to properly adjust mowing height.
16.05	Develop policies and procedures to be followed by employees caring for turf equipment.
17.0	Identify turfgrasses used in the golf and landscape industry – the student will be able to:
17.01	Identify the differences between warm and cool season grasses.
17.02	Demonstrate knowledge of basic management practices for various turfgrasses used in golf and landscape situations.
17.03	Demonstrate knowledge of the interaction between proper turf care and the overall health of the grass plant.
18.0	Develop a plan for the functional use of turf equipment management personnel – the student will be able to:
18.01	Determine the number of full-time and part-time staff needed.
18.02	Develop a work schedule for turf equipment management personnel.
18.03	Assign daily tasks to turf equipment management personnel.
18.04	Schedule work for smooth operation during times of personnel changes: sick leave, emergency leave, vacations, etc.
18.05	Provide the golf course superintendent with information on the use, maintenance, durability, and general characteristics of turf maintenance.
19.0	Develop communications and business management skills – the student will be able to:
19.01	Read and understand service manuals and technical service data.
19.02	Communicate effectively in writing and verbally to employees, supervisors, and small groups.
19.03	Evaluate the components of a basic business plan.
19.04	Demonstrate knowledge of effective management styles.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The Professional Turf Equipment Service Technicians Association (T.E.S.T.A.) is the appropriate industry association.

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Veterinary Technology  
**Career Cluster:** Agriculture, Food and Natural Resources

AS	
CIP Number	1351080800
Program Type	College Credit
Standard Length	73 credit hours
CTSO	N/A
SOC Codes (all applicable)	29-2056 - Veterinary Technologists and Technicians
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to animal office procedure; animal pharmacy and pharmacology; animal examination room/area; animal surgical preparation and assisting; large and small animal nursing; laboratory animal procedures; animal radiology, and employability skills. The curriculum also includes general course material such as computer literacy and use, applied mathematics, biological science, communications skills, fundamentals of microbiology, and humanities or liberal arts. Applicants for the certification examination given by the Florida Veterinary Medical Association must be graduates of approved two-year programs.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 73 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate knowledge of the health care delivery system and health occupations.
- 02.0 Demonstrate the ability to communicate and use interpersonal skills effectively.
- 03.0 Demonstrate an understanding of and apply wellness and disease concepts.
- 04.0 Recognize and practice safety and security procedures.
- 05.0 Recognize and respond to emergency situations as related to veterinary medicine.
- 06.0 Recognize and practice infection control procedures.
- 07.0 Demonstrate an understanding of information technology applications in veterinary healthcare.
- 08.0 Demonstrate employability skills.
- 09.0 Demonstrate knowledge of blood borne diseases.
- 10.0 Apply basic math and science skills.
- 11.0 Perform office procedures utilized in the management of a veterinary office.
- 12.0 Demonstrate an understanding of animal pharmacology by the proper handling and use of related drugs.
- 13.0 Perform under supervision, physical examinations, and laboratory procedures.
- 14.0 Assist with routine surgical and obstetrical procedures.
- 15.0 Prepare animals for surgical procedures.
- 16.0 Assist with anesthesia under supervision.
- 17.0 Perform surgical clean-up.
- 18.0 Perform large and small animal nursing techniques.
- 19.0 Perform specimen analysis laboratory procedures.
- 20.0 Perform parasitology laboratory procedures.
- 21.0 Perform microbiology laboratory procedures.
- 22.0 Perform necropsy laboratory procedures.
- 23.0 Perform cytology laboratory procedures.
- 24.0 Perform veterinary radiographic procedures.
- 25.0 Demonstrate research techniques on laboratory animals.
- 26.0 Apply knowledge of hospital management and equipment standards.
- 27.0 Apply knowledge of professional ethics, jurisprudence and professionalism.

Florida Department of Education  
Student Performance Standards

Program Title:       Veterinary Technology  
CIP Number:         1351080800  
Program Length:     73 credit hours  
SOC Code(s):        29-2056

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0	Demonstrate knowledge of the health care delivery system and veterinary health occupations – the student will be able to:
01.01	Identify the basic components of the veterinary health care delivery system including public, private, government and non-profit.
01.02	Identify common methods of payment for veterinary healthcare services.
01.03	Describe the various types of veterinary healthcare providers and the range of services available including resources for animal abuse and neglect.
01.04	Describe the composition and functions of a veterinary healthcare team.
01.05	Identify the general roles and responsibilities of the individual members of the veterinary healthcare team.
01.06	Identify characteristics of effective veterinary healthcare teams.
01.07	Recognize methods for building positive veterinary healthcare team relationships.
01.08	Analyze attributes and attitudes of an effective veterinary healthcare leader.
01.09	Recognize factors and situations that may lead to conflict.
01.10	Demonstrate effective techniques for managing team conflict.
01.11	Explain the impact of emerging issues including technology, pet insurance, epidemiology, bioethics and socioeconomics on healthcare delivery systems.
02.0	Demonstrate the ability to communicate and use interpersonal skills effectively – the student will be able to:
02.01	Develop basic speaking and active listening skills.
02.02	Develop basic observational skills and related documentation strategies in written and oral form.
02.03	Identify characteristics of successful and unsuccessful communication including barriers.
02.04	Respond to verbal and non-verbal cues.

02.05	Compose written communication using correct spelling, grammar, formatting and confidentiality.
02.06	Use appropriate veterinary medical terminology and abbreviations.
02.07	Recognize the importance of courtesy and respect for patients and other veterinary healthcare workers and maintain good interpersonal relationships.
02.08	Recognize the importance of client educations regarding veterinary healthcare.
02.09	Adapt communication skills to varied levels of understanding and cultural orientation including diverse age, cultural, economic, ethnic and religious groups.
02.10	Distinguish between and report subjective and objective information.
02.11	Report relevant information in order of occurrence.
03.0	Demonstrate an understanding of and apply wellness and disease concepts – the student will be able to:
03.01	Describe strategies for prevention of diseases including health screenings and examinations.
03.02	Identify environmental factors which affect optimal function of each of the major body systems.
03.03	Identify behavioral reactions to illness including defense mechanisms.
03.04	Identify complementary and alternative veterinary health practices.
03.05	Explain animal nutrition in health and disease.
03.06	Recognize the steps in the grief process.
04.0	Recognize and practice safety and security procedures – the student will be able to:
04.01	Recognize safe and unsafe working conditions and report safety hazards.
04.02	Demonstrate the safe use of medical equipment.
04.03	Demonstrate personal safety procedures based on Occupations Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations (including standard precautions).
04.04	Recognize Materials Data Safety Sheets (MSDS) and comply with safety signs, symbols and labels.
04.05	Demonstrate proper body mechanics and ergonomics to maintain technicians' health and safety.
04.06	Demonstrate the procedure for properly identifying patients.
04.07	Demonstrate procedures for the safe transport and transfer of patients.
04.08	Describe fire, safety, disaster and evacuations procedures.

05.0	Recognize and respond to emergency situations as related to veterinary medicine – the student will be able to:
05.01	Monitor and record vital signs.
05.02	Describe legal parameters relating to the administration of emergency care.
05.03	Recognize adverse drug related emergencies and take appropriate first aid action.
06.0	Recognize and practice infection control procedures – the student will be able to:
06.01	Define principles of infection control.
06.02	Demonstrate knowledge of medical asepsis and practice procedures such as hand-washing and isolation.
06.03	Describe how to dispose correctly of biohazardous materials according to appropriate government guidelines such as OSHA.
07.0	Demonstrate an understanding of information technology applications in veterinary healthcare – the student will be able to:
07.01	Describe the uses of computers in veterinary healthcare.
07.02	Define terms and demonstrate basic computer skills including billing and record keeping.
07.03	Recognize technology applications in veterinary healthcare.
07.04	Interpret information from electronic veterinary medical documents.
07.05	Identify methods of communication to access and distribute data such as fax, e-mail and internet.
08.0	Demonstrate employability skills – the student will be able to:
08.01	Identify personal traits or attitudes desirable in a member of the veterinary healthcare team.
08.02	Define basic professional standards of veterinary healthcare workers as they apply to hygiene, dress, language, confidentiality and behavior (i.e. courtesy and self-introductions).
08.03	Identify documents that may be required when applying for a job.
08.04	Write an appropriate resume.
08.05	Conduct a job search.
08.06	Complete a job application form correctly.
08.07	Demonstrate competence in job interview techniques.
08.08	Recognize levels of education, credentialing requirements, employment opportunities, workplace environments and career growth potential.



08.09	Identify acceptable work habits.
08.10	Recognize appropriate affective/professional behavior.
08.11	Compare careers within the veterinary health science career pathways
09.0	Demonstrate knowledge of blood borne diseases – the student will be able to:
09.01	Recognize emerging diseases and disorders.
09.02	Distinguish between fact and fallacy about the transmission and treatment of diseases caused by blood borne pathogens.
09.03	Apply infection control techniques designed to prevent the spread of diseases caused by blood borne pathogens following Centers for Disease Control (CDC) guidelines.
10.0	Apply basic math and science skills – the student will be able to:
10.01	Draw, read, and report on graphs, charts and tables.
10.02	Measure time, temperature, distance, capacity, and mass/weight.
10.03	Make and use measurements in both traditional and metric units.
10.04	Make estimations and approximations and judge the reasonableness of the result.
10.05	Convert from regular to 24 hour time.
10.06	Demonstrate ability to evaluate and draw conclusions.
10.07	Organize and communicate the results obtained by observation and experimentation.
10.08	Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solution of such questions.
10.09	Calculate ratios.
11.0	Perform office procedures utilized in the management of a veterinary office – the student will be able to:
11.01	Make appointments.
11.02	List state/federal health regulations and prepare health and vaccination certificated for signatures.
11.03	Admit patients, take history, and maintain records.
11.04	Demonstrate basic filing of x-rays, lab reports, etc.
11.05	Demonstrate effective client and public relations in the receiving, discharging and educating clients.

11.06	Demonstrate knowledge of First-Aid and CPR as they relate to animal care.
11.07	Identify documentation procedures for responding to veterinarian medical emergencies.
11.08	Practice basic cleanliness and orderliness in relationship to the on-going activity of a veterinary facility (including hospital, clinic, center, practice, laboratory, etc.).
11.09	Demonstrate the knowledge of the technician's role in generation of veterinary practice income.
11.10	Demonstrate basic bookkeeping.
11.11	Demonstrate business letter and report writing.
12.0	Demonstrate an understanding of animal pharmacology by the proper handling and use of related drugs – the student will be able to:
12.01	Identify and discuss general types and groups of drugs.
12.02	Label and package dispensed drugs correctly.
12.03	Read and fill prescriptions.
12.04	Calculate dosages.
12.05	Store and handle biologic and therapeutic agents appropriately.
12.06	Identify controlled substances.
12.07	Handle and record controlled drugs according to DEA regulations.
12.08	Describe inventory control.
12.09	Prepare medications for administration and dispensing.
12.10	Discuss the signs of adverse drug reactions.
12.11	Use and explain appropriate routes and methods of drug administration.
13.0	Perform under supervision physical assessments and laboratory procedures – the student will be able to:
13.01	List "normal" temperature, pulse and respiration in all common species.
13.02	Use proper medical terminology in oral and written communications as related to veterinary technology.
13.03	Perform under supervision and explain to clients schedules, procedures, and types of immunizations.
13.04	Identify common breeds of large, small, exotic, and laboratory animals.

13.05	Demonstrate basic restraint techniques in animals (encaging and removing from cages, placing on and removing from tables, haltering horses and cattle, application of nose tongs, twitches, hog holders, Elizabethan collars, dog safety muzzles; bovine tail and horse leg restraint, bird restraint, and operation of cattle chutes).
13.06	Demonstrate basic rope usage and knot tying techniques.
13.07	Identify heart and lung sounds with stethoscope.
13.08	Explain routine hospital procedures (e.g. surgeries, dental prophylaxis, deworming, patient care, etc.).
13.09	Collect blood, perform skin scrapings, and administer specific drugs under supervision of veterinarian.
13.10	Obtain and record patient history.
13.11	Describe training of companion animals and correction of behavior problems.
13.12	Identify common grains, grasses, hay.
13.13	Identify common poisonous plants.
14.0	Assist with routine surgical and obstetrical procedures – the student will be able to:
14.01	Explain routine surgical procedures and the veterinarian technicians' role in each procedure: (See Section 5 Surgical Nursing in AVMA student Essential Skills list) <a href="https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx">https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx</a>
14.02	Explain artificial insemination techniques and equipment in various species and the role of the veterinarian technician.
14.03	Explain pregnancy evaluation in various species.
15.0	Prepare for surgical procedures – the student will be able to:
15.01	Prepare surgical sites - aseptic techniques.
15.02	Clean surgical instruments.
15.03	Prepare sterile surgical packs.
15.04	Prepare and use gowns, masks, gloves, and drapes.
15.05	Sterilize instruments and supplies using steam and cold methods.
15.06	Identify instruments.
15.07	Operate and maintain autoclaves.
15.08	Explain the use of common surgical closure techniques and materials.

15.09	Position patients for common procedures.
15.10	Arrange lighting during surgery.
15.11	Demonstrate knowledge of alternative sterilization of instruments and supplies.
16.0	Assist with anesthesia under supervision – the student will be able to:
	(See Section 4 Anesthesia in AVMA student Essential Skills list) <a href="https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx">https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx</a>
17.0	Perform surgical clean-up – the student will be able to:
17.01	Describe and perform surgical clean-up including equipment, surgical room or area, instruments, patient, personnel and proper disposal of waste and tissue.
18.0	Perform large and small animal nursing techniques – the student will be able to:
	(See AVMA Essential Skills list for required skills) <a href="https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx">https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx</a>
18.01	Demonstrate common injection techniques.
18.02	Demonstrate common intravenous catheterization.
18.03	Maintain fluid therapy.
18.04	Describe and perform pre and post-operative patient care.
18.05	Administer oral medication by means of dose syringe, balling gun, oral speculum in large animals; hand pilling - small animals and gastric lavage in small animals.
18.06	Demonstrate bandaging techniques.
18.07	Apply and remove casts and splints.
18.08	Perform suture removal.
18.09	Apply emergency splint application.
18.10	Perform dental prophylaxis, using hand and machine techniques.
18.11	Demonstrate understanding in therapeutic bathing, grooming, and anti-parasitic treatment.
18.12	Demonstrate routine recordkeeping, care, and observation of hospitalized patients.
18.13	Observe stomach tubing of dogs, cats, cattle and horses.
18.14	Describe and perform intramammary treatment (mastitis therapy only).

18.15	Implement patient and personnel safety measures.
18.16	Describe and perform orphan animal care of small, large and exotic animals.
18.17	Perform feed preparation and therapeutic diets for animals.
18.18	Clean and care for cages, kennels, and stalls.
18.19	Practice nail trimming for dogs, cats, and birds, and observe beak-trimming and wing trimming for birds.
18.20	Practice equine leg and tail wraps.
18.21	Express canine anal sacs.
18.22	Practice blood collection.
18.23	Practice ear cleaning and dressing.
18.24	Observe enema administration.
18.25	Demonstrate catheterization of urinary tract of canine and feline.
18.26	Demonstrate emergency care of trauma patients.
18.27	Clean, prep, and medicate wounds or abscesses.
18.28	Apply topical medication to the eye.
18.29	Describe nursing care of newborns.
18.30	Care for and repair equipment.
18.31	Prepare for equine vaginal examination and cervical culture.
18.32	Demonstrate bovine mastitis testing.
18.33	Describe the procedures and purposes for marking, tattooing, and microchipping animals.
18.34	Practice physical therapy.
18.35	Describe the principles of blood transfusion.
19.0	Perform specimen analysis laboratory procedures – the student will be able to:
19.01	Perform and demonstrate skill in specimen analysis.

	(See Section 6 Laboratory Procedures- Specimen Analysis- in AVMA student Essential Skills list) <a href="https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx">https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx</a>
20.0	Perform parasitology laboratory procedures – the student will be able to:
20.01	Perform and demonstrate skill in the parasitology.
	(See Section 6 Laboratory Procedures- Specimen Analysis- in AVMA student Essential Skills list) <a href="https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx">https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx</a>
21.0	Perform microbiology laboratory procedures – the student will be able to:
21.01	Perform and demonstrate skill in microbiology: <ul style="list-style-type: none"> <li>• Sample collection.</li> <li>• Bacteriology to include culture and sensitivity, identification of common bacteria, common biological tests and staining procedures.</li> <li>• Mycology to include fungal culture and wet mount and identification of common fungi.</li> <li>• Virology to include principles of sampling and testing.</li> <li>• Principles of immunology.</li> </ul>
22.0	Observe necropsy laboratory procedures – the student will be able to:
22.01	Observe skill in necropsy procedures such as sample collection, storage and shipment, disposal of dead animals.
22.02	Describe euthanasia procedures and handling of rabies suspects.
23.0	Perform fluid analysis laboratory procedures – the student will be able to:
23.01	Explain skill in the following: Cytology: <ul style="list-style-type: none"> <li>• smear preparation and staining procedures</li> <li>• basic cell identification (normal and abnormal)</li> <li>• Tissue aspirates and impressions</li> <li>• smear preparation and staining procedures</li> <li>• basic cell identification (normal and common abnormal)</li> </ul>
23.02	Assist in collecting, preparing, and evaluating transudate, exudates, and cytologic specimens.
23.03	Prepare and stain bone marrow specimen.
23.04	Collect, prepare and evaluate vaginal smears.
23.05	Evaluate semen.
23.06	Collect, prepare, and evaluate ear cytology.
24.0	Perform veterinary radiographic procedures – the student will be able to:

24.01	Perform and demonstrate the following radiographic procedures: <ul style="list-style-type: none"> <li>• Implement safety measures.</li> <li>• Prepare and use technique charts.</li> <li>• Take and process diagnostic radiographs including small, large and laboratory, avian, and exotic animal positioning and techniques.</li> <li>• Use darkroom procedures.</li> <li>• Replace or replenish developer and fixer.</li> <li>• Demonstrate film labeling, filing, and storage.</li> <li>• Maintain radiographic quality control.</li> <li>• Maintain equipment including hanging or storage of gloves or aprons, cleaning screens, detecting or suspecting faulty equipment operation.</li> <li>• Proper use of both stationary and portable x-ray machines.</li> <li>• Perform special radiographic techniques (including contrast media studies).</li> <li>• Discuss use of digital systems.</li> </ul>
25.0	Demonstrate research techniques on laboratory animals – the student will be able to:
25.01	Explain basic principles of research, and necessity for use of laboratory animals.
25.02	Identify and restrain common species of small laboratory animals.
25.03	Determine sex of laboratory animals.
25.04	Perform and/or supervise basic animal care procedures, e.g. feeding, watering, breeding, identification, and handling.
25.05	Administer or inject drugs or medicaments using appropriate sites and routes.
25.06	Collect body tissues or fluids.
25.07	Demonstrate knowledge of gnotobiotic techniques.
25.08	Perform oral dosing (intubation, blunt needle, stomach tube)
25.09	Anesthetize laboratory animals.
25.10	Identify common disease signs of laboratory animals.
25.11	Identify species of non-human primates.
26.0	Apply knowledge of hospital management and equipment standards – the student will be able to:
26.01	Demonstrate knowledge of the principles of infection control, cross contamination, and zoonosis.
26.02	Maintain inventory of supplies, medications and disposables.

26.03	Demonstrate knowledge of personnel management, assignments.
26.04	Determine personnel needs on each shift.
26.05	Perform routine maintenance checks and monitor equipment use.
26.06	Describe risk management techniques.
27.0	Apply knowledge of professional ethics, jurisprudence and professionalism – the student will be able to:
27.01	List the benefits of belonging to a professional organization.
27.02	Describe the technician/veterinarian relationship.
27.03	Discuss the legal framework of the healthcare occupations including scope of practice legislation.
27.04	Explain practices that could result in malpractice, liability and/or negligence.
27.05	Demonstrate procedures for accurate documentation and record keeping.
27.06	Interpret healthcare facility policy and procedures.
27.07	Describe informed consent.
27.08	Explain the laws governing harassment, labor and employment.
27.09	Differentiate between legal and ethical issues in healthcare.
27.10	Describe a code of ethics consistent with the healthcare occupation.
27.11	Identify and compare personal, professional, and organizational ethics.
27.12	Recognize the limits of authority and responsibility of healthcare workers.
27.13	Recognize and report illegal and/or unethical practices of healthcare workers.
27.14	Demonstrate knowledge of ethics and jurisprudence as related to veterinary technology.
27.15	Describe a valid veterinary/client relationship.
27.16	Describe laws governing veterinary medicine in Florida.



## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **AVMA Student Essential and Recommended Skills**

In order to properly prepare students for certification please refer to Appendix I in the certification manual for the most up to date listings of Essential and Recommended skills required of students. The list is updated at least once a year, because the list is updated more frequently than our frameworks in some standards you see a reference to the list to ensure you are teaching the most update material and not just was is listed in the framework. Please use the link below to access the skills list.

<https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Programs/Pages/cvtea-pp-appendix-i.aspx>

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Environmental Science Technology  
**Career Cluster:** Agriculture, Food and Natural Resources

AS	
CIP Number	1703010401
Program Type	College Credit
Standard Length	64 credit hours
CTSO	N/A
SOC Codes (all applicable)	19-4091 - Environmental Science and Protection Technicians, Including Health
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to conducting environmental surveys, and investigations and evaluations of noise, air and water conditions to determine compliance with public laws and regulations.

Reinforcement of basic skills in English, mathematics, and science appropriate for the job preparatory programs is provided through vocational classroom instruction and applied laboratory procedures or practice. This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the public service industry; planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of 64 credit hours.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate knowledge of the principles of managing and remediation of water pollution.
- 02.0 Demonstrate knowledge of the principles of managing and remediation of air pollution.
- 03.0 Demonstrate awareness of environmental noise sources and their monitoring.
- 04.0 Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants.
- 05.0 Sample, analyze and calculate data related to air and water pollutants.
- 06.0 Demonstrate an awareness of radiation monitoring and radioactive contamination control.
- 07.0 Demonstrate and awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems.
- 08.0 Demonstrate employability skills.

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Environmental Science Technology  
**CIP Number:** 1703010401  
**Program Length:** 64 credit hours  
**SOC Code(s):** 19-4091

**The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. At the completion of this program, the student will be able to:**

01.0 Demonstrate knowledge of the principles of managing and remediation of water pollution – the student will be able to:

01.01 Determine chemical and physical properties of water.

01.02 Describe microbial systems.

01.03 Describe surface water, groundwater systems, hydrologic cycle, and potable water treatment processes.

01.04 Describe the marine environment.

01.05 Identify types and sources of water contamination.

01.06 Describe legal aspects and consequences of pollution.

01.07 Collect water samples for analysis.

01.08 Identify the accepted water quality standards for effluent from wastewater treatment plants.

01.09 Identify the correct and accepted water quality standards for industrial waste effluent.

01.10 Demonstrate the technology applied to non-point source pollution control (stormwater and agriculture runoff).

02.0 Demonstrate knowledge of the principles of managing and remediation of air pollution – the student will be able to:

02.01 Define and discuss atmosphere, meteorology and topography.

02.02 Identify natural and manmade pollutants; their sources, effects, and control techniques.

02.03 Collect and analyze air samples.

02.04 Describe legal aspects and consequences of air pollution.

02.05 List the regulated parameters of emission for selected industrial sources.

02.06	List the types of air pollution control devices used to control emissions of sulfur oxides, nitrogen oxides, particulates and volatile organic contaminants.
02.07	Measure the air pollutant of a specific source.
02.08	Record, interpret and report laboratory analyses.
03.0	Demonstrate awareness of environmental noise sources and their monitoring – the student will be able to:
03.01	Define and discuss the physical properties of sound.
03.02	Discuss the threshold of hearing, tolerance, and hearing loss.
03.03	Discuss environmental noise, its effect on humans, and solutions to noise pollution.
03.04	Discuss legal aspects and consequences of noise pollution.
03.05	List the sources of noise.
03.06	Select the regulatory agency that controls noise sources.
03.07	List the control devices for different noise sources.
04.0	Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants – the student will be able to:
04.01	Demonstrate knowledge of basic laboratory operation.
04.02	Operate and calibrate selected laboratory instruments.
04.03	Operate and calibrate selected field instruments and equipment.
05.0	Sample, analyze and calculate data related to air and water pollutants – the student will be able to:
05.01	Gather and analyze selected samples.
05.02	Manipulate data and reach firm conclusions.
05.03	Write selected formal technical reports.
05.04	Identify and perform the correct analysis for selected air pollutants listed with state and federal regulations.
05.05	Identify and perform the correct analysis for selected parameters listed with state and federal regulations for wastewater effluent.
06.0	Demonstrate an awareness of radiation monitoring and radioactive contamination control – the student will be able to:
06.01	Discuss atomic structure, radiation and radioactive decay.

06.02	Discuss types and sources of radiation.
06.03	Demonstrate knowledge of radiation exposure and dosimetry experiments.
06.04	Discuss the immediate and long range effects of radiation on animals and plants.
06.05	Discuss nuclear power plant design, nuclear power hazards, and safety features.
06.06	Discuss nuclear fuel reprocessing and storage.
06.07	Discuss legal aspects and consequences of radioactive pollution.
07.0	Demonstrate an awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems – the student will be able to:
07.01	Discuss the composition, sources and quantity of solid waste.
07.02	Discuss methods of solid waste disposal.
07.03	Discuss various solutions to solid waste accumulations and disposal.
07.04	Discuss the legal aspects and consequences of solid waste pollution.
07.05	Identify the solid wastes from domestic households, municipalities and industry.
07.06	Identify a sanitary landfill.
07.07	Discuss the construction features of a safe landfill.
07.08	Discuss the possibilities of contaminants (leachates) seeping into the groundwater.
07.09	Discuss the need to have monitoring well located around a sanitary landfill.
07.10	Discuss those wastes that are permitted by state and federal regulation to be disposed at a landfill site.
08.0	Demonstrate employability skills – the student will be able to:
08.01	Conduct a job search.
08.02	Secure information about a job.
08.03	Identify documents that may be required when applying for a job.
08.04	Complete a job application.
08.05	Demonstrate competence in job interview techniques.

08.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.

08.07 Identify acceptable work habits.

08.08 Demonstrate knowledge of how to make job changes appropriately.

08.09 Demonstrate acceptable employee health habits.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

### **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Environmental Science Technician (0703010407 – 30 credit hours)  
Hazardous Materials Specialist (0703010403) – 14 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>



Florida Department of Education  
Curriculum Framework

**Program Title:** Landscape Operations (New)  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Program Number	8002100
CIP Number	0101060511
Grade Level	9-12, 30, 31
Standard Length	6 credits
Teacher Certification	AGRICUTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	37-3011 - Landscaping and Groundskeeping Workers 37-1012 - First-Line Supervisors of Landscaping, Lawn Service, an Groundskeeping Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of three occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

This program is a planned sequence of instruction consisting of a core and two completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations 1	1 credit	37-1011	3	EQ
	8121510	Introductory Horticulture 2	1 credit		3	PA
	8121520	Horticulture Science 3	1 credit		3	PA
B	8121310	Landscape and Turf Science 4	1 credit	37-1012	2	VO
	8121320	Landscape and Turf Science 5	1 credit		2	VO
C	8121410	Sports & Recreational Turf Operations 6	1 credit	37-1012	2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth- Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Agriscience Foundations 1	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%
Introductory Horticulture 2	4/87 5%	5/80 6%	39/83 47%	6/69 7%	24/67 39%	9/70 13%	7/69 10%	38/82 46%	7/66 11%	28/74 38%	4/72 6%
Horticulture Science 3	26/87 30%	23/80 29%	19/83 23%	26/69 38%	4/67 6%	30/70 43%	26/69 38%	18/82 22%	24/66 36%	9/74 12%	21/72 29%
Landscape and Turf Science 4	12/87 14%	13/80 16%	13/83 16%	12/69 17%	11/67 16%	15/70 21%	13/69 19%	14/82 17%	11/66 17%	13/74 18%	15/72 21%
Landscape and Turf Science 5	1/87 1%	4/80 5%	4/83 5%	2/69 3%	3/67 4%	4/70 6%	1/69 1%	5/82 6%	3/66 5%	5/74 7%	6/72 8%

Sports & Recreational Turf Operations 6	1/87 1%	3/80 4%	1/83 1%	3/69 4%	3/67 4%	2/70 3%	1/69 1%	1/82 1%	3/66 5%	3/74 4%	3/72 4%
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\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%
Introductory Horticulture 2	**	**	**	**	**	**	**
Horticulture Science 3	**	**	**	**	**	**	**
Landscape and Turf Science 4	**	**	**	**	**	**	**
Landscape and Turf Science 5	**	**	**	**	**	**	**
Sports & Recreational Turf Operations 6	**	**	**	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

### **National Standards (NS)**

Some or all of the courses in this program have been aligned with Industry or National Standards. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link:

[https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn\\_000.pdf](https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf)

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Landscape Operations.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Landscape Operations.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Landscape Operations.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Discuss components of food safety and handling practices in agriculture.
- 14.0 Describe the horticulture industry.
- 15.0 Identify safety procedures in the workplace.
- 16.0 Identify and classify plants.
- 17.0 Demonstrate plant propagation techniques.
- 18.0 Identify growing media and fertilizers.
- 19.0 Explain irrigation techniques for plants and turf.
- 20.0 Describe Integrated Pest Management approaches.
- 21.0 Describe the principles and requirements of plant growth.
- 22.0 Apply best management practices in the horticulture industry.
- 23.0 Identify principles of landscape design.
- 24.0 Describe varieties and care of indoor plants.
- 25.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Landscape Operations.
- 26.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Landscape Operations.
- 27.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Landscape Operations.
- 28.0 Apply safety procedures in the workplace.
- 29.0 Classify plants based on scientific principles.
- 30.0 Demonstrate proper use of growing media and fertilizers
- 31.0 Demonstrate Integrated Pest Management approaches.
- 32.0 Identify the principles and requirements of plant growth.

- 33.0 Apply best management practices in landscape design.
- 34.0 Demonstrate customer service skills that are essential in dealing with clients.
- 35.0 Apply principles of landscape design and maintenance.
- 36.0 Harvest, transport, and install plant materials.
- 37.0 Identify procedures to operate, repair, and maintain tools and equipment.
- 38.0 Identify emerging technologies in the horticulture industry.
- 39.0 Demonstrate leadership, employability, communications and human relations skills.
- 40.0 Describe personal traits, attitudes, customer approaches, and activities that help successful selling.
- 41.0 Maintain tools and equipment.
- 42.0 Demonstrate application of chemicals and calibrate spray equipment.
- 43.0 Classify plants and turfgrass.
- 44.0 Demonstrate fertilization skills.
- 45.0 Irrigate plants and turf.
- 46.0 Layout and/or install landscape and/or interiorscape.
- 47.0 Maintain customer relations and observe follow-up procedures.
- 48.0 Perform service on tools and equipment.
- 49.0 Apply chemicals and calibrate spray equipment.
- 50.0 Perform classification of plants and turfgrass.
- 51.0 Use fertilization skills.
- 52.0 Perform irrigation of plants and turf.
- 53.0 Maintain landscape.
- 54.0 Identify components of athletic fields.
- 55.0 Maintain athletic fields.
- 56.0 Develop recreational areas.
- 57.0 Maintain sports turf.
- 58.0 Establish turfgrass.
- 59.0 Tending and rejuvenating turf.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Landscape Operations.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.	

Florida Standards		Correlation to CTE Program Standard #
		LAFS.910.RST.2.4
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	
		LAFS.910.RST.2.5
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	
		LAFS.910.RST.2.6
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	
		LAFS.910.RST.3.7
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	
		LAFS.910.RST.3.8
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	
		LAFS.910.RST.3.9
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently.	
		LAFS.910.RST.4.10
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Landscape Operations.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content.	
		LAFS.910.WHST.1.1
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
		LAFS.910.WHST.1.2
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development,	



Florida Standards		Correlation to CTE Program Standard #
	organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03 Research to Build and Present Knowledge		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04 Range of Writing		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Landscape Operations.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics.	

Florida Standards		Correlation to CTE Program Standard #
	MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1	
03.06 Attend to precision.	MAFS.K12.MP.6.1	
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy-- The student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	CS.10.02.01
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
04.02 Analyze the impact of agriculture on the local, state, national and global economy.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
05.0 Practice agriscience safety skills and procedures--The student will be able to:		SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	
05.01 Identify the common causes and prevention of accidents in agriscience operations.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.06.03.01.a CS.07.04.01.c.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.02 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		FPP.01.02.01.a FPP.02.01.01.a FPP.02.02.02.a FPP.02.03
05.03 Identify proper disposal of hazardous waste materials and biohazards.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.07.04.01
05.04 Describe emergency procedures for: basic first aid, CPR, chemical spills, fire extinguisher use	LAFS910.SL.1.1 LAFS.1112.SL.1.1		ESS.04.02.02.b ESS.04.05.01
06.0 Apply scientific and technological principles to agriscience issues--The student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	CS.07.03.01.c
06.01 Employ scientific measurement skills.			
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 CS.10.01.01.a
06.03 Identify the parts and functions of plant and animal cells.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		BS.02.02.01 ESS.01.01.02.b
06.04 Describe the phases of cell reproduction.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		PS.01.02.01.c AS.02.02.02.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8		PS.01.02.01.b. AS.02.02.03.b
06.06 Interpret, analyze, and report data.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.11.01.01 CS.11.02.01
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).	LAFS.910.W.3.7 LAFS.1112.W.3.7		BS.02.05.03.a.
07.0 Apply environmental principles to the agricultural industry--The student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	BS.01.01.03.a.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci	National Standards
07.01	Research how different climactic and geological activity influences agriculture.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
07.02	Describe various ecosystems as they relate to the agriculture industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.02.06.09 CS.05.03.02
07.03	Describe the environmental resources (soil, water, air) necessary for agriculture production.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.01.01.02.
07.04	Identify regulatory agencies that impact agricultural practices.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS910.L.3.6 LAFS.1112.L.3.6		PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.05	Apply Best Management Practices that enhance the natural environment.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
07.06	Identify conservation practices related to natural resources.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		PS.03.04.01.b AS.08.01.01.c
08.0	Investigate and utilize basic scientific skills and principles in plant science- -The student will be able to:		SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	PS.03.04.01.a
08.01	Identify and describe the specializations within the plant science industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.02	Categorize plants based on specific characteristics according to industry and scientific standards.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.03	Examine the processes of plant growth including photosynthesis, respiration, transpiration, absorption, transfer, storage, reproduction, etc....	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.01.01.c.
08.04	Identify the nutrients required for plant growth from the periodic table and explain their functions.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.03.01 PS.01.03.02
08.05	Analyze information from a fertilizer label.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		PS.02.03.01

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.02.03.04
08.07 Investigate the impacts of various pests and propose solutions for their control.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.01.03 PS.03.01.02
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.03.02 PS.03.03.03 PS.03.03.04
08.09 Explore career opportunities in plant science.	LAFS.910.W.3.7 LAFS.1112.W.3.7		FPP01.01.01.a
09.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
09.02 Analyze commercially important livestock breeds in Florida.	LAFS.910.W.2.4 LAFS.1112.W.2.4		AS.02.01.02.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.	LAFS.910.L.3.6 LAFS.1112.L.3.6		AS.02.01.01.c
09.04 Compare and contrast animal welfare issues.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.01.02.a AS.05.02.01.a
09.05 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.06 Explore career opportunities in animal science.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
10.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to		SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
10.01 Select and demonstrate proper use of hand tools in agriculture.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		AS.06.02.01.a FPP01.01.01.a
10.02 Operate service and maintain agriscience equipment, and instruments.			AS.01.01.02.b.
10.03 Manage facilities and supplies.			
11.0 Demonstrate agribusiness, employability and human relation skills--The student will be able to:			CS.08.01.01.b PST.02.02.02.b.
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		PST.03.04.01.b PST.03.03.02.a.
11.02 Utilize a record keeping system to collect, interpret, and analyze data.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		PST.04.04.03.a PST.04.04.06.a
11.03 Enhance oral communications through telephone, interview and presentation skills.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.08.03.01.c PST.03.02.03.c. PST.01.03.01.a.
11.04 Enhance written communication by developing resumes and business letters.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.L.1.2 LAFS.1112.L.1.2		
11.05 Demonstrate interpersonal (nonverbal) communication skills.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
11.06 Demonstrate good listening skills.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.09.02.01.b CS.10.01.01.a.
12.0 Apply leadership and citizenship skills--The student will be able to:			CS.03.01.03.b.
12.01 Identify and describe leadership characteristics.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.02 Identify opportunities to apply acquired leadership skills.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.03 Identify and demonstrate ways to be an active citizen.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.02.02

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
12.04 Participate in community based learning activities.			
12.05 Demonstrate the ability to work cooperatively.			CS.01.06.01.a.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		CS.02.02.02.b.
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.02.c.
12.08 Develop both a leadership and a career development plan utilizing SMART goals that include 5, 10, and 20 year benchmarks.			
13.0 Discuss components of food safety and handling practices in agriculture - The student will be able to:			
13.01 Demonstrate proper safety precautions and use of personal protective equipment.			
13.02 Evaluate the food safety responsibilities that occur along the food supply chain.			
13.03 Explain techniques and procedures for the safe handling of food products.			
13.04 Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).			
13.05 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:**        **Introductory Horticulture 2**  
**Course Number:**    **8121510**  
**Course Credit:**     **1**

**Course Description:**

This course is designed to develop competencies in the areas of career opportunities; global importance of agriculture; plant classification; propagation; growing media; nutritional needs; fertilization; irrigation; pest identification; pest control, pruning; plant installation; transplanting; safe hand-tool use; and employability skills.

Florida Standards	Correlation to CTE Program Standard #
01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Landscape Operations.	
01.01 Key Ideas and Details	
01.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. <span style="float: right;">LAFS.910.RST.1.1</span>	
01.01.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. <span style="float: right;">LAFS.910.RST.1.2</span>	
01.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. <span style="float: right;">LAFS.910.RST.1.3</span>	
01.02 Craft and Structure	
01.02.1 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. <span style="float: right;">LAFS.910.RST.2.4</span>	
01.02.2 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). <span style="float: right;">LAFS.910.RST.2.5</span>	
01.02.3 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	



Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Landscape Operations.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's	

Florida Standards		Correlation to CTE Program Standard #
	capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Landscape Operations.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06	Attend to precision. MAFS.K12.MP.6.1	
03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning.  MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
14.0 Describe the horticulture industry – the student will be able to:			
14.01 Describe the importance of horticulture to the American and global economies.			
14.02 Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.			
14.03 Describe Florida laws and regulation as they apply to the horticulture industry.			
14.04 Describe the importance of horticulture to the environment, including sustainability practices			
15.0 Identify safety procedures in the workplace – the student will be able to:		SC.912.L.17.14, 17	
15.01 Identify the common causes of accidents in the horticulture industry.			
15.02 Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.			
15.03 Explain, identify and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) according to Environmental Protection Agency (EPA), Worker Protection Standard and Occupational Safety and Health Agency (OHSA) Regulations.			
16.0 Identify and classify plants – the student will be able to:		SC.912.L.14.2, 3, 7, 8, 10, 53 SC.912.L.15.4, 5, 6 SC.912.L.18.7, 8, 9	
16.01 Identify plants by botanical and common names.			PS.01.01.02.b PS.01.01.02.c
16.02 Classify plants botanically.			PS.01.01.01.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
16.03 Write botanical names for plants.			
17.0 Demonstrate plant propagation techniques – the student will be able to:		SC.912.L.14.7, 8 SC.912.L.16.3, 12, 14, 16	
17.01 Identify propagating and growing facilities and structures.			
17.02 Prepare propagation media.			PS.02.02.01.c
17.03 Select and collect propagation materials.			
17.04 Demonstrate propagation by sexual and asexual methods.			PS.03.01.02.a PS.03.01.03.a
17.05 Demonstrate environmental controls for propagation materials.			
17.06 Identify and select proper rooting hormones based on plant characteristics.			
18.0 Identify growing media and fertilizers – the student will be able to:		SC.912.E.6.2, 4 SC.912.L.18.11 SC.912.P.8.1, 11	
18.01 Identify soil and media materials and appropriate containers.			PS.02.02.01.b
18.02 Identify nutritional needs of plants.			PS.02.03.01.a
18.03 Identify symptoms of nutritional deficiencies and toxicities of plants.			PS.02.03.01.b
18.04 Identify types and kinds of fertilizers.			
18.05 Identify methods of distributing fertilizers.			PS.02.03.04.a
18.06 Interpret information on a label of fertilizer used in Florida.			
19.0 Explain irrigation techniques for plants and turf – the student will be able to:		SC.912.L.18.12 SC.912.E.7.1	
19.01 Identify water needs of plants.			
19.02 Irrigate plants at recommended rates.			
19.03 Identify the symptoms of excessive water and water stress in plants.			
19.04 Describe the basic irrigation systems and principles used in the landscape and nursery.			
20.0 Describe Integrated Pest Management approaches – the student will be able to:		SC.912.L.14.9	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
20.01 Identify common pests and pathogens of plants.			PS.03.03.01.a
20.02 Describe life cycles of common pests and pathogens of plants.			PS.03.03.02.c PS.03.03.02.b
20.03 Recognize signs of damage from pests and pathogens.			PS.03.03.02.a
21.0 Describe the principles and requirements of plant growth – the student will be able to:		SC.912.E.7.1 SC.912.L.18.7, 9, 10 SC.912.P.10.1	
21.01 Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis and respiration.			PS.01.03.01.b
21.02 Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.			PS.01.03.01.c
21.03 Explain the process of respiration and transpiration and describe the flow of energy in plants.			PS.01.03.02.b PS.01.03.02.c
21.04 Describe the influence of light and temperature on plant growth including phototropism.			PS.01.03.04.b
22.0 Apply best management practices in the horticulture industry – the student will be able to:		SC.912.L.17.9, 11, 12, 13, 14, 15 SC.912.N.1.1 SC.912.N.2.4	
22.01 Identify and apply Best Management Practices to reduce pollution and conserve water.			
22.02 Identify and apply Best Management Practices on fertilizer recommendations for Florida plants including turf..			
22.03 Explain the concept of nonpoint source pollution, and the watershed environment.			
23.0 Identify principles of landscape design – the student will be able to:		SC.912.L.17.17	
23.01 Conduct a customer interview to determine needs and personal tastes of client.			
23.02 Compare and contrast the use of line, form, texture and color in designing landscapes.			PS.04.01.01.b
23.03 Identify the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.			PS.04.01.01.a
23.04 Identify points of emphasis and major design areas in the residential landscape.			PS.04.01.01.c
23.05 Identify plant selection for a residential landscape using Florida Friendly Landscape Principles.			
23.06 Read and interpret a landscape plan.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
23.07 Develop skills for drawing and identifying symbols.			
23.08 Draw and design a landscape plan for a small garden.			
23.09 Construct a landscape display.			
24.0 Describe varieties and care of indoor plants – the students should be able to:			
24.01 Identify common indoor plants			
24.02 Describe the lighting and environmental needs of indoor plants.			
24.03 Describe water, cleaning, and fertilizations needs for plants used indoors.			
24.04 Describe the most common problems with indoor foliage including pathogens, pests, and cultural damage.			
24.05 Analyze the air quality benefits of indoor plants.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Horticulture Science 3  
**Course Number:** 8121520  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of industry regulations; plant classification; plant transportation; soil sampling and analysis; fertilizer calculations; recording keeping; irrigation components, water quality; drainage; integrated pest management; pesticide safety and regulations; equipment calibration; chemical growth regulators; xeriscaping; integrated landscape management; safe use of power equipment; record keeping; and employability skills.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
25.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Landscape Operations.	
25.01	Key Ideas and Details	
25.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.  LAFS.1112.RST.1.1	
25.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.1112.RST.1.2	
25.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.1112.RST.1.3	
25.02	Craft and Structure	
25.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.  LAFS.1112.RST.2.4	
25.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.  LAFS.1112.RST.2.5	
25.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.  LAFS.1112.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
25.03 Integration of Knowledge and Ideas		
25.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
25.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
25.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
25.04 Range of Reading and Level of Text Complexity		
25.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
25.04.2		
26.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Landscape Operations.	
26.01 Text Types and Purposes		
26.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
26.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
26.02 Production and Distribution of Writing		
26.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
26.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
26.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback,	



Florida Standards		Correlation to CTE Program Standard #
	including new arguments or information. LAFS.1112.WHST.2.6	
26.03	Research to Build and Present Knowledge	
26.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
26.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
26.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
26.04	Range of Writing	
26.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
27.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Landscape Operations.	
27.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
27.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
27.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
27.04	Model with mathematics. MAFS.K12.MP.4.1	
27.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
27.06	Attend to precision. MAFS.K12.MP.6.1	
27.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
27.08 Look for and express regularity in repeated reasoning.  MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
28.0 Apply safety procedures in the workplace – the student will be able to:			
28.01 Describe emergency procedures in the horticulture workplace.			
28.02 Create preventive measures to avoid hazardous situations.			
28.03 Identify appropriate PPE (Personal Protective Equipment) for all activities.			
28.04 Use MSDS for all materials used.			
28.05 Identify specific hazards with industry specific equipment, and conduct equipment care and maintenance.			
28.06 Apply problem solving skills to correct a hazardous situation.			
29.0 Classify plants based on scientific principles – the student will be able to:		SC.912.L.14.2, 3, 7, 8, 10, 53 SC.912.L.15.4, 5, 6 SC.912.L.18.7, 8, 9	
29.01 Describe principles of plant biology and growth.			PS.01.03.03.c
29.02 Explain the role of plants in the ecosystem.			
29.03 Describe the major classifications of plants based on life cycle.			PS.01.01.01.c
29.04 Demonstrate the use of botanical and common names of plants including genus and specific epithet and cultivar.			
29.05 Demonstrate proper use of botanical names.			
30.0 Demonstrate proper use of growing media and fertilizers – the student will be able to:		SC.912.E.6.2, 4 SC.912.L.18.11 SC.912.P.8.5, 7, 11	
30.01 Apply information on a label of fertilizer, including updated BMP rules, used in Florida.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
30.02 Apply fertilizer and soil amendments.			Ps.02.03.04.b PS.02.03.04.c
30.03 Identify materials that are needed to alter pH and calculate the amount to apply to change the pH.			PS.02.03.02.a PS.02.03.02.c
30.04 Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.			
30.05 Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.			PS.02.03.01.a
30.06 Using references make fertilizer recommendations for ornamental plants, turf grass, and palms.			
31.0 Demonstrate Integrated Pest Management approaches – the student will be able to:		SC.912.L.14.9 SC.912.L.17.6, 7, 12, 13, 15	
31.01 Classify insects according to feeding habits.			
31.02 Describe IMP (Integrated Pest Management) methods of controlling plant pests.			PS.03.03.03.a
31.03 Diagnose and outline a plan for controlling pests on a horticultural crop.			PS.03.03.02.c
31.04 Describe methods of controlling nematode pests on ornamental plants, and use BMPs to prevent infestation..			
31.05 Develop a pest control program for a horticultural crop using Integrated Pest Management.			
31.06 Identify specific cultural, mechanical, chemical, and biological methods of weed management.			
31.07 Identify evasive and poisonous plants in Florida.			
31.08 Identify types of weeds common to Florida.			
32.0 Identify the principles and requirements of plant growth – the student will be able to:		SC.912.L.14.7, 15, 17, 31 SC.912.N.1.1, 7 SC.912.P.8.8, 9, 10	
32.01 Demonstrate methods of pruning plants.			
32.02 Identify appropriate time to prune plants.			
32.03 Identify and select pruning tools.			
32.04 Demonstrate proper use of pruning tools and care.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
32.05 Demonstrate sanitation of tools to prevent the spread of disease.			
32.06 Identify Plant Growth Regulators and their use on horticulture and landscape plants.			PS.01.03.04.a
32.07 Outline and use a record book for the use of a plant growth regulator on a horticultural or nursery crop.			
32.08 Identify appropriate pruning techniques to achieve plant size, form, and shape.			
33.0 Apply best management practices in landscape design – the student will be able to:		SC.912.L.17.9, 11, 12, 13, 14, 15 SC.912.N.1.1 SC.912.N.2.4	
33.01 Identify and apply Best Management Practices for the design and installation of landscapes.			
33.02 Identify and apply Best Management Practices on the management and handling of pesticides.			PS.03.03.04.b
34.0 Demonstrate customer service skills that are essential in dealing with clients.- the student will be able to:			
34.01 Demonstrate ability to communicate clearly with the client.			
34.02 Conduct a walk through and interview with client to assure clear vision.			
34.03 Identify future expectations of the client relationship.			
35.0 Apply principles of landscape design and maintenance – the student will be able to:		SC.912.L.17.17	
35.01 Demonstrate the use of line, form, texture and color in designing landscapes.			PS.04.01.01.b
35.02 Demonstrate the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.			PS.04.01.02.b
35.03 Apply points of emphasis and major design areas in the commercial landscape.			
35.04 Identify plant selection for a commercial and residential landscape using Florida Friendly Landscape Principles.			
35.05 Create a landscape plan for a residential or commercial property.			PS.04.01.02.c
35.06 Calculate materials needed according to the identified landscape plan.			PS.04.01.01.c
35.07 Identify factors in selecting turf for landscape installation.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
36.0 Harvest, transport, and install plant materials – the student will be able to:		SC.912.L.17.4, 15, 17	
36.01 Determine requirements for preserving plant viability.			
36.02 Demonstrate proper landscape plant establishment techniques.			
36.03 Select and prepare plants for transporting and transplanting.			
36.04 Select horticultural products according to Florida grades and standards.			PS.03.05.04.b
37.0 Identify procedures to operate, repair, and maintain tools and equipment – the student will be able to:		SC.912.N.1.1	
37.01 Perform equipment pre-operational check.			
37.02 Identify, maintain, and operate hand tools and power tools.			PS.03.05.01.c
38.0 Identify emerging technologies in the horticulture industry – the student will be able to:		SC.912.L.16.1, 2, 7, 9, 10 SC.912.L.17.15, 17	
38.01 Investigate DNA and genetic applications in horticulture including the theory of probability.			PS.03.01.05
38.02 Evaluate advances in biotechnology that impact horticulture. (e.g. transgenic crops, biological controls, micro propagation etc.).			PS.03.01.04.a PS.03.01.05.b
38.03 Investigate ways that GIS, Remote sensing, and precision agriculture, and UAV or RPA (Unmanned Ariel Vehicles) (Remotely Piloted Aircraft) are used in the Horticulture industry.			
39.0 Demonstrate leadership, employability, communications and human relations skills – the student will be able to:		SC.912.N.1.7	
39.01 Identify appropriate work habits and personal characteristics.			
39.02 Identify proper employee hygiene habits.			
39.03 Identify or demonstrate appropriate responses to criticism from employer,			
39.04 Describe the importance of employee industry certifications.			
39.05 Discuss education opportunities available in the area of Horticulture.			
40.0 Describe personal traits, attitudes, customer approaches, and activities that help successful selling. – the student will be able to:			
40.01 Demonstrate proper customer communication techniques.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
40.02 Determine your products pricing structure.			
40.03 Discuss components of customer satisfaction.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Landscape and Turf Science 4  
**Course Number:** 8121310  
**Course Credit:** 1

**Course Description:**

This course is designed to further develop competencies in the areas of use and maintenance of landscape and turf equipment; classification of plants and turfgrass; fertilization; and irrigation.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
25.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Landscape Operations.	
25.01	Key Ideas and Details	
25.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
25.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
25.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
25.02	Craft and Structure	
25.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
25.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
25.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
25.03	Integration of Knowledge and Ideas	
25.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
25.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
25.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
25.04	Range of Reading and Level of Text Complexity	
25.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
25.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
26.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Landscape Operations.	
26.01	Text Types and Purposes	
26.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
26.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
26.02	Production and Distribution of Writing	
26.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
26.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
26.02.3	Use technology, including the Internet, to produce, publish, and update	



Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
26.03	Research to Build and Present Knowledge	
26.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
26.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
26.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
26.04	Range of Writing	
26.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
27.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Landscape Operations.	
27.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
27.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
27.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
27.04	Model with mathematics. MAFS.K12.MP.4.1	
27.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
27.06	Attend to precision. MAFS.K12.MP.6.1	
27.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
27.08 Look for and express regularity in repeated reasoning.  MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
41.0 Maintain tools and equipment – the student will be able to:		SC.912.N.1.1 SC.912.N.2.4 SC.912.P.12.3, 5	
41.01 Maintain oil level in engines of power equipment.			
41.02 Check and maintain tire air pressure on equipment.			
41.03 Maintain fuel levels using proper fuel or fuel mixtures.			
41.04 Demonstrate proper equipment operations.			
41.05 Identify, operate, and maintain tractor and power equipment.			
42.0 Demonstrate application of chemicals and calibrate spray equipment – the student will be able to:		SC.912.L.16.6 SC.912.L.17.15, 16, 17 SC.912.N.1.1 SC.912.N.2.4	
42.01 Select, mix, and apply a non-restricted chemical according to the label and local, state, federal, and EPA regulations.			
42.02 Discuss appropriate responses to chemical or fertilizer spills.			
42.03 Identify and report insect and disease damage on plants and turf.			
42.04 Diagnose a plant or disease problem on turf.			
43.0 Classify plants and turfgrass – the student will be able to:		SC.912.L.14.5, 7, 10, 53 SC.912.L.15.4, 6 SC.912.L.17.7 SC.912.N.1.1 SC.912.N.2.4	
43.01 Classify plants including turfgrass as annuals, biennials, and perennials.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
43.02 Identify plants including turfgrass that are specific to a region.			
43.03 Identify common weeds in Florida turf grasses.			
44.0 Demonstrate fertilization skills – the students will be able to:		SC.912.N.1.1 SC.912.N.2.4	
44.01 Develop a fertilization schedule.			
44.02 Interpret fertilizer charts and develop recommendations according to turf species.			
45.0 Irrigate plants and turf – the student will be able to:		SC.912.N.1.1 SC.912.N.2.4 SC.912.P.10.15	
45.01 Identify various types of irrigation systems.			
45.02 Install and maintain piping and water distribution components.			
45.03 Install valves, timers, rain shut-offs, moisture sensors, and back flow prevention devices.			
45.04 Design a microirrigation system.			
45.05 List problems associated with improper design, installation and maintenance.			
46.0 Layout and/or install landscape and/or interiorscape – the student will be able to:			
46.01 Prepare landscape and/or interiorscape.			
46.02 Prepare final grade.			
46.03 Install mulch and perform final cleanup.			
46.04 Calculate labor costs associated with installation.			
47.0 Maintain customer relations and observe follow-up procedures – the student will be able to:			
47.01 Conduct walk-through of project with client to assure satisfaction.			
47.02 Identify current and future maintenance requirements.			
47.03 Analyze project records for profitability and employee performance			

Florida Department of Education  
Student Performance Standards

**Course Title:** Landscape and Turf Science 5  
**Course Number:** 8121320  
**Course Credit:** 1

**Course Description:**

This course is designed to further develop competencies in the areas of chemical application; equipment calibration; analyzing and designing landscape and turf; preparing estimates and contracts; and lay out and installation of landscape, interiorscape and turf.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
48.0 Perform service on tools and equipment – the student will be able to:		SC.912.N.1.1 SC.912.N.2.4 SC.912.P.10.3 SC.912.P.12.3, 4, 5	
42.01 Service and maintain battery and electrical systems.			
42.02 Perform minor tune-up on engines.			
42.03 Load, balance, secure, and transport equipment.			
42.04 Demonstrate safety precautions while working with tools and equipment.			
49.0 Apply chemicals and calibrate spray equipment – the student will be able to:		SC.912.L.17.15 SC.912.N.1.1 SC.912.N.2.4	
43.01 Calibrate spray and spread equipment.			
43.02 Determine chemical compatibility.			
43.03 Determine appropriate time frequency and method of chemical application according to the label.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
43.04 Apply Best Management Practices for fertilizer, and any additional chemicals.			
50.0 Perform classification of plants including turfgrass – the student will be able to:		SC.912.L.14.5, 7, 10, 53 SC.912.L.15.4, 6 SC.912.L.17.7 SC.912.N.1.1 SC.912.N.2.4	
44.01 Classify plants including turfgrass according to growth habit.			
44.02 Identify hazardous, poisonous, and evasive plants.			
51.0 Use fertilization skills – the students will be able to:		SC.912.N.1.1	
45.01 Determine rate of fertilizer application.			
45.02 Calibrate fertilizer equipment.			
52.0 Perform irrigation of plants including turf – the student will be able to:			
46.01 Check and evaluate irrigation system performance.			
46.02 Maintain irrigation system.			
46.03 Recognize symptoms of water stress on plants including turf grasses.			
46.04 Apply general knowledge of appropriate state laws to irrigation practices.			
53.0 Maintain landscape – the student will be able to:			
46.05 Perform maintenance inspection of the project.			
46.06 Determine water requirements and apply at proper rates.			
46.07 Identify weeds and apply herbicides safely.			
46.08 Determine fertilization requirements and apply at proper rates.			
46.09 Identify plant pest and disease problems and apply corrective measures.			
46.10 Trim and prune landscape plants.			
46.11 Maintain turf viability; mow at proper height and frequency, blade edge, line trim, and remove trash.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
46.12 Explain cause and effect of soil compaction and thatch buildups, and determine appropriate methods of correction.			
46.13 Identify mulch selection to cultivate plantings.			
46.14 Brace and repair trees including palms.			
46.15 Provide protection for plants from adverse weather conditions.			
46.16 Comply with local, state, and federal regulations and laws regarding landscape maintenance and pesticide applications.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Sports and Recreational Turf Operations 6  
**Course Number:** 8121410  
**Course Credit:** 1

**Course Description:**

This course is designed to further develop competencies in the areas of chemical application; equipment calibration; analyzing and designing turf;; and lay out and installation of turf.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci	National Standards
54.0	Identify components of athletic fields – the student will be able to:			
54.01	Identify turf selection for various athletic fields.			
54.02	Identify appropriate dimensions for different athletic fields and specific requirements.			
55.0	Maintain athletic fields – the student will be able to:		SC.912.N.1.1; SC.912.N.2.4, 5	
47.01	Apply proper line marks for athletic fields.			
47.02	Painting fields (school logos or names)			
47.03	Apply proper techniques for clay maintenance.			
47.04	Mow grass to appropriate height for field use.			
56.0	Develop recreational areas – the student will be able to:		SC.912.N.1.1 SC.912.N.2.4, 5	
48.01	Establish plant beds with annuals, biennials, and perennials.			
48.02	Plant accent trees and shrubs in a recreational area.			

48.03	Establish sports turf.			
57.0	Maintain sports turf – the student will be able to:		SC.912.N.1.1 SC.912.N.2.4, 5	
49.01	Mow sport turf with reel mowers.			
49.02	Irrigate turf.			
49.03	Verticut turf.			
49.04	Aerate turf and remove debris.			
58.0	Establish turfgrass – the student will be able to:			
51.01	Level seedbed.			
51.02	Plant turf by sprigs, plugs or sod.			
51.03	Remove sod with sod cutter.			
59.0	Tending and rejuvenating turf – the student will be able to:		SC.912.N.1.1 SC.912.N.2.4, 5	
59.01	Apply top dressing.			
59.02	Overseed turf.			
59.03	Irrigate turf.			
59.04	Aerate turf.			
59.05	Apply fertilizer.			



## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified

for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Agriculture Biotechnology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Program Number	8003100
CIP Number	0126120101
Grade Level	9-12, 30, 31
Standard Length	5 credits
Teacher Certification	AGRICUTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	19-4021 - Biological Technicians 19-1011 - Animal Scientists 19-1013 - Soil and Plant Scientists
Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of three occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

This program can be taken by students as a three credit program by completing OCP A, a four credit program by completing OCP A and B or OCP A and C, or a 5 credit program by completing OCP A, B and C.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations	1 credit	19-4021	3	EQ
	8106850	Agricultural Biotechnology 2	1 credit		3	VO
	8106860	Agricultural Biotechnology 3	1 credit		3	EQ
B	8106120	Animal Biotechnology	1 credit	19-1011	3	VO
C	8106510	Plant Biotechnology	1 credit	19-1013	3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth- Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Agriscience Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%
Agricultural Biotechnology 2	9/87 10%	9/80 11%	44/83 53%	10/69 14%	25/67 37%	11/70 16%	19/69 28%	16/82 21%	11/66 17%	33/74 45%	7/72 10%
Agricultural Biotechnology 3	26/87 30%	29/80 36%	13/83 16%	30/69 43%	3/67 4%	39/70 56%	29/69 42%	7/82 8%	30/66 45%	8/74 11%	28/72 38%
Animal Biotechnology	34/87 39%	29/80 36%	14/83 17%	30/69 43%	6/67 9%	30/70 43%	34/69 49%	9/82 11%	27/66 41%	10/74 16%	29/72 40%
Plant Biotechnology	24/87 28%	23/80 29%	13/83 16%	22/69 32%	3/67 4%	25/70 36%	28/69 41%	10/82 12%	22/66 33%	4/74 5%	23/72 32%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%
Agricultural Biotechnology 2	19/67 28%	14/75 19%	17/54 31%	10/46 21%	10/45 22%	3/45 7%	3/45 7%
Agricultural Biotechnology 3	4/67 0%	7/75 9%	#	12/46 26%	12/45 27%	12/45 27%	12/45 27%
Animal Biotechnology	11/67 16%	17/75 23%	8/54 15%	#	#	8/45 18%	8/45 18%
Plant Biotechnology	10/67 15%	18/75 24%	8/54 0%	#	#	8/45 18%	/45 18%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

### **National Standards (NS)**

Some or all of the courses in this program have been aligned with Industry or National Standards. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link:

[https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn\\_000.pdf](https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf)

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Biotechnology.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Biotechnology.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Identify the historical, social, cultural and potential applications of biotechnology.
- 14.0 Conduct scientific investigation and apply results.
- 15.0 Practice agricultural laboratory safety.
- 16.0 Apply genetic principles to agricultural production.
- 17.0 Demonstrate laboratory skills as applied to biotechnology.
- 18.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR).
- 19.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Biotechnology.
- 20.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Biotechnology.
- 21.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology.
- 22.0 Recognize and follow quality control procedures and regulatory guidelines.
- 23.0 Analyze the historical, social, cultural and potential applications of biotechnology.
- 24.0 Demonstrate proper tissue/cell culture techniques.
- 25.0 Demonstrate the application of biotechnology to the Agriculture, Food and Natural Resources (AFNR) industries.
- 26.0 Demonstrate leadership, employability, communication and human relation skills.

## **Animal Biotechnology**

- 27.0 Apply genetic principles to animal science.
- 28.0 Interpret the relationship between total digestible nutrients (TDN) in feeds and its utilization.

- 29.0 Examine the developmental processes that determine animal growth.
- 30.0 Investigate the reproduction system of animals.
- 31.0 Describe animal science and the role of animals in society.

### **Plant Biotechnology**

- 32.0 Describe plant classifications and the economic impact to your region.
- 33.0 Apply genetic principles to plant improvement.
- 34.0 Demonstrate methods of micropropagating plants.
- 35.0 Demonstrate methods of plant production.
- 36.0 Use plants to demonstrate growth disorders (nutrients, pathogens, pests).
- 37.0 Identify the historical, social, cultural and potential applications of plant biotechnology.



**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agriculture Biotechnology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical	

Florida Standards		Correlation to CTE Program Standard #
	context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
01.04.2		
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agriculture Biotechnology.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	

Florida Standards		Correlation to CTE Program Standard #
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agriculture Biotechnology.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	

Florida Standards		Correlation to CTE Program Standard #
03.03	Construct viable arguments and critique the reasoning of others.	MAFS.K12.MP.3.1
03.04	Model with mathematics.	MAFS.K12.MP.4.1
03.05	Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06	Attend to precision.	MAFS.K12.MP.6.1
03.07	Look for and make use of structure.	MAFS.K12.MP.7.1
03.08	Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy-- The student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	CS.10.02.01
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
04.02 Analyze the impact of agriculture on the local, state, national and global economy.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
05.0 Practice agriscience safety skills and procedures--The student will be able to:		SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
		SC.912.P.8.7;	
05.01 Identify the common causes and prevention of accidents in agriscience operations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.06.03.01.a CS.07.04.01.c.
05.02 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		FPP.01.02.01. a FPP.02.01.01. a FPP.02.02.02. a FPP.02.03
05.03 Identify proper disposal of hazardous waste materials and biohazards.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.07.04.01
05.04 Describe emergency procedures for: basic first aid, CPR, chemical spills, fire extinguisher use	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ESS.04.02.02. b ESS.04.05.01
06.0 Apply scientific and technological principles to agriscience issues--The student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	CS.07.03.01.c
06.01 Employ scientific measurement skills.			
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 CS.10.01.01.a
06.03 Identify the parts and functions of plant and animal cells.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		BS.02.02.01 ESS.01.01.02. b
06.04 Describe the phases of cell reproduction.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.01.02.01.c AS.02.02.02.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8		PS.01.02.01.b. AS.02.02.03.b

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
06.06 Interpret, analyze, and report data.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.11.01.01 CS.11.02.01
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).	LAFS.910.W.3.7 LAFS.1112.W.3.7		BS.02.05.03.a.
07.0 Apply environmental principles to the agricultural industry--The student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	BS.01.01.03.a.
07.01 Research how different climactic and geological activity influences agriculture.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
07.02 Describe various ecosystems as they relate to the agriculture industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.02.06.09 CS.05.03.02
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.01.01.02.
07.04 Identify regulatory agencies that impact agricultural practices.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS910.L.3.6 LAFS.1112.L.3.6		PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.05 Apply Best Management Practices that enhance the natural environment.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
07.06 Identify conservation practices related to natural resources.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		PS.03.04.01.b AS.08.01.01.c
08.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:		SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	PS.03.04.01.a
08.01 Identify and describe the specializations within the plant science industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.02 Categorize plants based on specific characteristics according to	LAFS.910.W.2.4 LAFS.1112.W.2.4		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
industry and scientific standards.			
08.03 Examine the processes of plant growth including photosynthesis, respiration, transpiration, absorption, transfer, storage, reproduction, etc....	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.01.01.c.
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.03.01 PS.01.03.02
08.05 Analyze information from a fertilizer label.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		PS.02.03.01
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.02.03.04
08.07 Investigate the impacts of various pests and propose solutions for their control.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.01.03 PS.03.01.02
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.03.02 PS.03.03.03 PS.03.03.04
08.09 Explore career opportunities in plant science.	LAFS.910.W.3.7 LAFS.1112.W.3.7		FPP01.01.01.a
09.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
09.02 Analyze commercially important livestock breeds in Florida.	LAFS.910.W.2.4 LAFS.1112.W.2.4		AS.02.01.02.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.	LAFS.910.L.3.6 LAFS.1112.L.3.6		AS.02.01.01.c
09.04 Compare and contrast animal welfare issues.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4		AS.02.01.02.a AS.05.02.01.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
	LAFS.1112.SL.2.4		
09.05 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.06 Explore career opportunities in animal science.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
10.0 Demonstrate the use of agriscience tools, equipment, and instruments-- The student will be able to		SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c
10.01 Select and demonstrate proper use of hand tools in agriculture.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		AS.06.02.01.a FPP01.01.01.a
10.02 Operate service and maintain agriscience equipment, and instruments.			AS.01.01.02.b.
10.03 Manage facilities and supplies.			
11.0 Demonstrate agribusiness, employability and human relation skills--The student will be able to:			CS.08.01.01.b PST.02.02.02. b.
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		PST.03.04.01. b PST.03.03.02. a.
11.02 Utilize a record keeping system to collect, interpret, and analyze data.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		PST.04.04.03. a PST.04.04.06. a
11.03 Enhance oral communications through telephone, interview and presentation skills.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.08.03.01.c PST.03.02.03.c .



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
			PST.01.03.01.a.
11.04 Enhance written communication by developing resumes and business letters.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.L.1.2 LAFS.1112.L.1.2		
11.05 Demonstrate interpersonal (nonverbal) communication skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
11.06 Demonstrate good listening skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.09.02.01.b CS.10.01.01.a.
12.0 Apply leadership and citizenship skills--The student will be able to:			CS.03.01.03.b.
12.01 Identify and describe leadership characteristics.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.02 Identify opportunities to apply acquired leadership skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.03 Identify and demonstrate ways to be an active citizen.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.02.02
12.04 Participate in community based learning activities.			
12.05 Demonstrate the ability to work cooperatively.			CS.01.06.01.a.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		CS.02.02.02.b.
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.02.c.
12.08 Develop both a leadership and a career development plan utilizing SMART goals that include 5, 10, and 20 year benchmarks.			
13.0 Discuss components of food safety and handling practices in agriculture - The student will be able to:			
13.01 Demonstrate proper safety precautions and use of personal protective equipment.			
13.02 Evaluate the food safety responsibilities that occur along the food supply chain.			
13.03 Explain techniques and procedures for the safe handling of food products.			

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
13.04 Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).			
13.05 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Biotechnology 2  
**Course Number:** 8106850  
**Course Credit:** 1

**Course Description:**

This course was developed as a core and is designed to develop competencies in the areas of agricultural biotechnology in agriculture, scientific investigation, laboratory safety, scientific and technological concepts; and the fundamentals of biotechnology.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Biotechnology	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).  LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Biotechnology	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06	Attend to precision. MAFS.K12.MP.6.1	
03.07	Look for and make use of structure.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
14.0 Identify the historical, social, cultural and potential applications of biotechnology – the student will be able to:			
14.01 Define biotechnology and explore the historical impact on agriculture.	LAFS.910.L.3.6	SC.912.L.16.10	BS.01.01.01.a. BS.01.01.01.b.
14.02 Explain the developmental progression of biotechnology.			
14.03 Examine current research and applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture.	LAFS.910.RI.3.8	SC.912.N.1.1	BS.01.01.01.c. BS.01.01.02.a. BS.01.01.02.b BS.01.01.03.a.
14.04 Describe the role of agencies that regulate biotechnology.	LAFS.910.SL.1.2	SC.912.L.17.13	
14.05 Interpret the major regulatory issues related to biotechnology.		SC.912.L.17.13	
14.06 Explore ethical, legal and social biotechnology issues.	LAFS.910.SL.1.2	SC.912.L.16.10	
14.07 Research emerging problems and issues and evaluate the benefits and risks associated with biotechnology.	LAFS.910.W.3.7, 8 LAFS.910.SL.1.1, 2	SC.912.L.16.10	BS.01.01.03.b. BS.01.01.03.c.
14.08 Investigate the emergence and evolution of biological organisms and their use in biotechnology.	LAFS.910.W.3.7, 8 LAFS.910.SL.1.1, 2	SC.912.L.15.1, 2, 3, 8, 14;	BS.01.03.02.a
14.09 Examine intellectual properties associated with biotechnology by defining their components.	LAFS.910.W.3.7, 8 LAFS.910.SL.1.1, 2 LAFS.1112.RI.3.8	SC.912.L.16.10; SC.912.L.17.13	BS.01.03.03.a.
14.10 Examine an ethical dilemma associated with biotechnology by identifying its components.	LAFS.910.RI.1.2	SC.912.L.16.10	BS.01.03.01.a.
15.0 Conduct scientific investigation and apply results – the student will be able to:			
15.01 Discuss the differences between scientific laws and scientific theories.	LAFS.910.SL.1.1	SC.912.N.3.1, 2, 3, 4;	
15.02 Design an agricultural experiment using appropriate control measures.		SC.912.N.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
15.03 Collect and record data using SI units.	MAFS.912.N-Q.1.1, 3	SC.912.N.1.1	
15.04 Using the scientific method summarize data, draw conclusions, and plan follow-up experiments.	MAFS.912.S-IC.2.3, 4, 5, 6	SC.912.N.1.1	
16.0 Practice agricultural laboratory safety – the student will be able to:			
16.01 Identify first aid supplies, personnel and emergency protection areas.			
16.02 Monitor, use, store and dispose of hazardous materials and disposal of biological pathogens according to industry practices.		SC.912.L.17.14	
16.03 Document safety training and practices (reading and interpreting) using Material Safety Data Sheets (MSDS) and Occupational Safety and Health Administration (OSHA) standards.		SC.912.L.17.14, 16;	
16.04 Demonstrate and utilize safety equipment.			
16.05 Identify safety symbols and signs.			
16.06 Demonstrate appropriate safety procedures and guidelines, and discuss implications of safety violations.			
17.0 Apply genetic principles to agricultural production – the student will be able to:			
17.01 Describe the relationship between reproduction and genetic improvement.	LAFS.910.SL.2.4	SC.912.L.16.17	
17.02 Demonstrate how traits are inherited.		SC.912.L.16.1, 2;	Bs.02.05.02.c
17.03 Describe how genetic processes and structures control inheritance.	LAFS.910.SL.2.4	SC.912.L.16.1, 2, 16;	
17.04 Predict probable results of single or multiple trait crosses.	MAFS.912.S-MD.2.7 MAFS.912.S-MD.1.1, 3	SC.912.L.16.3, 16;	
17.05 Differentiate between dominant and recessive traits.	LAFS910.L.3.6	SC.912.L.16.2	
17.06 Describe the chemical and physical properties of DNA.		SC.912.L.16.3	BS.02.05.02.a
17.07 Develop a hypothetical species using genetic engineering.		SC.912.N.4.2	
17.08 Debate the safeguards used in research in genetic engineering.	LAFS.910.SL.1.1, 3	SC.912.N.4.2; SC.912.L.16.10	
17.09 Perform DNA manipulations, such as cloning/subcloning, blotting, sequencing and amplification.		SC.912.L.16.12	BS.02.05.03.c
17.10 Analyze factors that influence gene expression.		SC.912.L.16.5, 6;	BS.02.05.02.c

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
17.11 Describe the process of genetic marker assisted selection.	LAFS.910.SL.2.4	SC.912.L.16.7	
<b>18.0 Demonstrate laboratory skills as applied to biotechnology – the student will be able to:</b>			
18.01 Maintain and interpret biotechnology laboratory and production records.	LAFS.910.W.1.2		
18.02 Operate laboratory equipment and measurement devices.			
18.03 Demonstrate aseptic techniques in the biotechnology laboratory.			
18.04 Select an appropriate standard operating procedure for working with biological materials and equipment.		SC.912.P.8.7	
18.05 Prepare buffers, reagents, solutions and media.	MAFS.912.N-Q.1.2 MAFA.912.A-CED.1.3	SC.912.P.8.11	BS.02.04.01.b.
18.06 Inventory biological and chemical materials, and maintain accurate records of supplies and expiration dates.			BS.02.04.02.b.
18.07 Isolate, maintain, quantify and store cell cultures.		SC.912.P.12.12	BS.02.05.01.b.
18.08 Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.	LAFS.910.W.1.2	SC.912.L.16.2, 11	BS.02.05.02.b.
18.09 Extract and purify DNA.		SC.912.L.16.12	BS.02.05.03.a.
18.10 Perform protein separation techniques and interpret the results.		SC.912.P.8.6, 11; SC.912.L.18.4	
18.11 Describe how antibodies are formed and how they can be used in biotechnology applications.	LAFS.910.SL.2.4	SC.912.L.14.52	BS.02.05.05.a
18.12 Research and describe the use of biotechnology to detect microbes.	LAFS.910.W.3.7 LAFS.910.L.1.1, 6	SC.912.L.14.52	BS.02.05.06.b.
<b>19.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR) – the student will be able to:</b>			
19.01 Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes.	LAFS.910.SL.2.4	SC.912.L.16.10	BS.03.01.01.a
19.02 Differentiate the roles of carbohydrates, fats, and proteins in biotechnology applications.		SC.912.L.18.1	
19.03 Describe the role of fermentation in biotechnology applications.		SC.912.L.18.8	BS.03.02.03.a
19.04 Diagram the processes used to produce transgenic eukaryotes.		SC.912.L.16.7	
19.05 Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.	LAFS.910.SL.2.4	SC.912.L.18.1, 11;	BS.03.01.02.a



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
19.06 Describe processes by which enzymes are produced through biotechnology.	LAFS.910.SL.2.4	SC.912.L.18.1, 4;	BS.03.01.02.b.
19.07 Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.		SC.912.L.17.14	BS.03.01.03.a
19.08 Diagram the process by which organisms are genetically engineered for waste treatment.		SC.912.L.17.17	BS.03.01.03.b.
19.09 Investigate and report on genetic engineering procedures used in the production of agricultural products.		SC.912.L.16.10, 12;	
19.10 Explain the functions of hormones in animals.		SC.912.L.14.29, 32;	BS.03.02.01.a.
19.11 Describe the processes used to produce animal hormones from transgenic organisms.		SC.912.L.16.7, 9;	BS.03.02.01.b.
19.12 Identify foods produced through fermentation.		SC.912.L.18.8	BS.03.02.02.a.
19.13 Compare and contrast bioengineering and conventional pathways used in food processing.	LAFS.910.RI.1.3	SC.912.L.18.2, 8	
19.14 Explain biomass and sources of biomass.	LAFS.910.SL.2.4	SC.912.L.17.11	BS.03.03.08.a
19.15 Assess the characteristics of biomass that make it useful for biofuels production.		SC.912.L.18.7, 8, 9;	
19.16 Describe the process used in producing alcohol from biomass.	LAFS.910.SL.2.4	SC.912.L.18.6, 8;	BS.03.02.03.b.
19.17 Diagram the process used in producing biodiesel from biomass.		SC.912.N.1.7; SC.912.N.3.5	BS.03.02.04.b
19.18 Illustrate the process used in producing methane from biomass.		SC.912.P.8.12, 13	BS.03.02.05.b
19.19 Describe the selective plant breeding process.	LAFS.910.SL.2.4	SC.912.L.14.7, 53;	BS.03.03.01.a.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Biotechnology 3  
**Course Number:** 8106860  
**Course Credit:** 1

**Course Description:**

This course is designed to enhance competencies in the areas of current agricultural biotechnology applications, genetic principles, tissue/cell culture, and the potential for biotechnology in the area of agriculture.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Florida Standards		Correlation to CTE Program Standard #
20.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Biotechnology	
20.01	Key Ideas and Details	
20.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
20.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
20.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
20.02	Craft and Structure	
20.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.1112.RST.2.4	
20.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
20.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
20.03 Integration of Knowledge and Ideas		
20.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
20.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
20.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
20.04 Range of Reading and Level of Text Complexity		
20.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
20.04.2		
21.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Biotechnology		
21.01 Text Types and Purposes		
21.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
21.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
21.02 Production and Distribution of Writing		

Florida Standards		Correlation to CTE Program Standard #
21.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
21.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
21.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
<b>21.03 Research to Build and Present Knowledge</b>		
21.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
21.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
21.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
<b>21.04 Range of Writing</b>		
21.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
<b>22.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology</b>		
22.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
22.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
22.03	Construct viable arguments and critique the reasoning of others.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.3.1
22.04 Model with mathematics.	MAFS.K12.MP.4.1
22.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
22.06 Attend to precision.	MAFS.K12.MP.6.1
22.07 Look for and make use of structure.	MAFS.K12.MP.7.1
22.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
23.0 Recognize and follow quality control procedures and regulatory guidelines – the student will be able to:			
23.01 Design and conduct an experiment using tools to evaluate biotechnology derived products.		SC.912.N.1.1	CS.11.02.01.a
23.02 Describe the need for and function of regulatory agencies such as those in government, industry, and society.		SC.912.L.17.13, 14;	BS.01.02.01.a
23.03 Discuss quality control as it relates to products, safety, quality to the end user, and meeting regulatory specifications.	LAFS.1112.SL.1.1		
23.04 Perform quality control methods utilizing proper documentation.			
23.05 Conduct a polymerase chain reaction to determine the presence of genetic modifications in a common food item.		SC.912.L.16.12	BS.02.05.06.c
23.06 Troubleshoot aberrant results or parameters.	MAFS.912.S-ID.1.1, 1.3 MAFS.912.S-1D.2.6	SC.912.N.1.1	
24.0 Analyze the historical, social, cultural and potential applications of agricultural biotechnology – the student will be able to:			
24.01 Research and report on the major innovators and milestones in the development of biotechnology.	LAFS.1112.W.3.7 LAFS.1112.L.1.1, LAFS.1112.L.3.6	SC.912.L.16.10	BS.01.01.01.c
24.02 Assess the future impact biotechnology could have on world populations.		SC.912.N.4.1, 2; SC.912.L.16.10	BS.01.01.03.c
24.03 Research and debate a major regulatory issue pertaining to	LAFS.1112.W.3.7, 8 LAFS.1112.L.1.1,	SC.912.N.4.1, 2; SC.912.L.16.10	BS.01.01.03.b

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
biotechnology.	LAFS.1112.L.3.6 LAFS.1112.SL.1.2, 3 LAFS.1112.RI.3.8		
24.04 Research, evaluate and articulate the implications of an ethical, legal, social or cultural biotechnology issue in agricultural production.	LAFS.1112.W.3.7, 8 LAFS.1112.L.1.1, LAFS.1112.L.3.6 LAFS.1112.SL.1.2 LAFS.1112.RI.3.8	SC.912.N.4.1, 2; SC.912.N.2.2; SC.912.L.16.10	BS.01.02.01.c
24.05 Debate an ethical issue associated with biotechnology.	LAFS.1112.SL.2.4 LAFS.1112.RI.3.8	SC.912.N.4.1, 2; SC.912.N.2.2; SC.912.L.17.15	BS.01.03.01.c
24.06 Analyze an intellectual property issue associated with bioethics in agricultural production.	LAFS.1112.RI.3.8	SC.912.N.4.1, 2; SC.912.N.2.2; SC.912.L.16.10	BS.01.03.02.c
24.07 Identify and discuss emerging technologies in agriculture production (transgenics, biologics, biosecurity, food safety, sustainability, etc.).	LAFS.1112.SL.1.1	SC.912.N.1.6; SC.912.L.17.15, 20; SC.912.L.16.10	BS.01.03.03.c
24.08 Use web-based resources to find information on the genetic sequence of a protein using bioinformatics.	LAFS.1112.RI.3.7	SC.912.L.18.4	
25.0 Demonstrate proper tissue/cell culture techniques – the student will be able to:			
25.01 Prepare a lab using aseptic techniques for use a tissue culture facility.		SC.912.L.14.6	BS.02.03.01.a
25.02 Describe the effects of growth hormones on tissue/cell culture.		SC.912.L.14.1,2, 7	BS.02.03.01.c
25.03 Demonstrate the use of sterile instruments and materials.			BS.02.03.01.a BS.02.03.02.b
25.04 Produce plants using tissue culture methods and prepare a written report of data and results.	MAFS.912.S-ID.3.9 MAFS.912.S-ID.2.6		
26.0 Demonstrate the application of biotechnology to the Agriculture, Food and Natural Resources (AFNR) industries – the student will be able to:			
26.01 Develop a standard operating procedure for a biological process in agriculture.		SC.912.L.14.6	BS.02.03.02.b
26.02 Maintain and calibrate equipment logs documenting use, maintenance, calibration and repair Simulate the process needed to order, stock, and maintain supplies of biological and chemical materials.			
26.03 Devise a management plan to reduce laboratory waste.			BS.02.04.03.c
26.04 Characterize the biochemical properties of proteins.		SC.912.L.18.4; SC.912.P.8.13	BS.02.05.04.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
26.05 Use antibodies to detect and quantify antigens.		SC.912.L.18.4	BS.02.05.05.a
26.06 Conduct an Enzyme-Linked Immunosorbent Assay (ELISA).		SC.912.P.12.12	BS.02.05.05.c
26.07 Produce ethanol and co-products from biomass.		SC.912.P.8.12, 13;	BS.03.03.08.c
26.08 Produce biodiesel and co-products from biomass.		SC.912.P.8.12, 13;	BS.03.03.08.c
26.09 Produce methane and co-products from biomass.		SC.912.P.8.12, 13;	BS.03.03.08.c
26.10 Evaluate the technologies used to create biofuels from biomass.		SC.912.N.1.3	BS.03.03.09.c
26.11 Discuss (or demonstrate) algae growth (culture to large scale) for biofuel production.	LAFS.1112.SL.1.1. MAFS.912.S-ID.2.6, MAFS.912.S-ID.3.9	SC.912.L.17.2	BS.03.03.09.b
26.12 Describe the principles (purpose) of centrifugation and filtration.	LAFS.1112.SL.2.4	SC.912.L.14.2	BS.02.02.01.b
26.13 Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.		SC.912.N.4.2; SC.912.L.16.10	BS.03.03.02.b
26.14 Describe the use of biotechnology in bioremediation.	LAFS.1112.SL.2.4	SC.912.L.17.12, 17;	BS.03.03.03.b
26.15 Describe the processes involved in biotreatment of biological and chemical wastes.	LAFS.1112.SL.2.4	SC.912.L.17.16, 17;	BS.03.03.05.b
26.16 Explain the global importance of biodiversity.	LAFS.1112.SL.2.4	SC.912.L.17.8; SC.912.N.4.2	
26.17 Explain the positive and negative impacts of agricultural practices on wild populations.	LAFS.1112.SL.2.4	SC.912.L.17.8	BS.03.03.07.a
26.18 Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.	LAFS.1112.SL.2.4	SC.912.L.17.7	BS.03.03.07.b
26.19 Describe the processes used in the production of molecules for use in industrial applications.	LAFS.1112.SL.2.4	SC.912.P.10.5; SC.912.P.8.9, 12	BS.03.03.09.b
27.0 Demonstrate leadership, employability, communication and human relation skills – the student will be able to:			
27.01 Conduct group meetings using parliamentary procedure and public speaking skills.	LAFS.1112.SL.2.4 LAFS.1112.SL.2.6 SL.1.1		
27.02 Follow acceptable work habits, personal characteristics and hygiene habits for the biotechnology workplace.			CS.02.02.02.a CS.02.01.03.a
27.03 Identify or demonstrate appropriate responses to criticism and coaching from employer, supervisor, or other persons.	LAFS.1112.SL.1.2,3		CS.03.03.03.c
27.04 Demonstrate appropriate methods for asking questions, and providing constructive criticism and feedback.			CS.02.04.01.a

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
27.05 Conduct a job search and identify advanced training opportunities and the requirements.	LAFS.1112.RI.3.7		CS.02.03.03.a
27.06 Prepare a resume.	LAFS.1112.W.4.1		CS.03.01.02.b
27.07 Demonstrate appropriate methods for asking questions, and providing constructive criticism and feedback to supervisor, employer, supervisor, or other persons.			CS.02.04.01.a



**Florida Department of Education  
Student Performance Standards**

**Course Title:** Animal Biotechnology  
**Course Number:** 8106120  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of biotechnology in animal science, animal growth and reproduction, and the role of animals in society.

Florida Standards		Correlation to CTE Program Standard #
19.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Biotechnology	
19.01	Key Ideas and Details	
19.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
19.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
19.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
19.02	Craft and Structure	
19.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
19.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
19.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
19.03	Integration of Knowledge and Ideas	
19.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
19.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
19.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
19.04	Range of Reading and Level of Text Complexity	
19.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
19.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
20.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Biotechnology	
20.01	Text Types and Purposes	
20.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
20.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
20.02	Production and Distribution of Writing	
20.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
20.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	

Florida Standards		Correlation to CTE Program Standard #
20.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
20.03 Research to Build and Present Knowledge		
20.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
20.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
20.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
20.04 Range of Writing		
20.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
21.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology.	
21.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
21.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
21.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
21.04	Model with mathematics. MAFS.K12.MP.4.1	
21.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
21.06	Attend to precision. MAFS.K12.MP.6.1	

Florida Standards	Correlation to CTE Program Standard #
21.07 Look for and make use of structure.	MAFS.K12.MP.7.1
21.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
28.0 Apply genetic principles to animal science – the student will be able to:			
28.01 Describe how the concept of heritability is used in the selection of livestock.	LAFS.1112.SL.2.4	SC.912.L.16.2, 3	AS.05.03.03.c
28.02 Chart the difference between phenotypic and genotypic characteristics and determine probabilities.	MAFS.912.S-MD.2.7 MAFS.912.S-MD.1.1, 3	SC.912.L.16.2, 4	BS.02.05.01.b
28.03 Analyze performance data used in the selection process of livestock. (EPDs)	MAFS.912.S-IC.2.6	SC.912.N.1.1	
28.04 Use computer data to assist in the selection process of livestock.		SC.912.N.1.1	
28.05 Extract a visible mass of DNA from animal or plant tissue.		SC.912.N.1.1	BS.02.05.03.a
28.06 Develop a hypothetical species using genetic engineering.		SC.912.N.4.2; SC.912.L.16.4, 7, 12;	BS.01.03.02.c
28.07 Debate the safeguards used in research in genetic engineering.	LAFS.1112.SL.1.3	SC.912.N.1.4; SC.912.L.17.15, 16	
29.0 Interpret the relationship between total digestible nutrients (TDN) in feeds and its utilization – the student will be able to:			
29.01 Determine nutritional requirements of selected animals.		SC.912.L.18.1, 2, 3, 4	AS.04.01.01.c
29.02 Select appropriate feed samples for analysis of nutritional values and develop a balanced ration.	MAFS.912.N-Q.1.1,1.3	SC.912.L.18.9; SC.912.L.14.46	AS.04.01.02.c
29.03 Conduct experiments comparing growth rates using selected rations.	MAFS.912.S-IC.2.5	SC.912.N.1.1	AS.04.01.02.b
29.04 Compare how the body's cells metabolize fats, carbohydrates and proteins.		SC.912.L.14.46	AS.04.01.01.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
29.05 Analyze the effect of diseases on nutritional utilization.		SC.912.N.1.1	AS.03.01.02.b
30.0 Examine the developmental processes that determine animal growth – the student will be able to:			
30.01 Develop a growth curve using selected animal species.	MAFS.912.S-ID.2.6	SC.912.N.1.1	
30.02 Differentiate between muscle, fat, and bone development.		SC.912.L.14.11, 12,16	
30.03 Evaluate the effects of hormones in animal production.		SC.912.L.14.31, 32, 33	BS.03.02.01.c
30.04 Compare morphology of developing embryos.		SC.912.L.15.1	
30.05 Analyze the diseases that affect development growth.		SC.912.L.14.6	AS.03.01.03.a
31.0 Investigate the reproduction system of animals – the student will be able to:			
31.01 Analyze the quality of semen of selected animals.		SC.912.L.14.33	AS.05.03.05.b
31.02 Compare and contrast sperm anatomy of selected animal species.		SC.912.L.14.33	AS.05.03.05.b
31.03 Analyze the factors that affect sperm mobility and development.		SC.912.P.10.3, 5	AS.05.03.05.b
31.04 Compare and contrast the reproductive cycles of selected animal species.		SC.912.L.14.33	AS.05.03.04.b
31.05 Compare and contrast the breeding time and conception rates of selected animal species.		SC.912.L.14.33	AS.05.03.04.b
31.06 Describe the functions of hormones that control reproduction.	LAFS.1112.SL.2.4	SC.912.L.16.10; SC.912.L.14.31	BS.03.02.01.a
31.07 Discuss the use of hormone therapy to manipulate ovarian activity.	LAFS.1112.SL.1.1, LAFS.1112.L.3.6	SC.912.L.16.10; SC.912.L.14.31	AS.05.03.04.b
31.08 Describe and compare the different pathogens that cause animal diseases.	LAFS.1112.SL.2.4 LAFS.1112.W.2.4 LAFS.1112.L.3.6	SC.912.L.14.6	AS.03.01.03.a
31.09 Analyze the mating process of selected animal species.		SC.912.L.14.33	AS.05.03.02.b
32.0 Describe animal science and the role of animals in society – the student will be able to:			
32.01 Debate current events concerning animal welfare and animal rights.	LAFS.1112.SL.2.6	SC.912.N.4.1, SC.912.N.2.2	AS.06.01.02.a
32.02 Demonstrate safe procedures when working with animal related equipment in laboratory settings.			AS.06.01.01.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
32.03 Practice safety precautions around animals.			AS.06.01.01.c
32.04 Develop a research project related to biotechnology and animal science.	LAFS.1112.W.3.7. W.3.8 LAFS.1112.L.3.6	SC.912.N.1.1, 7 SC.912.N.3.5 SC.912.L.17.13	CS.11.02.01.a
32.05 Discuss the benefits of biotechnology in producing and marketing animals and animal products.	LAFS.1112.SL.1.1	SC.912.L.16.10; SC.912.N.4.1	BS.01.03.01.b
32.06 Research how biotechnology affects the consumer.	LAFS.1112.W.3.7, W.3.8. LAFS.1112.L.3.6	SC.912.L.16.10; SC.912.N.4.2.	BS.01.03.01.c

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Plant Biotechnology  
**Course Number:** 8106510  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of biotechnology in plant science, growth and reproduction, and the role of plants in biotechnology.

Florida Standards		Correlation to CTE Program Standard #
19.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Biotechnology	
19.01	Key Ideas and Details	
19.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
19.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
19.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
19.02	Craft and Structure	
19.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
19.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
19.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
19.03	Integration of Knowledge and Ideas	
19.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
19.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
19.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
19.04	Range of Reading and Level of Text Complexity	
19.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
19.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
20.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Biotechnology	
20.01	Text Types and Purposes	
20.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
20.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
20.02	Production and Distribution of Writing	
20.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
20.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	



Florida Standards		Correlation to CTE Program Standard #
20.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
20.03 Research to Build and Present Knowledge		
20.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
20.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
20.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
20.04 Range of Writing		
20.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
21.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology.	
21.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
21.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
21.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
21.04	Model with mathematics. MAFS.K12.MP.4.1	
21.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
21.06	Attend to precision. MAFS.K12.MP.6.1	

Florida Standards	Correlation to CTE Program Standard #
21.07 Look for and make use of structure. MAFS.K12.MP.7.1	
21.08 Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
32.0 Describe plant classifications and the economic impact to your region – the student will be able to:			
32.01 Classify plants based upon their regional use and importance.		SC.912.L.14.2; SC.912.L.15.5	PS.01.01.01.c
32.02 Describe the economic impact of regionally produced products.	LAFS.1112.SL.2.4, LAFS.1112.L.3.6		
32.03 Describe the regional growing conditions that impact the feasibility of producing particular plant products.	LAFS.1112.SL.2.4, LAFS.1112.L.3.6	SC.912.E.7.4	
32.04 Identify economically significant plant families.		SC.912.L.14.53	PS.01.01.01.c
32.05 Identify at least fifty plants by common and scientific names.		SC.912.L.14.7; SC.912.L.15.5	PS.01.01.02.b PS.01.01.02.c
33.0 Apply genetic principles to plant improvement – the student will be able to:			
33.01 Describe the relationship between reproduction and plant improvement.	LAFS.1112.SL.2.4, LAFS.1112.L.3.6	SC.912.L.15.5; SC.912.L.15.6	PS.03.03.01.a
33.02 Demonstrate the reproductive cycle in seed plants, angiosperms and gymnosperms, mosses and ferns.		SC.912.L.16.1, 2, 4;	PS.03.01.01.b
33.03 Describe how genetic processes and structures control inheritance in plants.	LAFS.1112.SL.2.4, LAFS.1112.L.3.6	SC.912.L.16.1, 2, 4;	BS.03.03.01.a
33.04 Explain polyploidy in both natural settings and in commercial plant production.	LAFS.1112.L.3.6	SC.912.L.16.1, 2, 4;	
33.05 Differentiate phenotypic versus genotypic expression in plant crosses.		SC.912.L.16.1, 2, 4;	BS.02.05.02.a
33.06 Describe the processes used for mutation induction.	LAFS.1112.SL.2.4, LAFS.1112.L.3.6	SC.912.L.15.15	BS.03.03.01.b
34.0 Demonstrate methods of micropropagating plants – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
34.01 Evaluate the advantages and disadvantages of using micropropagation techniques.		SC.912.L.16.17	PS.03.01.04.a
34.02 Demonstrate aseptic/sterile technique.		SC.912.L.14.6	PS.03.01.04.b
34.03 Prepare and mix stock solutions of media for micro-propagation.	MAFS.912.N-Q.1.2 MAFS.912.A-CED.1.3		BS.02.04.01.b
34.04 Produce a crop using tissue culture methods and prepare a written report of results.		SC.912.L.16.17	PS.03.01.04.c
34.05 Propagate plants using tissue culture techniques for producing synthetic seed culture.		SC.912.L.14.1, 2, 7;	PS.03.01.04.c
34.06 Develop and write a protocol to insert a gene of interest in plants.	LAFS.1112.W.1.2, LAFS.1112.W.2.4 LAFS.1112.L.3.6,	SC.912.L.16.12	BS.03.01.01.b BS.02.03.02.c
34.07 Propagate plants using cell cultures, callus culture, and algae culture.		SC.912.L.16.12	PS.03.01.04.c
34.08 Research uses of cryopreservation in seed and in-vitro propagation methods.	LAFS.1112.W.3.7, LAFS.1112.W.3.8 LAFS.1112.L.3.6	SC.912.L.14.1, 2, 7;	PS.03.01.04.c PS.03.05.03.b
<b>35.0 Demonstrate methods of plant production – the student will be able to:</b>			
35.01 Evaluate the advantages and disadvantages of non-traditional crop production techniques (hydroponic/substrate, greenhouse, tunnel/hoop, etc.).		SC.912.N.1.1; SC.912.L.17.7, 10; SC.912.E.7.1	BS.01.01.03.b
35.02 Demonstrate different production methods used in hydroponics production.		SC.912.L.17.3, 7, 10; SC.912.E.7.1	PS.02.03.02.b PS.02.02.01.c
35.03 Determine the cultural needs in hydroponics production.	LAFS.1112.SL.2.4 LAFS.1112.L.3.6	SC.912.E.7.1; SC.912.L.17.3	PS.02.03.02.b PS.02.02.01.c
35.04 Describe crops grown commercially by non-traditional techniques in your region.		SC.912.E.7.1; SC.912.L.17.3	
<b>36.0 Use plants to demonstrate growth disorders (nutrients, pathogens, pests) – the student will be able to:</b>			
36.01 Identify plant nutrient-related disorders.		SC.912.E.7.1; SC.912.L.17.10	PS.02.03.01.c
36.02 Identify pathogen-related disorders in plants.		SC.912.L.14.6	PS.03.03.01.a , b
36.03 Identify pest-related disorders in plants.			PS.03.03.03.c
36.04 Discuss how IPM and biotechnology are used to solve plant disorders.	LAFS.1112.SL.1.1 LAFS.1112.L.3.6	SC.912.L.17.1, 17;	PS.03.03.03.c
36.05 Prepare plant tissue samples for submission to determine nutrient levels.		SC.912.L.18.8	PS.02.03.03.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
36.06 Demonstrate factors that affect the nutrient levels in plant tissue.		SC.912.L.18.8	PS.02.03.01.c
37.0 Identify the historical, social, cultural and potential applications of plant biotechnology – the student will be able to:			
37.01 Research and report on the major innovators and milestones in the development of biotechnology.	LAFS.1112.L.3.6 LAFS.1112.W.3.7, LAFS.1112.W.3.8,		BS.01.01.01.c
37.02 Analyze the scope and impact of plant biotechnology in today's global society.		SC.912.L.16.10; SC.912.N.4.2	BS.01.01.02.c
37.03 Assess the future impact plant biotechnology could have on world populations.		SC.912.L.16.10; SC.912.N.4.2	BS.01.01.03.c
37.04 Research, evaluate, and articulate a major regulatory issue pertaining to plant biotechnology.	LAFS.1112.L.3.6 LAFS.1112.W.3.7, 8, LAFS.1112.SL.2.4	SC.912.L.16.10; SC.912.N.4.2	BS.01.02.01.c
37.05 Research, evaluate, and articulate the implications of an ethical, legal, social, or cultural biotechnology issue in plant production.	LAFS.1112.L.3.6 LAFS.1112.W.3.7, 8 LAFS.1112.SL.2.4	SC.912.L.16.10; SC.912.N.4.2	BS.01.03.01.c
37.06 Research and debate an ethical issue associated with plant biotechnology.	LAFS.1112.SL.2.6 LAFS.1112.L.3.6 LAFS.1112.W.3.7, 8,	SC.912.L.16.10; SC.912.N.4.2	BS.01.03.02.c
37.07 Analyze an intellectual/genetic property issue associated with bioethics in plant production.		SC.912.L.16.10; SC.912.N.4.2	BS.01.03.03.c

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Aquaculture (New)  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Program Number	8004100
CIP Number	0101030303
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	45-2093 - Farmworkers, Farm, Ranch, and Aquacultural Animals 11-9013 – Aquaculture Managers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in the planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues in the aquaculture industry.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of two occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations	1 credit	45-2093	3	EQ
	8112010	Aquaculture 2	1 credit		3	EQ
	8112020	Aquaculture 3	1 credit		3	EQ
B	8112030	Aquaculture 4	1 credit	11-9013	3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

**Academic Alignment Table**

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Agriscience Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%
Aquaculture 2	33/87 38%	27/80 34%	63/83 76%	25/69 36%	46/67 64%	34/70 49%	25/69 36%	10/82 12%	34/66 51%	55/74 74%	26/72 36%
Aquaculture 3	41/87 47%	45/80 56%	38/83 46%	42/69 60%	23/67 34%	51/70 73%	41/69 59%	32/82 39%	44/66 67%	33/74 45%	44/72 61%
Aquaculture 4	**	**	**	**	**	**	**	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations	**	**	**	**	**	**	**
Aquaculture 2	**	**	**	**	**	**	**
Aquaculture 3	**	**	**	**	**	**	**
Aquaculture 4	**	**	**	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course



## **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Aquaculture.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Aquaculture.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Aquaculture.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Discuss components of food safety and handling practices in agriculture
- 14.0 Safely operate, maintain and repair machinery, equipment and facilities used in aquaculture
- 15.0 Describe the nature and origin of and career opportunities in aquaculture
- 16.0 Demonstrate the management and environmentally sound use of water and land resources.
- 17.0 Apply biological principles to the reproduction, identification and growth of aquaculture species.
- 18.0 Assist in the propagation and culture of an aquaculture organism.
- 19.0 Describe procedures used in locating markets and marketing aquaculture products.
- 20.0 Apply business management skills in managing an aquaculture operation.
- 21.0 Identify applicable local, state, and federal rules and regulations and assistance programs.
- 22.0 Discuss leadership, employability, communication, and human relations skills
- 23.0 Students evaluate the importance of the food and fiber system to understand the impact on global economy
- 24.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Aquaculture.
- 25.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Aquaculture.
- 26.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Aquaculture.
- 27.0 Exhibit the management and environmentally sound use of water and land resources
- 28.0 Complete the propagation and culture of an aquaculture organism
- 29.0 Demonstrate procedures used in locating markets and marketing aquaculture products
- 30.0 Incorporate business management skills in managing an aquaculture operation
- 31.0 Demonstrate leadership, employability, communication, networking, and human relations skills
- 32.0 Produce an aquaculture species in one or more of the following: pond, cage, tank, raceway, net pen
- 33.0 Control disease, pest and water quality problems
- 34.0 Assist in harvesting and processing aquaculture species
- 35.0 Identify biological components of reptiles, amphibians, and fish

- 36.0 Discuss production practices of reptiles, amphibians, and fish.
- 37.0 Investigate scientific skills and principles in aquatic plant science.
- 38.0 Describe techniques for producing marine ornamentals, clams, oysters, and shrimp.
- 39.0 Manage aquatic animal health
- 40.0 Determine nutritional needs of aquaculture organisms
- 41.0 Manage aquaculture systems
- 42.0 Perform economic practices involved with aquaculture enterprises
- 43.0 Participate in classroom extension activities

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Aquaculture.	
	01.01 Key Ideas and Details	
	01.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
	01.01.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
	01.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
	01.02 Craft and Structure	
	01.02.1 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	
	LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	
	LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	
	LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	
	LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	
	LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently.	
	LAFS.910.RST.4.10	
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Aquaculture.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content.	
	LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
	LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		

Florida Standards		Correlation to CTE Program Standard #
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
<b>03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Aquaculture.</b>		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.3.1
03.04 Model with mathematics.	MAFS.K12.MP.4.1
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy – the student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.			CS.10.02.01
04.02 Analyze the impact of agriculture on the local, state, national and global economy.			
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.			
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.			
05.0 Practice agriscience safety skills and procedures – the student will be able to:	MAFS.912.S-IC.2;	SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.01 Identify the common causes and prevention of accidents in agriscience operations.			
05.02 Demonstrate proper safety precautions and use of personal protective equipment.			CS.06.03.01.a CS.07.04.01.c
05.03 Evaluate the food safety responsibilities that occur along the food supply chain.			FPP.01.02.01. a FPP.02.01.01. a FPP.02.02.02. a FPP.02.03
05.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.			CS.07.04.01
05.05 Identify proper disposal of hazardous waste materials and biohazards.			ESS.04.02.02. b ESS.04.05.01
05.06 Describe emergency procedures.			CS.07.03.01.c
06.0 Apply scientific and technological principles to agriscience issues – the student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	
06.01 Employ scientific measurement skills.			BS.02.02.01 CS.10.01.01.a
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 ESS.01.01.02. b
06.03 Identify the parts and functions of plant and animal cells.			PS.01.02.01.c AS.02.02.02.b
06.04 Describe the phases of cell reproduction.			PS.01.02.01.b AS.02.02.03.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research			CS.11.01.01 CS.11.02.01

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
project.			
06.06 Interpret, analyze, and report data.			
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.			BS.02.05.03.a
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).			BS.01.01.03.a
07.0 Apply environmental principles to the agricultural industry – the student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	
07.01 Research how different climactic and geological activity influences agriculture.			NRS.02.06.09 CS.05.03.02
07.02 Describe various ecosystems as they relate to the agriculture industry.			NRS.01.01.02.
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.			PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.04 Identify regulatory agencies that impact agricultural practices.			
07.05 Apply Best Management Practices that enhance the natural environment.			PS.03.04.01.b AS.08.01.01.c
07.06 Identify conservation practices related to natural resources.			PS.03.04.01.a
08.0 Investigate and utilize basic scientific skills and principles in plant science – the student will be able to:	MAFS.912.S-IC.2	SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L.15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	
08.01 Identify and describe the specializations within the plant science industry.			
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.			PS.01.01.01.c.
08.03 Examine the processes of plant growth including photosynthesis and respiration.			PS.01.03.01 PS.01.03.02

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.			PS.02.03.01
08.05 Analyze information from a fertilizer label.			PS.02.03.04
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.03.01.03 PS.03.01.02
08.07 Investigate the impacts of various pests and propose solutions for their control.			PS.03.03.02 PS.03.03.03 PS.03.03.04
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.			FPP01.01.01. a
08.09 Explore career opportunities in plant science.			
09.0 Investigate and utilize basic scientific skills and principles in animal science – the student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.			AS.02.01.02.c
09.02 Categorize animals according to use, type, breed, and scientific classification.			AS.02.01.01.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.			AS.02.01.02.a AS.05.02.01.a
09.04 Compare basic internal and external anatomy of animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b
09.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.			AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
09.06 Compare and contrast animal welfare issues.			AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
09.07 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.06.02.01.a FPP01.01.01.a
09.08 Explore career opportunities in animal science.			AS.01.01.02.b
10.0 Demonstrate the use of agriscience tools, equipment, and instruments – the student will be able to	MAFS.912.S-IC.2	SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	
10.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.			CS.08.01.01.b PST.02.02.02.b.
10.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			PST.03.04.01.b PST.03.03.02.a.
10.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.			PST.04.04.03.a PST.04.04.06.a
10.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.			CS.08.03.01.c PST.03.02.03.c. PST.01.03.01.a.
11.0 Demonstrate agribusiness, employability and human relation skills – the student will be able to:			
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).			
11.02 Utilize a record keeping system to collect, interpret, and analyze data.			CS.09.02.01.b CS.10.01.01.a
11.03 Enhance oral communications through telephone, interview and presentation skills.			CS.03.01.03.b
11.04 Enhance written communication by developing resumes and business letters.			CS.03.01.01 CS.03.01.02
11.05 Demonstrate interpersonal (nonverbal) communication skills.			CS.03.01.01 CS.03.01.02
11.06 Demonstrate good listening skills.			CS.01.02.02
12.0 Apply leadership and citizenship skills – the student will be able to:			
12.01 Identify and describe leadership characteristics.			CS.01.06.01.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
12.02 Identify opportunities to apply acquired leadership skills.			CS.02.02.02.b
12.03 Identify and demonstrate ways to be an active citizen.			CS.01.05.02.c
12.04 Participate in community based learning activities.			CS.01.05.01.c
12.05 Demonstrate the ability to work cooperatively.			CS.01.02.02.b
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.			
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.			
13.0 Discuss components of food safety and handling practices in agriculture - The student will be able to:			
13.01 Demonstrate proper safety precautions and use of personal protective equipment.			
13.02 Evaluate the food safety responsibilities that occur along the food supply chain.			
13.03 Explain techniques and procedures for the safe handling of food products.			
13.04 Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).			
13.05 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Aquaculture 2  
**Course Number:** 8112010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of nature and origin, career opportunities, biological principles, safety, water quality, seed production, market outlets, rules and regulations, technological advances, problem solving and leadership employability communication and human relations skills.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Aquaculture.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	
	LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	
	LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	
	LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	
	LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	
	LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently.	
	LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Aquaculture.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content.	
	LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
	LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	

Florida Standards		Correlation to CTE Program Standard #
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
<b>03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Aquaculture.</b>		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others.	



Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.3.1
03.04 Model with mathematics.	MAFS.K12.MP.4.1
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
14.0 Safely operate, maintain and repair machinery, equipment and facilities used in aquaculture – the student will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.L.17.7 SC.912.P.8.2 SC.912.P.10.2, 3, 4, 5, 7, 8, 14, 15 SC.912.P.12.2, 3, 5, 5, 9, 13
14.01 Recognize and observe safety practices necessary in carrying out aquaculture activities.		
14.02 Inspect, maintain and perform basic repairs on aquaculture machinery, equipment and facilities.		
14.03 Safely operate aquaculture machinery and equipment.		
14.04 Discuss the safety and maintenance of a re-circulating aquaculture system (RAS) including biological, chemical, and mechanical filtration, degassing, sterilization, and foam fractionation.		
15.0 Describe the nature and origin of and career opportunities in aquaculture – the students will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.E.6.4, 5, 6 SC.912.L.14.2, 3, 6, 33 SC.912.L.15.3, 6, 7, 9, 13 SC.912.L.16.9, 14, 15, 16 SC.912.L.17.7, 9 10,

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
		12, 13, 14, 15, 16, 17, 18 SC.912.N.1.2, 3, 4, 5, 6; SC.912.N.2.5;
15.01 List the definition of aquaculture as defined by the Florida Division of Aquaculture.		
15.02 Compare and contrast aquaculture and fisheries.		
15.03 List and describe major global aquatic crops and animals.		
15.04 Explain the history of aquaculture.		
15.05 List and describe aquaculture related occupations.		
15.06 Determine the educational requirements and experience needed to enter and advance in aquaculture occupations.		
16.0 Demonstrate the management and environmentally sound use of water and land resources – the student will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.E.5.6 SC.912.E.6.2, 4, 5, SC.912.E.7.1, 2, 3, 4, 5, 6, 7, 8 9 SC.912.L.17. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 18, 20 SC.912.L.18.6, 12 SC.912.P.8.2, 6, 10, 11, 12 SC.912.P.12.9, 12
16.01 Identify and describe the physical and chemical characteristics of water for use in aquaculture.		
16.02 Explain how changes in water affect aquatic life.		
16.03 Be able to measure the total ammonia nitrogen (TAN), unionized ammonia, nitrite, nitrate in a water system.		
16.04 Be able to measure the water temperature dissolved oxygen, pH, salinity, hardness, alkalinity, turbidity, chlorine/chloramine and carbon dioxide in a water system.		
16.05 Explain how the nitrogen cycle is related to maintaining healthy fish.		
16.06 Identify land masses, climates, and bodies of water on world and local maps.		
17.0 Apply biological principles to the reproduction, identification and growth of aquaculture species – the students will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.L.14.1, 3, 4, 6, 11, 12, 13, 14, 16, 17, 18, 19, 21, 28, 29, 30, 31, 32, 33,

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
		36, 42, 43, 44, 46, 48, 49, 50, 51, 52, 53 SC.912.L.15.4, 5, 6, 7 SC.912.L.15.7, 9 SC.912.L.17.13 SC.912.L.18.1, 2, 3, 4, 7, 8, 9, 10, 11, 12 SC.912.N.3.1, 2, 5 SC.912.N.4.1, 2 SC.912.P.8.7, 8, 11, 12, 13
17.01 Define morphology, anatomy, and physiology.		
17.02 Identify and describe the anatomy and physiology of crustaceans.		
17.03 Identify and describe the anatomy and physiology of mollusks.		
17.04 Identify and describe the anatomy and physiology of fish.		
17.05 Identify and describe the basic morphology of aquatic macroalgae and microalgae.		
17.06 List and describe important characteristics in choosing a production species.		
17.07 Identify and describe common aquaculture organism by family, genus and species.		
17.08 List and describe the chemical and physical factors, which influence the growth of aquatic fauna and flora.		
17.09 Identify aquaculture species of commercial importance in Florida.		
17.10 Describe necessary biosecurity measures for various aquaculture facilities.		
18.0 Assist in the propagation and culture of an aquaculture organism – the student will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.L.15.12, 13, 15 SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17 SC.912.L.17.4, 5, 6, 7, 8, 9, 11, 14, 15, 17 SC.912.N.1.7 SC.912.P.12.13
18.01 Identify/describe facilities used in a grow-out operation.		
18.02 List sources of aquaculture organisms and how they are produced.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.03 Determine the purpose and functions of a hatchery.		
18.04 Describe and contrast the reproductive anatomy of aquaculture organisms.		
18.05 Describe and contrast types of spawning exhibited by aquaculture organisms.		
18.06 Discuss proper broodstock conditioning and spawning techniques for aquaculture organisms.		
18.07 Discuss proper grow-out techniques for aquaculture organisms.		
19.0 Describe procedures used in locating markets and marketing aquaculture products – the student will be able to:		SC.912.E.5.10 SC.912.N.1.1, 5, 7 SC.912.N.2.2, 3, 4, 5 SC.912.P.8.1, 2, 7, 10, 11, 12
19.01 Identify possible market outlets for aquaculture products.		
19.02 Identify the steps in securing a specific market outlet for a given species.		
19.03 Describe the product characteristics of marketable animal and plant products for both food and ornamental markets.		
20.0 Apply business management skills in managing an aquaculture operation – the student will be able to:	MAFS.912.S-IC.2	
20.01 Identify and list functions in the management process.		
20.02 Demonstrate basic bookkeeping skills.		
20.03 Complete Supervised Agricultural Experience (SAE) records.		
21.0 Identify applicable local, state and federal rules, regulations and assistance programs – the student will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.N.4.1, 2
21.01 Identify and observe laws and regulations affecting the industry in the local area.		
21.02 Describe process to obtain required permits, licenses, leases, etc. for production and marketing.		
21.03 Identify and list agencies regulating the industry and their functions.		
21.04 Identify and list government assistance programs available to the industry.		
22.0 Discuss leadership, employability, communication, and human relations skills – the student will be able to:		SC.912.N.1.7
22.01 Conduct group meetings, using parliamentary procedure and public-speaking skills.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
22.02 Identify acceptable work habits (ethics) and desired personal characteristics.		
22.03 Demonstrate acceptable employee-hygiene habits.		
22.04 Secure information about a job.		
22.05 Complete a job application.		
23.0 Students evaluate the importance of the food and fiber system to understand the impact on global economy – the student will be able to:		
23.01 Assess the impact of US aquaculture products to the total global aquaculture industry.		
23.02 Recognize the value of aquaculture food products and agribusiness industry.		

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Aquaculture 3  
**Course Number:** 8112020  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the area of management and use of water, the propagation and rearing of seed, producing aquaculture species, control of diseases, pests and water quality problems, harvesting and processing, marketing and transportation, management skills and leadership, employability, communication and human relation skills.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Florida Standards		Correlation to CTE Program Standard #
24.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Aquaculture.	
	24.01 Key Ideas and Details	
24.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
24.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
24.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	24.02 Craft and Structure	
24.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	

Florida Standards		Correlation to CTE Program Standard #
24.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
24.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
24.03 Integration of Knowledge and Ideas		
24.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
24.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
24.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
24.04 Range of Reading and Level of Text Complexity		
24.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
24.04.2		
25.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Aquaculture.	
25.01 Text Types and Purposes		
25.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
25.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
25.02 Production and Distribution of Writing		
25.02.1	Produce clear and coherent writing in which the development,	

Florida Standards		Correlation to CTE Program Standard #
	organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
25.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
25.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
25.03 Research to Build and Present Knowledge		
25.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
25.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
25.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
25.04 Range of Writing		
25.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
26.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Aquaculture.		
26.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
26.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
26.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	



Florida Standards		Correlation to CTE Program Standard #
26.04 Model with mathematics.	MAFS.K12.MP.4.1	
26.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1	
26.06 Attend to precision.	MAFS.K12.MP.6.1	
26.07 Look for and make use of structure.	MAFS.K12.MP.7.1	
26.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
27.0 Exhibit the management and environmentally sound use of water and land resources – the student will be able to:		SC.912.L.17.5, 7, 8, 13, 14, 15, 16, 17, 20 SC.912.L.18.12 SC.912.N.4.1, 2, 6 SC.912.P.8.1, 10, 11, 12, 13 SC.912.P.10.2, 3, 9; SC.912.P.12.2, 5, 6, 9, 12
27.01 Calculate volume in circular, rectangular and irregular shaped water structures.		
27.02 Identify and explain point and non-point pollution management associated with aquaculture.		
27.03 Determine soil types, land slope and other factors to consider in choosing a location for an aquaculture operation.		
27.04 Discuss Florida Department of Agriculture and Consumer Services (FDACS) Best Management Practices (BMP) for managing water usage and aquaculture affluent.		
27.05 Discuss different stages of construction of ponds and/or other aquaculture production facilities.		
27.06 Discuss the advantages and disadvantages of hydroponics and aquaponics.		
28.0 Complete the propagation and culture of an aquaculture organism. – the student will be able to:		SC.912.E.5.8 SC.912.E.6.4, 5, 6

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
		SC.912.E.7.1, 6, 8 SC.912.L.14.4, 6, 31, 33, 41, 43, 44, 46, 52 SC.912.L.15.6, 7, 9 SC.912.L.16.1, 2, 3, 7, 9, 12, 14 SC.912.L.17.1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20 SC.912.L.18.1, 2, 3, 4 SC.912.N.1.1 SC.912.N.2.4, 5
28.01 Identify and describe the methods of reproducing aquaculture organisms.		
28.02 Identify and describe the hatchery facilities used in aquaculture.		
28.03 Select a method of producing seed for a selected species.		
28.04 List and explain the process for hatching eggs in four aquaculture organisms.		
28.05 Determine the types and sizes of feeds to grow different life stages of aquaculture organisms.		
28.06 Discuss the proper methods for harvesting, grading and transporting seed, fry and juvenile aquaculture organisms.		
29.0 Demonstrate procedures used in locating markets and marketing aquaculture products – the student will be able to:		SC.912.N.1.1, 3, 4, 5, 6 SC.912.N.2.2, 4, 5 SC.912.N.3.5 SC.912.N.4.1, 2
29.01 Develop a marketing plan for an aquaculture product.		
29.02 Determine laws and regulations involved in transporting and marketing aquaculture organisms.		
29.03 Market aquaculture products.		
30.0 Incorporate business management skills in managing an aquaculture operation – the student will be able to:	MAFS.912.S-IC.2	SC.912.N.2.5 SC.912.N.3.5 SC.912.N.4.1, 2 SC.912.P.8.2, 6, 9, 11, 12, 13 SC.912.P.10.2, 13, 14, 15
30.01 Determine cost of production/harvesting and profitability of different systems.		

<b>CTE Standards and Benchmarks</b>		<b>FS-M/LA</b>	<b>NGSSS-Sci</b>
30.02	Determine procedures and costs for acquiring the land/water, machinery, equipment structures, etc., needed for an operation specified by the instructor.		
30.03	Discuss the relevance of (a) land purchase, (b) water leases, (c) permits, (d) licenses, (e) financial loans, (f) insurance, in an aquaculture business.		
30.04	Discuss the relevance of: (a) property ownership, (b) equipment acquired, (c) equipment repair and maintenance, (d) income and expense, (e) employee time and days, (f) income tax and social security, (g) insurance, in aquaculture business.		
30.05	Manage a production/harvesting system.		
30.06	Complete Supervised Agriculture Experienced (SAE) records.		
31.0	Demonstrate leadership, employability, communication, networking, and human relations skills – the student will be able to:		SC.912.N.1.1, 3, 5, 7 SC.912.N.2.2, 5 SC.912.N.4.1, 2
31.01	Demonstrate competence in job-interview techniques.		
31.02	Demonstrate appropriate response to criticism from employer, supervisor, or other persons in the workplace.		
31.03	Demonstrate knowledge of how to appropriately make a career change, including resigning from a job.		
31.04	Write a resume complete with cover letter.		
32.0	Produce an aquaculture species in one or more of the following: pond, cage, tank, raceway, net pen – the student will be able to:		SC.912.E.5.8 SC.912.E.6.4, 5 SC.912.E.7.1, 2, 3, 4, 5, 6, 8, 9 SC.912.L.14.4, 6, 7, 16, 19, 46, 53 SC.912.L.17.2, 3, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 SC.912.L.18.1, 2, 3, 4 SC.912.N.1.3, 4, 5, 6, 7 SC.912.N.2.4, 5 SC.912.N.3.5 SC.912.N.4.1, 2 SC.912.P.8.1, 6, 7, 8, 9, 10, 11, 12 SC.912.P.10.2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 18 SC.912.P.12.2, 3, 4, 5, 6, 7, 8, 9

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
32.01 Identify the types of growing systems and important factors in their selection, design and use.		
32.02 Determine economic factors to consider in choosing a system for commercial production.		
32.03 Identify and describe facility construction and site requirements.		
32.04 Select species for a specific culture facility.		
32.05 Determine feeding methods and calculate feeding rates for an aquaculture organism.		
32.06 Assist in managing water quality in one or more production systems.		
32.07 Maintain and perform repairs on aquaculture machinery, equipment, and facilities.		
33.0 Control disease, pest and water quality problems – the student will be able to:		SC.912.E.5.8 SC.912.E.6.5, 6 SC.912.L.14.2, 3, 4, 6, 11, 12, 16, 19, 29, 42, 43, 44, 45, 46, 47, 52, 53 SC.912.L.15.15 SC.912.L.16. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 SC.912.L.17.1, 2, 3, 5, 6, 7, 8, 9, 13, 14, 15, 16, 17, 18 SC.912.L.18.5, 7, 8, 9, 11, 12 SC.912.N.2.4, 5 SC.912.N.3.5 SC.912.P.8.9
33.01 Identify major diseases of several locally important commercial species and list different methods of prevention and treatment.		
33.02 Identify major pests of several locally important commercial species and list recommended control methods.		
33.03 Describe methods of prevention, treatment and control of the major diseases and pests previously identified.		
33.04 Identify water quality problems.		
33.05 Determine water quality parameters and describe corrective action where needed.		
33.06 Identify resources for assistance in disease prevention, identification, and treatment.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
34.0 Assist in harvesting and processing aquaculture species – the student will be able to:		SC.912.E.5.8 SC.912.E.6.5, 6 SC.912.L.14.2, 3, 4, 6, 11, 12, 16, 19, 29, 42, 43, 44, 45, 46, 47, 52, 53 SC.912.L.15.15 SC.912.L.16. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 SC.912.L.17.1, 2, 3, 5, 6, 7, 8, 9, 13, 14, 15, 16, 17, 18 SC.912.L.18.5, 7, 8, 9, 11, 12 SC.912.N.2.4, 5 SC.912.N.3.5 SC.912.P.8.9
34.01 Recognize and observe safety and sanitary practices including biosecurity in harvesting and processing aquaculture organisms.		
34.02 Determine harvesting practices recommended for aquaculture organisms.		
34.03 Determine equipment, labor, financial and legal requirements for harvesting aquaculture organisms.		
34.04 Harvest aquaculture organisms using recommended practices.		
34.05 Determine processing and packaging practices recommended for aquaculture organisms.		
34.06 Determine equipment, labor, financial and legal requirements for processing and packaging aquaculture organisms.		
34.07 Process and/or package aquaculture organisms using recommended practices.		
34.08 Compare and contrast methods for shipping aquaculture organisms.		

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Aquaculture 4  
**Course Number:** 8112030  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the area of management and use of water, the propagation and rearing of seed, producing aquaculture species, control of diseases, pests and water quality problems, harvesting and processing, marketing and transportation, management skills and leadership, employability, communication and human relation skills.

Florida Standards		Correlation to CTE Program Standard #
24.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Aquaculture.	
24.01	Key Ideas and Details	
24.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
24.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
24.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
24.02	Craft and Structure	
24.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
24.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
24.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.1112.RST.2.6	
24.03	Integration of Knowledge and Ideas	
24.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
24.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
24.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
24.04	Range of Reading and Level of Text Complexity	
24.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
24.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
25.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Aquaculture.	
25.01	Text Types and Purposes	
25.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
25.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
25.02	Production and Distribution of Writing	
25.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
25.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	

Florida Standards		Correlation to CTE Program Standard #
25.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
<b>25.03 Research to Build and Present Knowledge</b>		
25.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
25.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
25.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
<b>25.04 Range of Writing</b>		
25.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
<b>26.0</b>	<b>Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Aquaculture.</b>	
26.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
26.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
26.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
26.04	Model with mathematics. MAFS.K12.MP.4.1	
26.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
26.06	Attend to precision. MAFS.K12.MP.6.1	



Florida Standards		Correlation to CTE Program Standard #
26.07	Look for and make use of structure.	MAFS.K12.MP.7.1
26.08	Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
35.0	Identify biological components of reptiles, amphibians, and fish. – The student will be able to:		
35.01	Describe anatomy and physiology of alligators and turtles.		
35.02	Describe anatomy and physiology of frogs.		
35.03	Describe anatomy and physiology of marine and freshwater baitfish.		
35.04	Describe anatomy and physiology of sturgeon.		
36.0	Discuss production practices of reptiles, amphibians, and fish. – The student will be able to:		
36.01	Determine production needs of alligators and turtles.		
36.02	Determine production needs of frogs.		
36.03	Determine production needs of marine and freshwater baitfish.		
36.04	Determine production needs of sturgeon.		
37.0	Investigate scientific skills and principles in aquatic plant science. – the student will be able to:		
37.01	Explain nutrient uptake and photosynthesis in aquatic plants.		
37.02	Describe reproductive methods used by aquatic plants.		
37.03	Identify commercially important aquatic plants.		
38.0	Describe techniques for producing marine ornamentals, clams, oysters, and shrimp.- the student will be able to:		
38.01	Discuss practices necessary to produce marine ornamentals.		
38.02	Discuss practices necessary to produce clams.		
38.03	Discuss practices necessary to produce oysters.		
38.04	Discuss practices necessary to produce shrimp.		

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>
39.0 Manage aquatic animal health. – the student will be able to:		
39.01 Outline general management measures for preventing disease outbreaks.		
39.02 Calculate treatment for aquatic systems.		
39.03 Discuss disease resistances.		
39.04 Discuss the role of stress in fish diseases.		
39.05 Create a biosecurity plan for an aquaculture production facility.		
39.06 Develop proper animal husbandry protocols for aquaculture production.		
40.0 Determine nutritional needs of aquaculture organisms – the student will be able to:		
40.01 Describe dietary requirements needed for aquatic organisms.		
40.02 Explain how anatomy and behavior affect feeding.		
40.03 Select the appropriate feed for different life stages of aquatic organisms.		
40.04 Design a feeding protocol from day one post hatch to mature adult.		
41.0 Manage aquaculture systems – student will be able to:		
41.01 Perform routine maintenance on the system.		
41.02 Record day to day observations on the system.		
41.03 Design standard operating procedures for an aquaculture system.		
41.04 Perform water quality checks on aquaculture systems.		
41.05 Design a recirculating system.		
42.0 Perform economic practices involved with aquaculture enterprises. – The student will be able to		
42.01 Create a cost analysis for producing an individual species.		
42.02 Determine the cost of installation and operation of an aquaculture system.		
42.03 Calculate a profit and loss analysis of an aquaculture system.		
43.0 Participate in classroom extension activities. – the student will be able to:		

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>
43.01 Conduct a field experiment or research study on aquaculture topics.		
43.02 Complete a Proficiency Applications in an aquaculture area.		

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Technical Agriculture Operations  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Program Number	8005100
CIP Number	0101020500
Grade Level	9-12, 30, 31
Standard Length	5 credits
Teacher Certification	AGRICULTUR 1 @2 AGRI MECH #7
CTSO	FFA
SOC Codes (all applicable)	49-3041 - Farm Equipment Mechanics and Service Technicians 45-2091 - Agricultural Equipment Operators
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agriculture mechanics industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to mechanical operations, welding, small engine maintenance and repair, planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting two occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations 1	1 credit	45-2091	3	EQ
	8005110	Technical Agriculture Operations 2	1 credit		2	VO
	8005120	Technical Agriculture Operations 3	1 credit		2	VO
B	8005130	Technical Agriculture Operations 4	1 credit	49-3041	2	VO
	8005140	Technical Agriculture Operations 5	1 credit		2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth- Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Agriscience Foundations 1	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%
Technical Agriculture Operations 2	1/87 1%	3/80 4%	20/83 24%	1/69 1%	21/67 31%	2/70 3%	1/69 1%	20/82 24%	3/66 5%	23/74 31%	5/72 7%
Technical Agriculture Operations 3	20/87 23%	23/80 29%	3/83 4%	24/69 35%	4/67 6%	27/70 39%	21/69 30%	5/82 6%	18/66 27%	10/74 14%	30/72 42%
Technical Agriculture Operations 4	20/87 23%	21/80 26%	1/83 1%	23/69 33%	2/67 3%	22/70 31%	20/69 29%	4/82 5%	15/66 23%	4/74 5%	22/72 31%
Technical Agriculture Operations 5	0/87 0%	3/80 4%	0/83 0%	2/69 3%	2/67 3%	0/70 0%	0/69 0%	1/82 1%	0/66 0%	5/74 7%	6/72 8%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%
Technical Agriculture Operations 2	12/67 18%	8/75 11%	13/54 24%	**	**	**	**
Technical Agriculture Operations 3	7/67 10%	9/75 12%	6/54 11%	**	**	**	**
Technical Agriculture Operations 4	1/67 1%	7/75 9%	1/54 1%	**	**	**	**
Technical Agriculture Operations 5	#	#	#	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

### **National Standards (NS)**

Some or all of the courses in this program have been aligned with Industry or National Standards. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link:

[https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn\\_000.pdf](https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf)



## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Technical Agriculture Operations.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Technical Agriculture Operations.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Technical Agriculture Operations.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Practice personal, equipment, and shop safety.
- 14.0 Select and use hand and power tools.
- 15.0 Install simple electrical circuits.
- 16.0 Plan, draw, and construct a project.
- 17.0 Perform basic plumbing procedures.
- 18.0 Mix and pour concrete and use masonry materials.
- 19.0 Construct and maintain agricultural structures.
- 20.0 Students evaluate the importance of the food and fiber system to understand the impact on global economy.
- 21.0 Students examine the scope of career opportunities in and the importance of agriculture to the economy.
- 22.0 Demonstrate employability skills.
- 23.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Technical Agriculture Operations.
- 24.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Technical Agriculture Operations.
- 25.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Technical Agriculture Operations.
- 26.0 Demonstrate electric and gas welding.
- 27.0 Service and maintain small gasoline engines.
- 28.0 Perform preventative maintenance, checks, and services for agricultural equipment.
- 29.0 Perform minor repairs on an irrigation system.
- 30.0 Discuss the role of refrigeration in agriculture.
- 31.0 Demonstrate knowledge of new and emerging technologies in agriculture.

- 32.0 Explain the components of the American business system.
- 33.0 Investigate agricultural cooperatives structure and function.
- 34.0 Apply basic financial management skills.
- 35.0 Keep records.
- 36.0 Weld, braze, and cut, using appropriate equipment.
- 37.0 Operate, service, test, and maintain agricultural machinery and equipment.
- 38.0 Demonstrate positive customer-relations skills.
- 39.0 Diagnose, service, and repair the lubrication system.
- 40.0 Test, repair and/or replace, and maintain the cooling system.
- 41.0 Test, repair and/or replace the intake, exhaust, and turbo-charged systems.
- 42.0 Test, repair and/or replace the fuel-delivery system, using service manuals.
- 43.0 Test, repair and/or replace, and maintain the brake system.
- 44.0 Diagnose, service, repair, and maintain the hydraulic system.
- 45.0 Diagnose, service, and repair transmission systems.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Technical Agriculture Operations.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical	

Florida Standards		Correlation to CTE Program Standard #
	context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
01.04.2		
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Technical Agriculture Operations.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	

Florida Standards		Correlation to CTE Program Standard #
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Technical Agriculture Operations.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	

Florida Standards		Correlation to CTE Program Standard #
03.03	Construct viable arguments and critique the reasoning of others.	MAFS.K12.MP.3.1
03.04	Model with mathematics.	MAFS.K12.MP.4.1
03.05	Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06	Attend to precision.	MAFS.K12.MP.6.1
03.07	Look for and make use of structure.	MAFS.K12.MP.7.1
03.08	Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy-- The student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	CS.10.02.01
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
04.02 Analyze the impact of agriculture on the local, state, national and global economy.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
05.0 Practice agriscience safety skills and procedures--The student will be able to:		SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
		SC.912.P.8.7;	
05.01 Identify the common causes and prevention of accidents in agriscience operations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.06.03.01.a CS.07.04.01.c.
05.02 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		FPP.01.02.01. a FPP.02.01.01. a FPP.02.02.02. a FPP.02.03
05.03 Identify proper disposal of hazardous waste materials and biohazards.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.07.04.01
05.04 Describe emergency procedures for: basic first aid, CPR, chemical spills, fire extinguisher use	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ESS.04.02.02. b ESS.04.05.01
06.0 Apply scientific and technological principles to agriscience issues--The student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	CS.07.03.01.c
06.01 Employ scientific measurement skills.			
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 CS.10.01.01.a
06.03 Identify the parts and functions of plant and animal cells.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		BS.02.02.01 ESS.01.01.02. b
06.04 Describe the phases of cell reproduction.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.01.02.01.c AS.02.02.02.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8		PS.01.02.01.b. AS.02.02.03.b



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
06.06 Interpret, analyze, and report data.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.11.01.01 CS.11.02.01
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).	LAFS.910.W.3.7 LAFS.1112.W.3.7		BS.02.05.03.a.
07.0 Apply environmental principles to the agricultural industry--The student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	BS.01.01.03.a.
07.01 Research how different climactic and geological activity influences agriculture.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
07.02 Describe various ecosystems as they relate to the agriculture industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.02.06.09 CS.05.03.02
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.01.01.02.
07.04 Identify regulatory agencies that impact agricultural practices.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS910.L.3.6 LAFS.1112.L.3.6		PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.05 Apply Best Management Practices that enhance the natural environment.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
07.06 Identify conservation practices related to natural resources.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		PS.03.04.01.b AS.08.01.01.c
08.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:		SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	PS.03.04.01.a
08.01 Identify and describe the specializations within the plant science industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.02 Categorize plants based on specific characteristics according to	LAFS.910.W.2.4 LAFS.1112.W.2.4		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
industry and scientific standards.			
08.03 Examine the processes of plant growth including photosynthesis, respiration, transpiration, absorption, transfer, storage, reproduction, etc....	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.01.01.c.
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.03.01 PS.01.03.02
08.05 Analyze information from a fertilizer label.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		PS.02.03.01
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.02.03.04
08.07 Investigate the impacts of various pests and propose solutions for their control.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.01.03 PS.03.01.02
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.03.02 PS.03.03.03 PS.03.03.04
08.09 Explore career opportunities in plant science.	LAFS.910.W.3.7 LAFS.1112.W.3.7		FPP01.01.01.a
09.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
09.02 Analyze commercially important livestock breeds in Florida.	LAFS.910.W.2.4 LAFS.1112.W.2.4		AS.02.01.02.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.	LAFS.910.L.3.6 LAFS.1112.L.3.6		AS.02.01.01.c
09.04 Compare and contrast animal welfare issues.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4		AS.02.01.02.a AS.05.02.01.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
	LAFS.1112.SL.2.4		
09.05 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.06 Explore career opportunities in animal science.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
10.0 Demonstrate the use of agriscience tools, equipment, and instruments-- The student will be able to		SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c
10.01 Select and demonstrate proper use of hand tools in agriculture.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		AS.06.02.01.a FPP01.01.01.a
10.02 Operate service and maintain agriscience equipment, and instruments.			AS.01.01.02.b.
10.03 Manage facilities and supplies.			
11.0 Demonstrate agribusiness, employability and human relation skills--The student will be able to:			CS.08.01.01.b PST.02.02.02. b.
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		PST.03.04.01. b PST.03.03.02. a.
11.02 Utilize a record keeping system to collect, interpret, and analyze data.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		PST.04.04.03. a PST.04.04.06. a
11.03 Enhance oral communications through telephone, interview and presentation skills.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.08.03.01.c PST.03.02.03.c .

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
			PST.01.03.01.a.
11.04 Enhance written communication by developing resumes and business letters.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.L.1.2 LAFS.1112.L.1.2		
11.05 Demonstrate interpersonal (nonverbal) communication skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
11.06 Demonstrate good listening skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.09.02.01.b CS.10.01.01.a.
12.0 Apply leadership and citizenship skills--The student will be able to:			CS.03.01.03.b.
12.01 Identify and describe leadership characteristics.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.02 Identify opportunities to apply acquired leadership skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.03 Identify and demonstrate ways to be an active citizen.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.02.02
12.04 Participate in community based learning activities.			
12.05 Demonstrate the ability to work cooperatively.			CS.01.06.01.a.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		CS.02.02.02.b.
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.02.c.
12.08 Develop both a leadership and a career development plan utilizing SMART goals that include 5, 10, and 20 year benchmarks.			
13.0 Discuss components of food safety and handling practices in agriculture - The student will be able to:			
13.01 Demonstrate proper safety precautions and use of personal protective equipment.			
13.02 Evaluate the food safety responsibilities that occur along the food supply chain.			
13.03 Explain techniques and procedures for the safe handling of food products.			

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
13.04 Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).			
13.05 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Technical Agriculture Operations 2  
**Course Number:** 8005110  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of safety; selection and use of tools; planning and building projects and construction of agricultural structures, including the use of electrical circuits, plumbing, concrete and masonry; and employability skills.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Technical Agriculture Operations	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).  LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Technical Agriculture Operations	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
<b>03.0</b>	<b>Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Technical Agriculture Operations</b>	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06	Attend to precision. MAFS.K12.MP.6.1	
03.07	Look for and make use of structure.	



Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
14.0 Practice personal, equipment, and shop safety – the student will be able to:			
14.01 Identify and eliminate hazards in agricultural mechanics settings.		SC.912.N.1.1	
14.02 Observe color-coded warnings in work areas and on equipment and machinery. (Example Red= Danger, Orange = Warning, Yellow =caution, Blue = Information, Green = Safety)		SC.912.N.1.1	
14.03 Describe appropriate actions in case of fire, accident, or other emergencies.		SC.912.N.1.1	CS.07.03.01.b
14.04 Describe personal protective equipment (PPE) and appropriate clothing. (Clothing, closed toe shoes Eye wear, and hearing protection)		SC.912.N.1.1	CS.06.02.01.a
14.05 Demonstrate safety procedures and workplace "housekeeping" practices.		SC.912.N.1.1	CS.06.03.01.a
14.06 Safely handle and store flammable and non-restricted chemicals.		SC.912.N.1.1	CS.07.04.02.a
14.07 Interpret the equipment instructions according to the operator's manuals for equipment.		SC.912.N.1.1	CS.08.01.02.a
14.08 Comply with the Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) rules and regulations within ag shop.		SC.912.N.1.1	CS.07.04.01.a
14.09 Describe the Florida "Right-to-Know" law (as recorded in Florida Statutes, Chapter 442).			CS.07.04.01.a
15.0 Select and use hand and power tools – the student will be able to:			
15.01 Identify the capabilities and limitations of hand and power tools.			
15.02 Select and safely use hand and power tools.		SC.912.N.1.1	CS.08.01.01.c CS.08.01.02.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
15.03 Select and use proper PPE for hand and power tools.		SC.912.N.1.1	CS.06.02.01.a
15.04 Identify worn, damaged, or abused tools and repair.	MAFS.912.G-MG.1.1		
15.05 Select and demonstrate the appropriate procedures for sharpening tools. (Such as chisel, axe, shovel, and knife)	MAFS.912.G-CO.1.1 MAFS.912.G-CO.1.4	SC.912.N.1.1	
15.06 Demonstrate the use of measurement tools common to agriculture.	MAFS.912.G-CO.1.1	SC.912.N.1.1	
16.0 Plan, draw, and construct a project – the student will be able to:			
16.01 Plan and sketch a project.			
16.02 Design and draw a project using drawing instruments and/or computer-assisted design (CAD) software.			
16.03 Calculate a bill of materials.			
16.04 Construct a project (woodworking, metal working, PVC) .			
16.05 Identify and select appropriate finishes (such as paint, varnish, and stain).			
17.0 Install simple electrical circuits – the student will be able to:			
17.01 Demonstrate appropriate safety precautions and equipment			
17.02 Explain the principles of AC and DC circuitry.	MAFS.912.A-CED.1.1	SC.912.P.10.2	PST.03.04.02. a
17.03 Explain series and parallel circuitry.	MAFS.912.A-CED.1.2		PST.03.04.01. b
17.04 Explain the scientific principles of electrical systems.	MAFS.912.A-CED.1.4	SC.912.P.10.13,15	
17.05 Plan and install a simple wiring circuit.	MAFS.912.A-CED.1.3	SC.912.P.10.14	PST.03.04.01. b
17.06 Test electrical circuits using a multi-test meter.		SC.912.P.10.2	
17.07 Identify and describe the use and function of sensors in Agriculture		SC.912.P.10.16,17	
18.0 Perform basic plumbing and irrigation procedures – the student will be able to:			
18.01 Demonstrate appropriate safety precautions and equipment			
18.02 Identify and select plumbing and irrigation materials and tools.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
18.03 Plan and construct a simple water-delivery system.	MAFS.912.A-CO.4.12 MAFS.912.G-SRT.2.5		
18.04 Troubleshoot and perform minor plumbing and irrigation repairs.			PST.04.04.01. b
18.05 Locate the state and local codes and standards and describe the importance of complying with them.			PST.04.02.03. b
19.0 Mix and pour concrete and use masonry materials – the student will be able to:			
19.01 Demonstrate appropriate safety precautions and equipment			
19.02 Calculate concrete and other materials for a masonry project.	MAFS.912.G-MG.1.1		PST.04.04.05. a
19.03 Prepare forms; mix and pour concrete.	MAFS.912.G.GMD.1.2 MAFS.912.G.GMD.1.3		PST.04.04.05. b
20.0 Construct and maintain agricultural structures – the student will be able to:			
20.01 Demonstrate appropriate safety precautions and equipment			
20.02 Read and interpret basic construction plans.			PST.04.02.01. a
20.03 Lay out an agricultural structure for construction with the use of a transit.	MAFS.912.S-ID.3.7		
20.04 Demonstrate basic carpentry construction and procedures.	MAFS.912.G-GPE.2.5 MAFS.912.G-MG.1.1		
20.05 Construct a fence.	MAFS.912.G-MG.1.3 MAFS.912.G-SRT.2.5	SC.912.P.12.6	PST.04.04.06. b
20.06 Maintain and repair agricultural structures.	MAFS.912.G-MG.1.3		
21.0 Evaluate the importance of the food and fiber system to understand the impact on global economy – the student will be able to:			
21.01 Assess the agricultural impact upon the US gross national product and the total global economy.	MAFS.912.A-CED.1.1		CS.09.01.01.c
21.02 Investigate local, state, and national regulatory laws, industry regulations, and legislation for agricultural businesses.			
21.03 Identify and describe the primary government agencies involved with agriculture.			
21.04 Research new and emerging technologies and their impact on the economy.	MAFS.912.S-ID.1.2 MAFS.912.S-ID.3.9	SC.912.N.4.2	CS.10.02.01.b
21.05 Recognize the value of the food and agribusiness industry.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
22.0 Examine the scope of career opportunities in and the importance of agriculture to the economy – the student will be able to:			
22.01 Explore agriculture and agribusinesses and their role in the economy.	MAFS.912.A-CED.1.3 MAFS.912.S-IC.1.1		
22.02 Evaluate and explore the agribusiness career opportunities in agriculture.	MAFS.912.S-CP.1.1		
22.03 Compare how key organizational structures and processes affect organizational performance and the quality of products and services.	MAFS.912.S-CP.1.4	SC.912.N.4.2	
22.04 Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.	MAFS.912.S-IC.2.6	SC.912.N.1.1	
23.0 Demonstrate employability skills – the student will be able to:			
23.01 Conduct group meetings, using parliamentary procedures and public-speaking skills.		SC.912.N.1.1	
23.02 Identify the documents that are required for a job application.			
23.03 Complete a job application form.			
23.04 Demonstrate competencies in job-interview techniques.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:**        **Technical Agriculture Operations 3**  
**Course Number:**    **8005120**  
**Course Credit:**     **1**

**Course Description:**

This course is designed to develop competencies in the areas of welding; small gasoline engine service and repair; preventative maintenance procedures; irrigation system repair; refrigeration; new and emerging technologies; financial management skills; and employability skills.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
24.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Technical Agriculture Operations	
24.01	Key Ideas and Details	
24.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. <p align="right">LAFS.1112.RST.1.1</p>	
24.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. <p align="right">LAFS.1112.RST.1.2</p>	
24.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. <p align="right">LAFS.1112.RST.1.3</p>	
24.02	Craft and Structure	
24.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. <p align="right">LAFS.1112.RST.2.4</p>	
24.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. <p align="right">LAFS.1112.RST.2.5</p>	
24.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. <p align="right">LAFS.1112.RST.2.6</p>	

Florida Standards		Correlation to CTE Program Standard #
24.03	Integration of Knowledge and Ideas	
24.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
24.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
24.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
24.04	Range of Reading and Level of Text Complexity	
24.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
24.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
25.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Technical Agriculture Operations	
25.01	Text Types and Purposes	
25.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
25.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
25.02	Production and Distribution of Writing	
25.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
25.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
25.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
25.03	Research to Build and Present Knowledge	
25.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
25.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
25.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
25.04	Range of Writing	
25.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
26.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Technical Agriculture Operations	
26.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
26.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
26.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
26.04	Model with mathematics. MAFS.K12.MP.4.1	
26.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
26.06	Attend to precision. MAFS.K12.MP.6.1	
26.07	Look for and make use of structure.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.7.1
26.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
27.0 Demonstrate welding skills – the student will be able to:			
27.01 Demonstrate appropriate safety precautions and equipment.			
27.02 Select and use gas to complete a weld.			PST.04.04.07.b PST.04.04.07.c
27.03 Select and use electric arc to complete a weld.		SC.912.P.10.13,14,15	PST.04.04.07.b PST.04.04.07.c
27.04 Select and use MIG to complete a weld.			
28.0 Service and maintain small gasoline engines – the student will be able to:			
28.01 Demonstrate appropriate safety precautions and equipment			
28.02 Explain the scientific principles of small engines.	MAFS.912.A-APR.4.6 MAFS.912.F-BF.1.1	SC.912.P.10.3,4	
28.03 Identify major parts and describe the general operation of small gasoline engines (2- and 4-stroke cycle).		SC.912.P.12.2	PST.03.01.02.a
28.04 Troubleshoot and perform minor repairs on small gasoline engines.	MAFS.912.A-APR.4.6 MAFS.912.F-BF.1.1	SC.912.P.12.1	PST.03.01.01.c
29.0 Perform preventive maintenance, checks, and services for agricultural equipment – the student will be able to:			
29.01 Explain the scientific principles of hydraulic and transmission systems.	MAFS.912.A-APR.4.6 MAFS.912.F-BF.1.1	SC.912.P.8.2, SC.912.10.8, SC.912.12.2,12	PST.03.02.01.a PST.03.03.01.b
29.02 Perform daily operator maintenance checks for equipment.			
29.03 Determine the preventive-maintenance procedures, using the equipment’s operator manual.			
29.04 Perform scheduled preventive-maintenance procedures.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
29.05 Interpret and perform operator's trouble-shooting procedures as described in the manual.	MAFS.912.S-IC.2.6	SC.912.P.8.2	
29.06 Keep records of equipment maintenance and services.	MAFS.912.A-REI.4.11		
30.0 Design and maintain an irrigation system – the student will be able to:			
30.01 Demonstrate appropriate safety precautions and equipment			
30.02 Identify the basic components of irrigation systems.			
30.03 Differentiate various types of irrigation systems.	MAFS.912.G-C.1.2 MAFS.912.G-C.2.5		
30.04 Identify state and local regulatory agencies for water management.		SC.912.N.4.1, SC.912.L.17.13	
30.05 Perform minor repair on an irrigation system.	MAFS.912.G-MG.1.3 MAFS.912.A-APR.4.6 MAFS.912.F-BF.1.1		
30.06 Identify irrigation based on volume and pressure.			
30.07 Calculate water consumption for an irrigation system.			
31.0 Discuss the role of refrigeration in agriculture – the student will be able to:			
31.01 Demonstrate appropriate safety precautions and equipment			
31.02 Describe the primary components of a refrigeration system.		SC.912.I.17.13	
32.0 Demonstrate knowledge of new and emerging technologies in agriculture – the student will be able to:			
32.01 Discuss new power technologies.			
32.02 Discuss developing energy sources		SC.912.L.17.11,15,19, SC.912.P.10.1,2	
32.03 Discuss energy management issues.		SC.912.L.17.11,15,19, SC.912.P.10.1,2	
33.0 Explain the components of the American business system – the student will be able to:			
33.01 Describe the five basic ways American business is organized.			
33.02 Distinguish and identify between the characteristics of each method of doing business.	MAFS.912.A-REI.4.11		

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
33.03 Evaluate the advantages and disadvantages provided by each business method.	MAFS.912.S-CP.1.4		
33.04 Evaluate how cooperative principles and practices differentiate cooperatives from other businesses.	MAFS.912.S-CP.1.4		
34.0 Investigate agricultural cooperatives structure and function – the student will be able to:			
34.01 Explain the definition of a cooperative.			
34.02 Understand the history of cooperative principles and practices.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Technical Agriculture Operations 4  
**Course Number:** 8005130  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of welding; small gasoline engine service and repair; preventative maintenance procedures; irrigation system repair; refrigeration; new and emerging technologies; financial management skills; and employability skills.

Florida Standards	Correlation to CTE Program Standard #
23.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Technical Agriculture Operations	
23.01 Key Ideas and Details	
23.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
23.01.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
23.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
23.02 Craft and Structure	
23.02.1 Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
23.02.2 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
23.02.3 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
23.03	Integration of Knowledge and Ideas	
23.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
23.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
23.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
23.04	Range of Reading and Level of Text Complexity	
23.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
23.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
24.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Technical Agriculture Operations	
24.01	Text Types and Purposes	
24.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
24.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
24.02	Production and Distribution of Writing	
24.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
24.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	

Florida Standards		Correlation to CTE Program Standard #
24.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
24.03 Research to Build and Present Knowledge		
24.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
24.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
24.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
24.04 Range of Writing		
24.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
25.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Technical Agriculture Operations.	
25.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
25.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
25.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
25.04	Model with mathematics. MAFS.K12.MP.4.1	
25.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
25.06	Attend to precision. MAFS.K12.MP.6.1	

Florida Standards	Correlation to CTE Program Standard #
25.07 Look for and make use of structure.	MAFS.K12.MP.7.1
25.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS- LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
35.0 Keep records – the student will be able to:			
35.01 Explain the purpose and importance of keeping records.			
35.02 Demonstrate procedures for keeping records of equipment maintenance and services.			
35.03 Keep records on each job or project assignment.	MAFS.912.A.CED.1.2		
35.04 Complete work orders, service invoices, and requisitions.	MAFS.912.A-CED.1.2 MAFS.912.N-VM.3.8		
35.05 Prepare a written cost estimate of repair work.	MAFS.912.N-VM.3.8 MAFS.912.A-CED.1.2		
36.0 Weld, braze, and cut, using appropriate equipment – the student will be able to:			
36.01 Practice all recommended safety precautions.			
36.02 Set up, adjust, operate, and maintain MIG (metal inert gas) and TIG (tungsten inert gas) welding equipment.		SC.912.P.8.2, SC.912.P.10.4	PST.04.04.07
36.03 Set up, adjust, and operate plasma cutting equipment.		SC.912.P.10.1, 4	PST.04.04.07
36.04 Select recommended operational procedures and supplies for specific jobs.		SC.912.N.1.1	
36.05 Demonstrate the different welding positions.	MAFS.912.G-CO.1.1	SC.912.E.6.6, SC.912.N.1.1	PST.04.04.07
36.06 Cut and pierce metals, using oxyacetylene and plasma.		SC.912.P.8.2,6,13, SC.912.P.10.4, SC.912.P.12.12	PST.04.04.07
36.07 Braze metals.		SC.912.P.8.2,6, SC.912.P.10.4	PST.04.04.07

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
36.08 Store welding equipment and supplies according to the recommended storage procedures.		SC.912.N.1.1	
37.0 Operate, service, test, and maintain agricultural machinery and equipment – the student will be able to:			
37.01 Follow safety precautions when operating, servicing, and maintaining machines and equipment.			
37.02 Operate, diagnose, and adjust common agricultural machinery and equipment, according to the operator's manuals. (Examples include tractors, mowers, sprayers, and fertilizer spreaders)			
37.03 Diagnose, remove, clean, test, repair, and reinstall parts of machinery and equipment, using repair manuals.		SC.912.N.1.1	
37.04 Discuss the principles of GPS & GIS and its use with precision farming equipment.		SC.912.N.1.1	PST.05.03.01
37.05 Demonstrate techniques in land measurement. (including Differential and profile techniques)			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Technical Agriculture Operations 5  
**Course Number:** 8005140  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of service, repair and maintenance of the following: the lubrication system; the cooling system; the intake, exhaust, and turbo-charged systems; the fuel-delivery system; hydraulics and pneumatics; transmissions; and the brake system.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS- LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
38.0 Diagnose, service, and repair the lubrication system – the student will be able to:		SC.912.P.10.3, 4, 5, 6, 8; SC.912.P.12.1, 2, 7	
38.01 Change oil filters.			
38.02 Check and change oils and other lubricants in engines.			
38.03 Diagnose and replace damaged or worn components of the system.			
39.0 Test, repair and/or replace, and maintain the cooling system – the student will be able to:		SC.912.P.10.3, 4, 5, 6, 8; SC.912.P.12.1, 2, 7	
39.01 Test coolant.			PST.03.05.01.c
39.02 Flush and clean the system.			PST.03.05.01.c
39.03 Test, repair and/or replace parts of the system.			PST.03.05.01.c
39.04 Adjust parts of the system for proper operation.			PST.03.05.01.c



CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
40.0 Test, repair and/or replace the intake, exhaust, and turbo-charged systems – the student will be able to		SC.912.P.10.3, 4, 5, 6, 8; SC.912.P.12.1, 2, 7	
40.01 Troubleshoot the intake, exhaust, and turbo-charged systems, using recommended diagnostic equipment.			
40.02 Repair and replace parts of the systems.			
40.03 Service and adjust the systems for proper operation.			
41.0 Test, repair and/or replace the fuel-delivery system, using service manuals – the student will be able to:			
41.01 Identify how to remove, clean, rebuild, and reinstall carburetors.			
41.02 Bleed the diesel-fuel system.			
41.03 Remove and reinstall a diesel-fuel-injection pump, according to the manufacturer's specifications.			
41.04 Discuss how to replace components of the fuel system.			
41.05 Service and adjust parts of the fuel system for proper operation.			
41.06 Service electronic fuel injection for gas engines.			
42.0 Test, repair and/or replace, and maintain the brake system – the student will be able to:			
42.01 Drain, refill, and adjust the brake system.			
42.02 Repair and replace parts of the system.			
42.03 Service and adjust the system for proper operation.			
43.0 Diagnose, service, repair, and maintain the hydraulic system – the student will be able to:		SC.912.P.10.3, 4, 5, 5, 6, 8; SC.912.P.12.1, 2;	
43.01 Change filters and drain, flush, and refill the hydraulic system.			
43.02 Troubleshoot hydraulic-system components, using recommended diagnostic equipment.			PST.03.03.03.c
43.03 Repair and replace parts of the system.			PST.03.03.03.c
43.04 Service and adjust the system for proper operation			PST.03.03.03.c

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
44.0 Diagnose, service, and repair transmission systems – the student will be able to:		SC.912.P.10.3, 4, 5, 5, 6, 8; SC.912.P.12.1, 2;	
44.01 Troubleshoot transmission components, using recommended diagnostic equipment.			
44.02 Repair and replace parts of transmission systems.			
44.03 Service and adjust parts of different transmission systems for proper operation.			
44.04 Service and repair transfer case			
44.05 Troubleshoot transfer case components.			
44.06 Service and adjust system components.			
44.07 Repair and replace system components.			
44.08 Change filters and drain, flush, and refill the transfer case system.			

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Natural Resources  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Program Number	8006200
CIP Number	0103010302
Grade Level	9-12, 30, 31
Standard Length	5 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	19-4091 - Environmental Science and Protection Technicians, Including Health 19-1031 - Conservation Scientists
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of four courses with one occupational completion point. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations 1	1 credit	19-4091	3	EQ
	8006220	Introduction to Natural Resources 2	1 credit		3	VO
	8006230	Natural Resource Technology 3	1 credit		3	VO
B	8006240	Natural Resource Management 4	1 credit	19-1031	3	VO
	8006250	Advanced Natural Resources 5	1 credit		3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth- Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Agriscience Foundations 1	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%
Introduction to Natural Resources 2	3/87 3%	10/80 13%	32/83 39%	6/69 9%	30/67 48%	22/70 31%	7/69 10%	31/82 28%	20/66 30%	27/74 36%	6/72 8%
Natural Resource Technology 3	21/87 24%	25/80 31%	6/83 7%	23/69 33%	7/67 10%	28/70 40%	22/69 32%	7/82 9%	23/66 35%	5/74 7%	23/72 32%
Natural Resource Management 4	21/87 24%	22/80 28%	5/83 6%	22/69 32%	5/67 7%	29/70 3%	25/69 36%	4/82 5%	22/66 33%	3/74 4%	23/72 32%
Advanced Natural Resources 5	2/87 2%	3/80 4%	7/83 8%	3/69 4%	4/67 6%	11/70 16%	5/69 7%	4/82 5%	9/66 14%	3/74 4%	3/72 4%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	**	**	**	**	**	**	**
Introduction to Natural Resources 2	**	**	**	**	**	**	**
Natural Resource Technology 3	**	**	**	**	**	**	**
Natural Resource Management 4	**	**	**	**	**	**	**
Advanced Natural Resources 5	**	**	**	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

### **National Standards (NS)**

Some or all of the courses in this program have been aligned with Industry or National Standards. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link:

[https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn\\_000.pdf](https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf)

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.



## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Resources.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Resources.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Resources.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Discuss components of food safety and handling practices in agriculture.
- 14.0 Identify major ecosystems in Florida.
- 15.0 Describe hydrology.
- 16.0 Practice safety skills and procedures.
- 17.0 Demonstrate sampling procedures.
- 18.0 Collect and test samples used to determine soil characteristics.
- 19.0 Describe related geologic principles.
- 20.0 Discuss related standards and regulations.
- 21.0 Identify wetland management practices.
- 22.0 Describe methods to manage wildlife.
- 23.0 Describe procedures to manage forests.
- 24.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Environmental Resources.
- 25.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Environmental Resources
- 26.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Environmental Resources
- 27.0 Utilize data and resources
- 28.0 Determine the quality and quantity of water resources
- 29.0 Describe stormwater systems
- 30.0 Develop map reading skills
- 31.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems

- 32.0 Describe procedures for managing hazardous materials
- 33.0 Prepare a plan for a mock disaster activity
- 34.0 Identify career opportunities and organizational dynamics
- 35.0 Analyze wildlife management procedures
- 36.0 Analyze forest management techniques
- 37.0 Identify forest fire management techniques
- 38.0 Discuss Pest management for insects
- 39.0 Analyze the management of ecosystems
- 40.0 Discuss ecology restoration
- 41.0 Discuss the principles of land use planning
- 42.0 Discuss managing and disposing of solid waste
- 43.0 Evaluate the importance of the food and fiber system to understand the impact on global economy
- 44.0 Demonstrate the use of weather and climate data
- 45.0 Examine the scope of career opportunities in and the importance of agriculture and natural resources to the economy
- 46.0 Discuss sustainable agriculture

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Resources.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific	

Florida Standards		Correlation to CTE Program Standard #
	words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
<b>01.03 Integration of Knowledge and Ideas</b>		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
<b>01.04 Range of Reading and Level of Text Complexity</b>		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
<b>02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Resources.</b>		
<b>02.01 Text Types and Purposes</b>		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Resources.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively.	

Florida Standards		Correlation to CTE Program Standard #
	MAFS.K12.MP.2.1	
03.03 Construct viable arguments and critique the reasoning of others.	MAFS.K12.MP.3.1	
03.04 Model with mathematics.	MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1	
03.06 Attend to precision.	MAFS.K12.MP.6.1	
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy-- The student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	CS.10.02.01
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
04.02 Analyze the impact of agriculture on the local, state, national and global economy.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
05.0 Practice agriscience safety skills and procedures--The student will be able to:		SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
		3; SC.912.N.4.2; SC.912.P.8.7;	
05.01 Identify the common causes and prevention of accidents in agriscience operations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.06.03.01.a CS.07.04.01.c.
05.02 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		FPP.01.02.01. a FPP.02.01.01. a FPP.02.02.02. a FPP.02.03
05.03 Identify proper disposal of hazardous waste materials and biohazards.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.07.04.01
05.04 Describe emergency procedures for: basic first aid, CPR, chemical spills, fire extinguisher use	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ESS.04.02.02. b ESS.04.05.01
06.0 Apply scientific and technological principles to agriscience issues--The student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	CS.07.03.01.c
06.01 Employ scientific measurement skills.			
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 CS.10.01.01.a
06.03 Identify the parts and functions of plant and animal cells.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		BS.02.02.01 ESS.01.01.02. b
06.04 Describe the phases of cell reproduction.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.01.02.01.c AS.02.02.02.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8		PS.01.02.01.b. AS.02.02.03.b

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
06.06 Interpret, analyze, and report data.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.11.01.01 CS.11.02.01
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).	LAFS.910.W.3.7 LAFS.1112.W.3.7		BS.02.05.03.a.
07.0 Apply environmental principles to the agricultural industry--The student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	BS.01.01.03.a.
07.01 Research how different climactic and geological activity influences agriculture.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
07.02 Describe various ecosystems as they relate to the agriculture industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.02.06.09 CS.05.03.02
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.01.01.02.
07.04 Identify regulatory agencies that impact agricultural practices.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS910.L.3.6 LAFS.1112.L.3.6		PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.05 Apply Best Management Practices that enhance the natural environment.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
07.06 Identify conservation practices related to natural resources.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		PS.03.04.01.b AS.08.01.01.c
08.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:		SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	PS.03.04.01.a
08.01 Identify and describe the specializations within the plant science industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.02 Categorize plants based on specific characteristics according to	LAFS.910.W.2.4 LAFS.1112.W.2.4		



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
industry and scientific standards.			
08.03 Examine the processes of plant growth including photosynthesis, respiration, transpiration, absorption, transfer, storage, reproduction, etc....	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.01.01.c.
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.03.01 PS.01.03.02
08.05 Analyze information from a fertilizer label.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		PS.02.03.01
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.02.03.04
08.07 Investigate the impacts of various pests and propose solutions for their control.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.01.03 PS.03.01.02
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.03.02 PS.03.03.03 PS.03.03.04
08.09 Explore career opportunities in plant science.	LAFS.910.W.3.7 LAFS.1112.W.3.7		FPP01.01.01.a
09.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
09.02 Analyze commercially important livestock breeds in Florida.	LAFS.910.W.2.4 LAFS.1112.W.2.4		AS.02.01.02.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.	LAFS.910.L.3.6 LAFS.1112.L.3.6		AS.02.01.01.c
09.04 Compare and contrast animal welfare issues.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4		AS.02.01.02.a AS.05.02.01.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
	LAFS.1112.SL.2.4		
09.05 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.06 Explore career opportunities in animal science.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
10.0 Demonstrate the use of agriscience tools, equipment, and instruments-- The student will be able to		SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c
10.01 Select and demonstrate proper use of hand tools in agriculture.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		AS.06.02.01.a FPP01.01.01.a
10.02 Operate service and maintain agriscience equipment, and instruments.			AS.01.01.02.b.
10.03 Manage facilities and supplies.			
11.0 Demonstrate agribusiness, employability and human relation skills--The student will be able to:			CS.08.01.01.b PST.02.02.02. b.
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		PST.03.04.01. b PST.03.03.02. a.
11.02 Utilize a record keeping system to collect, interpret, and analyze data.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		PST.04.04.03. a PST.04.04.06. a
11.03 Enhance oral communications through telephone, interview and presentation skills.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.08.03.01.c PST.03.02.03.c .

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
			PST.01.03.01.a.
11.04 Enhance written communication by developing resumes and business letters.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.L.1.2 LAFS.1112.L.1.2		
11.05 Demonstrate interpersonal (nonverbal) communication skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
11.06 Demonstrate good listening skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.09.02.01.b CS.10.01.01.a.
12.0 Apply leadership and citizenship skills--The student will be able to:			CS.03.01.03.b.
12.01 Identify and describe leadership characteristics.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.02 Identify opportunities to apply acquired leadership skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.03 Identify and demonstrate ways to be an active citizen.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.02.02
12.04 Participate in community based learning activities.			
12.05 Demonstrate the ability to work cooperatively.			CS.01.06.01.a.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		CS.02.02.02.b.
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.02.c.
12.08 Develop both a leadership and a career development plan utilizing SMART goals that include 5, 10, and 20 year benchmarks.			
13.0 Discuss components of food safety and handling practices in agriculture - The student will be able to:			
13.01 Demonstrate proper safety precautions and use of personal protective equipment.			
13.02 Evaluate the food safety responsibilities that occur along the food supply chain.			
13.03 Explain techniques and procedures for the safe handling of food products.			

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
13.04 Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).			
13.05 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Environmental Resources 2  
**Course Number:** 8006220  
**Course Credit:** 1

**Course Description:**

This course was developed as a core and is designed to develop competencies in the areas of Environmental Resources in agriculture, scientific investigation, laboratory safety, scientific and technological concepts; and the fundamentals of biotechnology.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Resources	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).  LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Resources	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
<b>03.0</b>	<b>Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Resources</b>	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06	Attend to precision. MAFS.K12.MP.6.1	
03.07	Look for and make use of structure.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
14.0 Identify major ecosystems in Florida – the student will be able to:		SC.912.L.15.3 SC.912.L.17.1, 6, 7, 8, 9, 15, 16	
14.01 Identify common plant and animal species of the major ecosystems.		SC.912.L.17.7	NRS.01.02.01.b NRS.01.02.02.b NRS.01.02.03.b NRS.01.02.04.b
14.02 Identify the boundary between uplands and wetlands using resources such as: aerial photographs, soils, plants, and/or hydrology.	MAFS.912.G-GMD.2.4	SC.912.L.17.7	
14.03 Identify environmental factors affecting Florida’s major ecosystems.		SC.912.L.17.10	
14.04 Identify threatened and endangered plant and animal species of specific habitats.		SC.912.L.17.7	
14.05 Analyze biological and economical, impacts on managing ecosystems.	MAFS.912.G-MG.1.2, 3	SC.912.L.17.12 SC.912.N.1.1	
14.06 Trace the effects of pollution through an ecosystem.		SC.912.L.17.8	
14.07 Explain how lack of predation contributes to uncontrollable exotic populations.		SC.912.L.17.6, 8	NRS.02.06.07.c
14.08 Explain how exotic populations stress native.		SC.912.L.17.8	NRS.02.06.07.b
15.0 Describe hydrology – the student will be able to:			
15.01 Define basic hydrological terms.		SC.912.E.7.3	
15.02 Explain surface water systems.		SC.912.E.7.8 SC.912.L.17.16	ESS.03.03.03.b
15.03 Explain ground water systems.		SC.912.E.6.4 SC.912.E.7.8	ESS.03.03.03.b



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
		SC.912.L.17.16	
15.04 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.	MAFS.912.A-SSE.1.1, 2 MAFS.912.A-SSE.2.3	SC.912.L.17.10 SC.912.E.7.1 SC.912.N.3.5	
15.05 Discuss the Clean Water Act.			
15.06 List the components of Florida's fresh water systems (lakes, ground water, aquifer, springs, rivers, sink holes and swamps) and explain the importance of managing these resources.		SC.912.E.7.8 SC.912.E.6.4 SC.912.N.3.5	
16.0 Practice safety skills and procedures – the student will be able to:			
16.01 Demonstrate proper safety precautions and use of common laboratory, testing, and personal protective equipment.		SC.912.L.14.6	
16.02 Identify and utilize safe practices with equipment..		SC.912.L.14.6	
16.03 Identify physical, chemical, biological, and zoological hazards.		SC.912.L.14.6	
16.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA) regulations.		SC.912.L.14.6 SC.912.L.17.13	
16.05 Determine, review, and follow relevant regulations.		SC.912.L.17.13	
16.06 Maintain appropriate safety records.			
16.07 Identify and describe “on the job” hazards and risks including fire/explosive, lead asbestos, and weather hazards.		SC.912.L.14.6	
17.0 Demonstrate sampling procedures – the student will be able to:			
17.01 Define sampling objectives and protocol.		SC.912.N.1.1	
17.02 Operate, calibrate, and maintain sampling equipment.		SC.912.N.1.1	
17.03 Develop sampling strategy.	MAFS.912.S-IC.1.1, 2	SC.912.N.1.1 SC.912.N.3.5	
17.04 Perform applicable field measurements.		SC.912.N.1.1	
17.05 Appropriately preserve, document, and dispose of samples.	MAFS.912.S-ID.1.1, 2, 3 MAFS.912.S-CP.1.5	SC.912.N.1.1	
17.06 Identify cross-contamination and other risks associated with sampling.		SC.912.N.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
17.07 Describe, plan, and utilize quality assurance practices.	MAFS.912.S-ID.3.9	SC.912.N.1.1 SC.912.N.3.5	
17.08 Perform periodic follow-up sampling.		SC.912.N.1.1	
18.0 Collect and test samples used to determine soil characteristics – the student will be able to:		SC.912.L.17.10 SC.912.N.1.1, 3, 4, 5, 6	
18.01 Collect soil samples from test area and complete soil data forms.		SC.912.N.1.1	
18.02 Determine soil pH using pH test kit.		SC.912.N.1.1	PS.02.03.03.c
18.03 Conduct soil and mineral and analysis using soil test kit.		SC.912.N.1.1	PS.02.03.03.c
18.04 Determine and record texture, structure, temperature and color of each soil layer.		SC.912.N.1.1	
18.05 Analyze soil data and write lab report.	MAFS.912.S-IC.2.6	SC.912.N.1.1	
18.06 Determine the effect of texture, density, and porosity on permeability/infiltration rates and seasonal high groundwater table.		SC.912.L.17.2	ESS.03.02.01.c
18.07 Examine the relationship between soil texture, water movement and water holding capacity.		SC.912.L.17.2	ESS.03.02.01.c
18.08 Determine land class capability utilizing resources, such as: NRCS County Soil Survey, using Geographic Information Systems or other resources.	MAFS.912.G-GMD.2.4	SC.912.L.17.2	ESS.03.02.01.c NRS.02.02.01.c
19.0 Describe related geologic principles – the student will be able to:			
19.01 Explain the geological history of Florida.		SC.912.E.7.3 SC.912.N.3.5 SC.912.E.6.2, 4	
19.02 Analyze a soil profile and describe the associated components.		SC.912.E.7.3 SC.912.N.3.5 SC.912.E.6.4	
19.03 Evaluate soil profiles, land-capability classes, and soil conservation practices.	MAFS.912.A-SSE.1.1 MAFS.912.F-IF.2.5	SC.912.E.7.3 SC.912.N.3.5 SC.912.E.6.4	
19.04 Interpret legal descriptions of land.		SC.912.L.17.13	
19.05 Identify mapping and surveying techniques and equipment.	MAFS.912.N-Q.1.2, 3 MAFS.912.G-GMD.2.4 MAFS.912.G-SRT.1.1 MAFS.912.G-CO.4.12	SC.912.N.1.1 SC.912.N.3.5 SC.912.E.6.2	
20.0 Discuss related standards and regulations – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
20.01 Identify where local state, and federal regulations are documented and describe their impact.		SC.912.L.17.13	
20.02 Identify local, state, and national regulatory agencies and discuss their roles in relation to state and federal laws and statutes.		SC.912.L.17.13	
20.03 Research how rules and laws are made and implemented.		SC.912.L.17.13	
20.04 Research and report how endangered species get listed at the state and federal level.		SC.912.L.17.13	
21.0 Identify wetland management practices – the student will be able to:			
21.01 Identify ecosystems.		SC.912.L.17.7, 9 SC.912.N.3.5	
21.02 Discuss the structure, function, and delineation of wetlands. (Including characteristics, habitat value, and wetland fauna and flora.		SC.912.L.17.2, 9 SC.912.N.3.5	
21.03 Define characteristics of wetlands.		SC.912.L.17.2, 4, 13	
21.04 Discuss habitat value.		SC.912.L.17.7, 8, 17	
21.05 Identify wetland fauna and flora.		SC.912.L.17.9	
21.06 Determine desirable vs. invasive plant and animal species in Florida wetlands.		SC.912.L.17.6, 8	
21.07 Research control treatments for invasive plants.			
21.08 Discuss mitigation techniques.			
21.09 Evaluate impacts on wetlands.			
22.0 Describe methods to manage wildlife – the student will be able to:			
22.01 Identify wildlife species in the various Florida environments.		SC.912.L.17.6	
22.02 Identify and describe life cycle of game species and non-game.		SC.912.L.17.6	
22.03 Discuss urban wildlife management.		SC.912.L.17.6, 13, 17 SC.912.N.3.5	
22.04 Identify wildlife management techniques and principles.		SC.912.N.1.1 SC.912.L.17.1, 5, 17	
22.05 Identify common wildlife diseases and parasites.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
22.06 Discuss wildlife population dynamics.	MAFS.912.S-MD.2.5, 6, 7 MAFS.912.S-CP.1.2, 3, 5 MAFS.912.G-MG.1.2	SC.912.L.17.1, 5	
23.0 Describe procedures to manage forests – the student will be able to:			
23.01 Describe dendrology.		SC.912.L.17.4, 19	
23.02 Describe silviculture. (Including harvesting techniques, timber stand improvements)	MAFS.912.G-SRT.3.8 MAFS.912.G-SRT.4.11 MAFS.912.G-SRT.2.5 MAFS.912.G-SRT.1.3 MAFS.912.G-MG.1.2	SC.912.L.17.4, 8 SC.912.E.7.8 SC.912.N.3.5	
23.03 Describe replanting techniques.		SC.912.L.17.4, 17, 19	
23.04 Describe the need for prescribed fires.			
23.05 Identify timber and forest products.		SC.912.L.17.8, 19	

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Environmental Resource Technology 3  
**Course Number:** 8006230  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of water treatment, stormwater systems, Geographic Informational and Global Positioning Systems, environmental standards and regulations, career opportunities; scientific and research concepts; principles of leadership; and employability, and human relations skills. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
24.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Environmental Resources	
24.01	Key Ideas and Details	
24.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.  LAFS.1112.RST.1.1	
24.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.1112.RST.1.2	
24.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.1112.RST.1.3	
24.02	Craft and Structure	
24.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.  LAFS.1112.RST.2.4	
24.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.  LAFS.1112.RST.2.5	
24.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important	

Florida Standards		Correlation to CTE Program Standard #
	issues that remain unresolved. LAFS.1112.RST.2.6	
24.03	Integration of Knowledge and Ideas	
24.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
24.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
24.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
24.04	Range of Reading and Level of Text Complexity	
24.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
24.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
25.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Environmental Resources	
25.01	Text Types and Purposes	
25.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
25.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
25.02	Production and Distribution of Writing	
25.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
25.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	

Florida Standards		Correlation to CTE Program Standard #
		LAFS.1112.WHST.2.5
25.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.	
		LAFS.1112.WHST.2.6
25.03	Research to Build and Present Knowledge	
25.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
		LAFS.1112.WHST.3.7
25.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.	
		LAFS.1112.WHST.3.8
25.03.3	Draw evidence from informational texts to support analysis, reflection, and research.	
		LAFS.1112.WHST.3.9
25.04	Range of Writing	
25.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	
		LAFS.1112.WHST.4.10
26.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Environmental Resources	
26.01	Make sense of problems and persevere in solving them.	
		MAFS.K12.MP.1.1
26.02	Reason abstractly and quantitatively.	
		MAFS.K12.MP.2.1
26.03	Construct viable arguments and critique the reasoning of others.	
		MAFS.K12.MP.3.1
26.04	Model with mathematics.	
		MAFS.K12.MP.4.1
26.05	Use appropriate tools strategically.	
		MAFS.K12.MP.5.1
26.06	Attend to precision.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.6.1
26.07 Look for and make use of structure.	MAFS.K12.MP.7.1
26.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
27.0 Utilize data and resources – the student will be able to:			
27.01 Utilize word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, and GIS.			
27.02 Locate and interpret reference materials.			
27.03 Maintain necessary/required record keeping practices and procedures.			
27.04 Discuss Federal and state requirements for (TMDL) Total Maximum daily loads and minimum flows and levels.			
27.05 Describe the establishment and implementation of TMDL in Florida.			
27.06 Identify potential sources of point and non-point pollution.			
27.07 Identify the five water management districts in Florida.			
27.08 Define minimum flows and levels for a water management district.			
28.0 Determine the quality and quantity of water resources – the student will be able to			
28.01 Understand pretreatment, primary, secondary, and tertiary treatment processes of wastewater.		SC.912.L.17.11, 14, 15, 16, 17, 20 SC.912.N.3.5 SC.912.N.4.2	
28.02 Describe wastewater disposal options.		SC.912.L.17.11, 13, 14, 15, 16, 17, 20	
28.03 Identify septic tanks types and functions.		SC.912.L.17.11, 14, 15, 16	



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
28.04 Determine water quality of groundwater, rivers, lakes, and spring water.		SC.912.L.17.2	ESS.03.03.04.c
28.05 Determine stream flow.	MAFS.912.F-LE.1.1, 2, 3, 4 MAFS.912.F-LE.2.5	SC.912.N.1.1	ESS.03.03.05.c
28.06 Collect, store and label water samples from a representative test site.		SC.912.N.1.1	ESS.03.03.04.c
28.07 Determine the quality of water samples by measuring for pH, turbidity, dissolved solids and dissolved oxygen.		SC.912.N.1.1	ESS.03.03.04.c
28.08 Investigate water shed boundaries and drainage patterns.	MAFS.912.G-GMD.2.4	SC.912.L.17.2	
28.09 Monitor water levels of rivers, streams, ponds and lakes.		SC.912.N.1.1	ESS.03.03.05.c
29.0 Describe stormwater systems – the student will be able to:			
29.01 Demonstrate knowledge of runoff through use of terminology		SC.912.L.17.2, 11, 14, 15, 16	
29.02 Recognize soil types and land cover as related to runoff.			
29.03 Recognize erosion, non-point source pollution and erosion control methods.			
29.04 Define topography and groundcover and its effects on stormwater.		SC.912.L.17.11, 14, 20 SC.912.N.3.5	
30.0 Develop map reading skills – the student will be able to:			
30.01 Review aerial maps.	MAFS.912.G-SRT.1.1	SC.912.L.17.15	
30.02 Interpret topographical and flood plain maps.	MAFS.912.G-GMD.2.4	SC.912.E.7.3	
22.01 Interpret legal land descriptions.	MAFS.912.G-GMD.2.4	SC.912.L.17.15	
22.02 Interpret current and historical aerial photography for land cover and land use applications.	MAFS.912.G-GMD.2.4	SC.912.L.17.13, 15	
22.03 Explain topographic map symbols and legends.		SC.912.L.17.15	
22.04 Measure acreage on maps.	MAFS.912.N-Q.1.3	SC.912.N.1.1	
22.05 Determine location and other information from maps, using technology such as Global Positioning System (GPS) and/or compass.	MAFS.912.G-GMD.2.4	SC.912.L.17.15	NRS.02.02.01.c

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci	National Standards
31.0	Use Geographic Informational (GIS) and Global Positioning (GPS) Systems – the student will be able to:			
31.01	Define GIS and its function.		SC.912.E.7.3 SC.912.E.6.2	PST.05.03.01.a
31.02	Use GIS software.	MAFS.912.G-GMD.2.4	SC.912.E.7.3 SC.912.E.6.2, 4 SC.912.L.17.15	PST.05.03.01.a
31.03	Learn GIS applications.	MAFS.912.G-GMD.2.4	SC.912.E.7.3 SC.912.L.17.15	PST.05.03.01.a
31.04	Define GPS and its function.		SC.912.E.7.3 SC.912.L.17.15	PST.05.03.01.a
31.05	Collect GPS data and load on GIS.	MAFS.912.G-GMD.2.4	SC.912.E.7.3 SC.912.L.17.15	PST.05.03.01.a
31.06	Identify other remote sensing tools.		SC.912.N.3.5 SC.912.E.7.3	PST.05.03.01.a
32.0	Describe procedures for managing hazardous materials – the student will be able to:			
32.01	Describe flow and life cycles of materials.		SC.912.N.4.4 SC.912.N.3.5	
32.02	Identify proper chemical handling and storage guidelines.		SC.912.L.17.14, 17	
32.03	Describe material management procedures.		SC.912.L.17.14 SC.912.N.3.5	
32.04	Identify waste minimization, pollution prevention and alternatives to disposal.		SC.912.L.17.14, 17 SC.912.N.4.1, 2	
32.05	Describe shipping and transportation procedures for hazardous materials.		SC.912.L.17.14	
32.06	Identify principles of toxicology.			
32.07	Identify routes of exposure.			
32.08	Discuss common chemical compatibility.			
33.0	Prepare a plan for a mock disaster activity – the student will be able to:			
33.01	Describe the need for and types of pre-planning.			
33.02	Identify and select necessary agency involvement for the type of disaster.		SC.912.L.17.13	
33.03	Identify possible areas and types of impacts			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
33.04 Write and evaluate contingency plans.			
33.05 Create a plan for a disaster clean up including needed materials and equipment.			
34.0 Identify career opportunities and organizational dynamics – the student will be able to:			
34.01 Identify careers and opportunities in the following fields: agriculture, Surface/stormwater, drinking water, wastewater, groundwater, land resources, air quality, solid waste, and HAZMAT.		SC.912.L.17.11, 16, 20 SC.912.N.3.5	
34.02 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Natural Resource Management 4  
**Course Number:** 8006240  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of land management, weather systems, wildlife programs, commodity and non-commodity resources, sustainable agriculture and environmental research.

Florida Standards		Correlation to CTE Program Standard #
23.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Environmental Resources	
23.01	Key Ideas and Details	
23.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
23.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
23.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
23.02	Craft and Structure	
23.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
23.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
23.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
23.03	Integration of Knowledge and Ideas	
23.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
23.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
23.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
23.04	Range of Reading and Level of Text Complexity	
23.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
23.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
24.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Environmental Resources	
24.01	Text Types and Purposes	
24.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
24.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
24.02	Production and Distribution of Writing	
24.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
24.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	

Florida Standards		Correlation to CTE Program Standard #
24.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
<b>24.03 Research to Build and Present Knowledge</b>		
24.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
24.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
24.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
<b>24.04 Range of Writing</b>		
24.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
25.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Environmental Resources.	
25.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
25.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
25.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
25.04	Model with mathematics. MAFS.K12.MP.4.1	
25.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
25.06	Attend to precision. MAFS.K12.MP.6.1	

Florida Standards	Correlation to CTE Program Standard #
25.07 Look for and make use of structure.	MAFS.K12.MP.7.1
25.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
35.0 Analyze wildlife management procedures – the student will be able to:			
35.01 Discuss basic mammalogy, ornithology, and herpetology.			AS.02.01.02.a
35.02 Use a dichotomous key.		SC.912.N.3.5	NRS.01.02.03.a
35.03 Conduct experimental design and statistical analysis.	MAFS.912.S-MD.1.1, 2	SC.912.N.1.1	ESS.01.01.01.a
35.04 Collect and interpret data from a wildlife study.		SC.912.N.1.1	ESS.01.01.01.a
36.0 Analyze forest management techniques – the student will be able to:			
36.01 Identify related forestry equipment.		SC.912.L.17.17	NRS.03.01.01.a
36.02 Identify surveying techniques.	MAFS.912.N-Q.1.2, 3 MAFS.912.G-GMD.2.4 MAFS.912.G-SRT.1.1 MAFS.912.G-CO.4.12	SC.912.L.17.15	NRS.03.01.01.a
36.03 Describe a timber cruising activity.	MAFS.912.G-SRT.3.8 MAFS.912.G-SRT.4.11 MAFS.912.G-SRT.2.5 MAFS.912.G-SRT.1.3 MAFS.912.G-MG.1.1	SC.912.L.17.17	NRS.03.01.01.a
36.04 Perform a pacing exercise.		SC.912.L.17.17	
36.05 Describe how to calculate timber volumes using a Biltmore stick.	MAFS.912.G-MG.1.1, 2, 3 MAFS.912.G-GMD.1.3	SC.912.L.17.17	NRS.03.01.01.a NRS.02.04.02.c
36.06 Identify and discuss Forestry Best Management Practices (BMP).		SC.912.E.7.8	NRS.02.04.02.c NRS.03.01.01.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
37.0 Identify forest fire management techniques – the student will be able to:			
37.01 Describe the history of prescribed fire usage in Florida.		SC.912.E.7.3	NRS.04.01.01.a
37.02 Discuss the effects of prescribed burns and wildfires on communities in Florida.		SC.912.L.17.20	NRS.04.01.01.a
37.03 Discuss fire weather behavior.		SC.912.E.7.3, 8	NRS.04.01.01.a
37.04 Discuss seasonal ecological effects of burning.		SC.912.E.7.3, 8	NRS.04.01.01.a
37.05 Identify and discuss wildfire suppression techniques.		SC.912.E.7.3, 8	NRS.04.01.01.b
37.06 Describe prescribed burn techniques.		SC.912.N.3.5 SC.912.E.7.3, 8	NRS.04.01.01.b
37.07 Identify and discuss safety equipment and practices related to fire management.			NRS.04.01.01.b
37.08 Discuss how burning of vegetation releases nutrients into the soil and carbon in the atmosphere.		SC.912.L.17.19 SC.912.E.7.3, 8	
37.09 Investigate the merits of growing season burns versus non-growing season burns.		SC.912.L.17.19 SC.912.E.7.8	
37.10 Discuss safety precautions for controlled burns and legal ramifications.		SC.912.L.17.13	
38.0 Discuss Pest management for insects – the student will be able to:			
38.01 Assess environmental impact of pests.		SC.912.L.17.1, 6	
38.02 Discuss common pests.			NRS.04.03.01.a
38.03 Describe life cycles of common pests.		SC.912.L.17.8	NRS.04.03.01.a
38.04 Classify insects using a dichotomous key		SC.912.N.3.5	NRS.04.03.01.a
38.05 Describe the principles and benefits of integrated pest management. (biological, chemical, and cultural).		SC.912.L.17.8, 15, 17	NRS.04.03.01.c
38.06 Conduct pest population studies.	MAFS.912.F-LE.1.1, 2, 3, 4 MAFS.912.F-LE.2.5	SC.912.L.17.1	
38.07 Identify diseases and pests that impact agriculture production.		SC.912.L.17.8	PS.03.03.01.b
38.08 Explain methods to control and eradicate diseases and pests.		SC.912.L.17.8, 17	PS.03.02.01.c
38.09 Describe isolation or quarantine methods to minimize spread of		SC.912.L.17.8, 17	



<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
diseases and pests.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:**        **Advanced Natural Resources 5**  
**Course Number:**   **8006250**  
**Course Credit:**     **1**

**Course Description:**

This course is designed to develop competencies in the management of pests and ecosystems, planning and administering land usage, ecology restoration, career opportunities; scientific and research concepts; principles of leadership; and employability, and human relations skills. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M*

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
39.0 Analyze the management of ecosystems – the student will be able to:			
39.01 Describe biological and economic, impacts on managing ecosystems.		SC.912.L.17.13, 17	
39.02 Describe the effects of manipulating species with in an ecosystem.		SC.912.L.17.1, 5	
39.03 Discuss bio-diversity and discuss effect of bio diversity.		SC.912.L.17.8	
39.04 Evaluate how external factors affect communities.	MAFS.912.S-IC.2.4, 5		
39.05 Identify vegetation monitoring techniques		SC.912.L.17.15, 17	
39.06 Conduct vegetation sampling and analysis.		SC.912.N.3.5 SC.912.L.17.17	
40.0 Discuss ecology restoration – the student will be able to:			
40.01 Research of vegetation dynamics.		SC.912.L.17.19	
40.02 Describe restoration techniques.		SC.912.L.17.8	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
40.03 Research wetlands reclamation and uplands restoration.		SC.912.L.17.8	
40.04 Diagnose restoration from a systems approach.		SC.912.L.17.8	
40.05 Research applicable monitoring techniques.			
41.0 Discuss the principles of land use planning. – the student will be able to:			
41.01 Identify typical land use types in Florida and environmental issues		SC.912.L.17.13	
41.02 List the elements of a growth management plan			
41.03 Describe the principles of growth management		SC.912.L.17.17 SC.912.E.6.4	
41.04 Discuss the role of local government in growth management			
41.05 Describe buffer areas and protected lands.			
42.0 Discuss managing and disposing of solid waste – the student will be able to:			
42.01 Describe history of solid waste disposal.		SC.912.L.17.13, 14	
42.02 Identify types of waste.		SC.912.L.17.14	
42.03 Research and evaluate solid waste disposal options. (Landfill, incineration, and composting, etc.)		SC.912.L.17.14, 16, 17 SC.912.N.3.5	
42.04 Identify pollution prevention and source reduction options.			
43.0 Evaluate the importance of the food and fiber system to understand the impact on global economy – the student will be able to:			
43.01 Assess the agricultural impact upon the US gross national product and the total global economy.		SC.912.L.17.12, 19	
43.02 Investigate local, state, and national regulatory laws, industry regulations, and legislation for agricultural businesses.		SC.912.L.17.2	ABS.02.01.02. b
43.03 Identify and describe the primary government agencies involved with agriculture.		SC.912.L.17.2	
43.04 Research new and emerging technologies and their impact on the economy.		SC.912.L.17.15	
43.05 Recognize the value of the food and agribusiness industry.			
44.0 Examine the scope of career opportunities in and the importance of agriculture and natural resources to the economy – the student will be able			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
to:			
44.01 Define and explore natural resources and agribusinesses and their role in the economy.			
44.02 Evaluate and explore the agribusiness and natural resource career opportunities..			
44.03 Compare how key organizational structures and processes affect organizational performance and the quality of products and services.			
45.0 Demonstrate the use of weather and climate data – the student will be able to:	MAFS.912.S-IC.2	SC.912.L.17.8 SC.912.N.1.1	
45.01 Interpret a weather map.		SC.912.L.17.5, 6	ESS.03.01.01. c
45.02 Obtain and record measurements of local rainfall, temperature, air pressure, relative humidity, cloud cover and type, and wind speed..	MAFS.912.N-Q.1.2, 3	SC.912.N.1.1	ESS.03.01.01. c
45.03 Analyze the impact of weather and climate in regard to risk management.		SC.912.L.17.6	
46.0 Discuss sustainable agriculture – the student will be able to:	MAFS.912.N-Q.1.3	SC.912.L.17.12, 13, 14, 20	
46.01 Describe why it is important to sustain domestic agriculture.		SC.912.L.17.12	
46.02 Explain international issues affecting domestic agriculture.		SC.912.L.17.12	
46.03 Apply principles of nutrient, water, and waste management to environmental problems.	MAFS.912.N-Q.1.2, 3	SC.912.L.17.13	
46.04 Compare practices that either enhance or hinder the sustainability of agriculture.		SC.912.L.17.1, 18, 20	
46.05 Analyze the benefit of recent technological advances on the agricultural industry.			
46.06 Identify and monitor erosion hazards and environmental quality.		SC.912.L.17.16	
46.07 Describe Best Management Practices (BMP) and their significance. (Including management for water quality and conservation, and pesticide use)		SC.912.L.17.12, 15, 17	

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified

for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Environmental Water Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**NOTE:** This program has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

**Secondary – Career Preparatory**

Program Number	8007100
CIP Number	0715050608
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	ENV WAT TEC 7G
CTSO	FFA
SOC Codes (all applicable)	51-8031 - Water and Wastewater Treatment Plant and System Operators
CTE Program Resources	<a href="http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to applications of water resource management, application of safety procedures, record keeping and sampling, wetland management, reclamation treatment techniques, solid waste disposal, storm water management, hazardous material storage, government water technology regulations, filtrations, sedimentation, fluoridation process, and perform maintenance and inspections on equipment..

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of three courses and one occupational completion point points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8007110	Introduction to Environmental Water Technology	1 credit	51-8031	2	VO
	8007120	Intermediate Environmental Water Technology	1 credit		2	VO
	8007130	Advanced Environmental Water Technology	1 credit		2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Tables

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

**This program is daggered and will not be aligned to academic courses.**

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Introduction to Environmental Water Technology	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%
Intermediate Environmental Water Technology	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%
Advanced Environmental Water Technology	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%



\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

**This program is daggered and will not be aligned to academic courses.**

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Introduction to Environmental Water Technology	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
Intermediate Environmental Water Technology	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
Advanced Environmental Water Technology	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

### **National Standards (NS)**

Some or all of the courses in this program have been aligned with Industry or National Standards. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link:

[https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn\\_000.pdf](https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf)

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Water Technology.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Water Technology.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Water Technology.
- 04.0 Identify the historical, social, cultural and potential applications of water resource management.
- 05.0 Describe and discuss hydrology.
- 06.0 Practice safety skills and procedures.
- 07.0 Demonstrate record keeping and sampling procedures.
- 08.0 Describe and discuss geologic principles of water resources.
- 09.0 Manage wetlands.
- 10.0 Identify career opportunities and organizational dynamics.
- 11.0 Apply scientific and technological principles.
- 12.0 Describe water reclamation treatment techniques.
- 13.0 Collect and dispose of solid waste.
- 14.0 Explain water treatment techniques.
- 15.0 Discuss and manage stormwater systems.
- 16.0 Describe water distribution.
- 17.0 Demonstrate the management and environmentally sound use of water resources.
- 18.0 Maintain water treatment equipment and facilities.
- 19.0 Discuss related standards and regulations.
- 20.0 Conduct site assessment.
- 21.0 Practice safety skills and procedures.
- 22.0 Manage data and physical resources.
- 23.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems.
- 24.0 Control incidents.
- 25.0 Prepare a plan.
- 26.0 Perform remediation.
- 27.0 Collect and dispose of solid waste.
- 28.0 Identify continuing education needs and opportunities.
- 29.0 Conduct recordkeeping and sampling procedures.
- 30.0 Review stormwater permit procedures.
- 31.0 Demonstrate the use of industry appropriate tools, equipment, and instruments
- 32.0 Demonstrate industry specific mathematical calculations.
- 33.0 Demonstrate industry specific science skills and techniques.
- 34.0 Identify career opportunities and organizational dynamics in water resources.

- 35.0 Demonstrate water treatment techniques.
- 36.0 Discuss an Industrial Pretreatment Program/Inspection.
- 37.0 Discuss comprehensive quality assurance plan.
- 38.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Environmental Water Technology.
- 39.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Environmental Water Technology.
- 40.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Environmental Water Technology.
- 41.0 Identify professions related to the water technology field.
- 42.0 Identify scientific concepts common in water and wastewater treatment.
- 43.0 Identify safety hazards associated with water technologies.
- 44.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
- 45.0 Solve basic math problems common to water technologies.
- 46.0 Define pumping and basic hydraulic principles.
- 47.0 Define principles of disinfection.
- 48.0 Define sampling techniques.
- 49.0 Define federal, state, and local regulations that apply to water technologies.
- 50.0 Demonstrate employability skills.
- 51.0 Identify sampling techniques and explain the significance of the steps.
- 52.0 Identify chemical, biological, and physical constituents of water entering the water treatment facility or distribution systems.
- 53.0 Describe the principles, operational and troubleshooting practices of the aeration process.
- 54.0 Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes.
- 55.0 Describe the principles, operational and troubleshooting practices of the sedimentation process.
- 56.0 Describe the principles, operational and troubleshooting practices of the filtration process.
- 57.0 Describe the principles, operational and troubleshooting practices of the water-softening process.
- 58.0 Describe the principles, operational and troubleshooting practices of the stabilization process.
- 59.0 Describe the principles, operational and troubleshooting practices of the corrosion control process.
- 60.0 Describe the principles, operational and troubleshooting practices of the disinfection process.
- 61.0 Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes.
- 62.0 Describe the principles, operational and troubleshooting practices of the iron and manganese removal processes.
- 63.0 Describe the principles, operational and troubleshooting practices for taste and odor control.
- 64.0 Describe the principles, operational and troubleshooting practices of the demineralization processes.
- 65.0 Describe the principles, operational and troubleshooting practices of the fluoridation process.
- 66.0 Identify facility operational problems.
- 67.0 Describe basic hydraulics and pumping operations.
- 68.0 Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable water facility.
- 69.0 Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Environmental Water Technology  
**Course Number:** 8007110  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the area of hydrology, safety skills and procedures, geological principles of water resources, management of wetlands, storm water systems, environmental water resources, equipment and facility maintenance, scientific and research concepts; principles of leadership; and employability, and human relations skills. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This course has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Water Technology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	

Florida Standards		Correlation to CTE Program Standard #
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
01.04.2		
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Water Technology.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development,	

Florida Standards		Correlation to CTE Program Standard #
	organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
<b>03.0</b>	<b>Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Water Technology.</b>	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	

Florida Standards	Correlation to CTE Program Standard #
03.04 Model with mathematics.	MAFS.K12.MP.4.1
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Identify the historical, social, cultural and potential applications of water resource management – the student will be able to:		SC.912.E.7.8; HE.912.C.1.3; SC.912.L.15.8, 13; SC.912.L.16.4, 7, 8, 9, 10, SC.912.L.17.1, 8, 11, 16, 19, 20; SC.912.L.18.12; SC.912.N.1.1	
04.01 Explain the developmental progression of water resource management.			
04.02 Research emerging problems and issues with water resource management.			
04.03 Explain the global importance of water conservation.			
04.04 Explain international issues affecting water resources and water quality.			
04.05 Compare practices that either enhance or hinder water quality.			
04.06 Differentiate between point and non-point sources of pollution.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.07 Identify diseases and illnesses associated with water borne pathogens.			
04.08 Explain methods to control and eradicate diseases and illnesses associated with water borne pathogens.			
04.09 Explain the significance genetic factors, environmental factors and pathogenic agents to health from the perspective of both individual and public health.			
04.10 Analyze how population size is affected by water quantity and quality.			
04.11 Evaluate the cost and benefits of renewable and nonrenewable resources such as water, energy, fossil fuels, flora and fauna.			
04.12 Predict the impact of individuals on water quality and quantity and how human lifestyles affect sustainability.			
04.13 Discuss the special properties of water that contribute to earth's suitability as an environment for life.			
05.0 Describe and discuss hydrology – the student will be able to:		SC.912.E.5.2, 4; SC.912.E.6.2, 3, 4, 5; SC.912.E.7.1, 3; SC.912.L.17.16; SC.912.P.8.1, 5, 7	
05.01 Define basic hydrological terms.			ESS.03.03.02.a ESS.03.03.02.b
05.02 Explain surface water systems.			ESS.03.03.02.a ESS.03.03.02.b
05.03 Explain ground water systems.			ESS.03.03.02.c ESS.03.03.03.a ESS.03.03.03.b ESS.03.03.03.C
05.04 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.			
05.05 List the components of Florida's fresh water systems (lakes, ground water, aquifer, sink holes, rivers, and swamps) and explain the importance of managing these resources.			
05.06 Identify alternative sources of water.			
05.07 Identify soil conditions as they relate to water quality.			ESS.03.02.03
05.08 Research and explain saltwater intrusion.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.09 Identify and discuss water wells and water reservoirs.			
06.0 Practice safety skills and procedures – the student will be able to:		SC.912.P.8.5, 7, 11	
06.01 Demonstrate proper safety precautions and use of common laboratory, testing, and personal protective equipment.			CS.06.02.01.a CS.07.01.01.b
06.02 Identify and utilize safe work practices.			CS.06.02.01.a
06.03 Identify physical, chemical, biological, and zoological hazards.			
06.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, Occupational Safety and Health Agency (OSHA), and Hazard Communication (HAZCOM) regulations.			
06.05 Determine, review, and follow regulations.			
06.06 Develop and maintain appropriate safety records.			
06.07 Identify and describe “on the job” hazards and risks including fire/explosive, lead asbestos, weather hazards and emergency response preparedness			
06.08 Perform lifting activities safely.			
06.09 Identify ladder safety and fall protection.			
06.10 Become certified in first aid/CPR and describe First Responder responsibilities.			CS.07.02.01.c
07.0 Demonstrate record keeping and sampling procedures – the student will be able to:		SC.912.N.1.1, 4, 6; SC.912.P.8.8, 11;	
07.01 Define sampling objectives, protocol and Chain of Custody.			ESS.01.01.01.a
07.02 Operate, calibrate, and maintain sampling equipment.			ESS.01.01.02.c
07.03 Develop sampling strategy.			ESS.01.01.01.b
07.04 Perform applicable field measurements including pH, dissolved oxygen, temperature, chlorine residual, and turbidity.			
07.05 Appropriately preserve, document, and dispose of samples.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
07.06 Identify cross-contamination and other risks associated with sampling.			
07.07 Describe, plan, and utilize quality assurance practices.			
07.08 Submit samples for analysis.			ESS.01.01.01.b
07.09 Perform periodic follow-up sampling.			
07.10 Identify permit requirements and procedures.			
07.11 Define and follow federal, state and local sampling guidelines.			
08.0 Describe and discuss geologic principles of water resources – the student will be able to:		SC.912.E.6.1, 2, 4; SC.912.L.17.13; SC.912.P.8.6, 7, 8, 11	
08.01 Explain the geological history of Florida.			
08.02 Create a soil profile and describe the associated components.			
08.03 Evaluate soil profiles, land-capability classes, and soil conservation practices.			
08.04 Interpret legal descriptions of land.			
08.05 Identify mapping and surveying techniques and equipment.			
08.06 Analyze local mineral resources.			
08.07 Describe lithological descriptions of local units/formations.			
08.08 Describe Florida aquifer system.			
08.09 Discuss basic groundwater chemistry.			
08.10 Describe local geology related problems.			
09.0 Manage wetlands – the student will be able to:		SC.912.E.5.4; SC.912.L.14.35; SC.912.L.17.4, 8, 16, 19, 20;	
09.01 Identify ecosystems.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
09.02 Discuss the structure and function of wetlands.			ESS.03.04.01.b
09.03 Define limits of wetlands.			
09.04 Discuss habitat value.			
09.05 Identify fauna and flora.			ESS.03.04.02
09.06 Determine desirable vs. nuisance plant and animal species.			
09.07 Describe changes in ecosystems resulting from seasonal variations, climate change, environmental impacts, and succession.			
09.08 Explain the general distribution of life in aquatic systems as a function of effluent discharge, stormwater runoff and drought.			
10.0 Identify career opportunities and organizational dynamics – the student will be able to:			
10.01 Describe the nature and origin of career opportunities in water, water reclamation and environmental industries.			CS.02.03.01.a
10.02 Compare supervisory and administrative responsibilities.			
10.03 Identify organizational structures.			
10.04 Identify team building communication skills.			CS.01.01.01.a
10.05 Identify problem-solving techniques.			CS.02.04.02.c
10.06 Identify employee responsibility/benefits.			
10.07 Identify legal aspects of personnel relations.			
10.08 Communicate effectively in verbal, written, and nonverbal modes.			
10.09 Recognize and demonstrate good listening skills.			
10.10 Conduct small informal and formal group meetings.			
10.11 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.			
10.12 Recognize and demonstrate effective communications skills in the workplace.			
10.13 Identify related associated professional associations.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
10.14 List and describe the careers associated with water treatment, distribution, and management.			
10.15 Determine the educational requirements and experience needed to enter and advance in water, water reclamation and environmental occupations.			
11.0 Apply scientific and technological principles – the student will be able to:			
11.01 Employ scientific measurement skills.			BS.02.02.01.b
11.02 Demonstrate safe and effective use of common laboratory equipment.			
11.03 Implement the scientific method and science process skills through the design and completion of a research project.			
11.04 Interpret, analyze, and report data.			
11.05 Evaluate advances in biotechnology and its impact on water resources.			
11.06 Compare and contrast structure and function of various types of microscopes.			
12.0 Describe reclaimed water treatment techniques – the student will be able to:		SC.912.L.17.16, 19, 20 SC.912.L.18.6, 8;	
12.01 Understand pretreatment, primary, secondary, and tertiary treatment processes of wastewater.			
12.02 Describe disposal options.			
12.03 Identify septic tanks types and functions.			
12.04 Apply principles of nutrients, water and waste management to environmental problems.			
13.0 Collect and dispose of solid waste – the student will be able to:		SC.912.17.16, 19, 20	
13.01 Describe history of solid waste disposal.			
13.02 Identify types of waste.			
13.03 Identify household hazardous waste collection and disposal programs.			
13.04 Research and evaluate solid waste disposal options. (landfill, incineration, and composting, etc.)			
14.0 Explain water treatment techniques – the student will be able to:		SC.912.E.6.5; SC.912.L.17.16,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
		19, 20; SC.912.L.18.6, 8; SC.912.P.8.2;	
14.01 Describe drinking water treatments.			
14.02 Identify and describe the desirable water qualities.			
14.03 Explain how changes in water quality affect life cycles.			
14.04 Explain, monitor, and maintain freshwater/salt water quality standards.			
14.05 Calculate volume in circular, rectangular and irregular shaped water structures.			
14.06 List and explain sources of pollution and methods of preventing and/or correcting these pollution problems.			
15.0 Discuss and manage stormwater systems – the student will be able to:		SC.912.E.6.2; SC.912.L.17.16, 19, 20;	
15.01 Determine boundaries of watersheds.			
15.02 Identify runoff coefficients.			
15.03 Identify the relationship between construction sites and stormwater systems.			
15.04 Research rules and regulations in regards to stormwater systems.			
15.05 Contact local municipalities to determine stormwater regulations.			
15.06 Research current construction trends and methods of stormwater systems.			
15.07 Define topography and its effects on stormwater.			
15.08 Discuss the affects that uncollected stormwater has on lakes, rivers, ponds and wetlands.			
16.0 Describe water distribution – the student will be able to:		SC.912.P.12.11	
16.01 Identify the need for backflow prevention and cross connections controls.			
16.02 Identify necessary equipment for water distribution purposes e.g.; pumps, motors, valves, storage tanks, pipes and fittings.			
16.03 Read and maintain meters.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
16.04 Identify maintenance requirements for fire hydrants, pipes, and valves.			
16.05 Identify proper procedures for operation and maintenance of lift stations.			
16.06 Discuss importance of period flushing of water distribution systems.			
17.0 Demonstrate the management and environmentally sound use of water resources – the student will be able to:			
17.01 Determine quality of groundwater and surface water.			
17.02 Identify solids and dissolved solids found in water.			
17.03 Identify primary and secondary contaminants.			
17.04 Identify unregulated organic compounds.			
18.0 Maintain water treatment equipment and facilities – the student will be able to:		SC.912.N.1.1; SC.912.P.10.4, 5, 7;	
18.01 Research water treatment equipment and facility components.			
18.02 Identify appropriate temperatures and other external conditions.			
18.03 Identify the effect of weather conditions and changes.			
18.04 Describe appropriate flow rates and tank levels.			
18.05 Create a checklist and/or policies of necessary procedures to handle daily conditions, hazards and/or malfunctions.			
18.06 Describe maintenance procedures and techniques of filters, pipes, generators, meters, motors, valves, instruments, injectors, storage basins etc.			

Florida Department of Education  
Student Performance Standards

**Course Title:** Intermediate Environmental Water Technology  
**Course Number:** 8007120  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the area of standards and regulations, site assessments, safety, managing data and physical resources, prepare a plan, perform remediation, collect and dispose of solid waste, record keeping and sampling procedures, career opportunities, leadership, teamwork, and money management concepts. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This course has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Water Technology	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text,	



Florida Standards		Correlation to CTE Program Standard #
	including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Water Technology	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	
	LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	
	LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
	LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	
	LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research.	
	LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	
	LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Water Technology	
03.01	Make sense of problems and persevere in solving them.	
	MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively.	
	MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others.	
	MAFS.K12.MP.3.1	
03.04	Model with mathematics.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.4.1
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
19.0 Discuss related standards and regulations – the student will be able to:		SC.912.N.1, 2, 3, 4	
19.01 Explain the importance and impacts of local, state, and federal regulations and required documentation.			
19.02 Describe the Florida Administrative Code's (F.A.C.) impact on environmental issues.			
19.03 Discuss the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA).			
19.04 Identify local, state, and national regulatory agencies and discuss their roles in relation to state and federal laws and statutes.			
19.05 Research how rules and laws are made and mandated.			
19.06 Describe permitting procedures.			
19.07 Identify regulation resources.			
19.08 Describe various licensing procedures.			
19.09 Research governmental regulation authorities associated with Florida's water sources.			
19.10 Describe National Pollution Discharge Elimination System (NPDES).			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
19.11 Identify appropriate agencies and their functions			
19.12 Describe the role of environmental protection.			
19.13 Create, evaluate and present a well-head protection plan.			
19.14 Discuss the need for adequate monitoring of environmental parameters when making policy decisions.			
20.0 Conduct site assessment – the student will be able to:		SC.912.L.17.20; SC.912.N.1.1;	
20.01 Identify the purposes of site assessment.			
20.02 Describe required documentation.			
20.03 Interpret blueprints			
20.04 Demonstrate map reading			
20.05 Obtain physical and performance measurements.			
20.06 Assess needed equipment and processes.			
21.0 Practice safety skills and procedures – the student will be able to:		SC.912.N.4.2	
21.01 Identify safety procedures for: wells, pumps, electrical equipment, motor vehicles, buildings, and other necessary equipment.			
21.02 Handle compressed gasses, solids, and liquids safely.			
21.03 Summarize “Right of Access” law.			
21.04 Summarize “Confined Space” regulations.			
21.05 Identify Zero Tolerance policies.			
21.06 Identify employee limitations.			
21.07 Identify appropriate decontamination procedures.			
21.08 Identify principles of toxicology.			
21.09 Identify routes of exposure.			
21.10 Identify respirator safety procedures.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
21.11 Discuss history of hazardous materials and hazardous categories.			
21.12 Discuss common chemical compatibility.			
21.13 Describe and discuss OSHA concepts.			
21.14 Describe and discuss the Vulnerability Assessment process.			
22.0 Manage data and physical resources – the student will be able to:		SC.912.N.1, 2, 3, 4, 5, 6, 7	
22.01 Utilize word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, and security.			
22.02 Identify possible funding sources.			
22.03 Prepare budgets and purchase orders.			
22.04 Prepare a time management plan.			
22.05 Utilize information databases.			
22.06 Locate and interpret printed reference materials.			
22.07 Describe network opportunities.			
22.08 Maintain necessary/required record keeping practices and procedures.			
22.09 Keep inventory, time sheets, and equipment maintenance logs.			
22.10 Identify suppliers and technical resources.			
23.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems – the student will be able to:		SC.912.N.1.1	
23.01 Define GIS and its function.			PST.05.03.01.a PST.05.03.01.b PST.05.03.02.b
23.02 Use GIS software.			PST.05.03.01.c PST.05.03.02.c
23.03 Learn GIS applications.			PST.05.03.03.c
23.04 Develop a GIS model.			
23.05 Define GPS and its function.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
23.06 Collect GPS data and load on GIS.			PST.05.03.02.c
23.07 Research and identify other remote sensing tools.			PST.05.03.04.b
23.08 Identify and plot points on a map.			
24.0 Control incidents – the student will be able to:		SC.912.N.1.1	
24.01 Identify and describe reasons for controlling incidents.			
24.02 Describe levels of response.			
24.03 Determine and use proper chain of command.			
24.04 Determine methods of control.			
24.05 Demonstrate site access restriction methods.			
24.06 Identify appropriate authorities to be notified.			
24.07 Place equipment appropriately.			
24.08 Orient zones.			
24.09 Identify possible geographic hazards.			
24.10 Identify media protocol and procedures for communicating with the public.			
24.11 Prepare a press release for a mock incident.			
24.12 Identify abnormal event management processes utilizing the National Information Management System (NIMS).			
25.0 Prepare a plan – the student will be able to:		SC.912.N.1.1	
25.01 Describe the need for and the types of pre-planning.			
25.02 Identify and select necessary agency involvement.			
25.03 Identify possible contamination zones.			
25.04 Review contingency plans			
25.05 Create contingency plans for hurricanes, tornadoes, floods, fires, and/or nuclear accidents (emergency response plan).			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
25.06 Discuss Superfund Amendments Reauthorization Act (SARA) also known as the Emergency Planning and Community Right-to-Know Act (EPCRA) regulations.			
25.07 Create plan for deployment.			
25.08 Conduct mock disaster activities.			
26.0 Perform remediation – the student will be able to:		SC.912.L.17.16	
26.01 Research appropriate cleaning methods.			
26.02 Create a plan for a disaster clean up including needed materials and equipment.			
26.03 Understand entry and closure methods.			
26.04 Identify contamination removal procedures.			
26.05 Design a site/system cleanliness verification procedure.			
26.06 Identify tear down and demobilization procedures.			
27.0 Collect and dispose of solid waste – the student will be able to:		SC.912.L.17.20	
27.01 Describe history of solid waste disposal.			
27.02 Identify types of waste.			
27.03 Research and evaluate solid waste disposal options. (Landfill, incineration, and composting, etc.)			
28.0 Identify continuing education needs and opportunities – the student will be able to:			
28.01 Determine continuing education needs/goals.			
28.02 Identify available educational and financial resources.			
28.03 Identify appropriate professional associations and attend meetings where applicable.			
28.04 Read and review trade journals.			
29.0 Conduct recordkeeping and sampling procedures – the student will be able to:		SC.912.N.1.1, 2	
29.01 Demonstrate sampling, testing and recordkeeping.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
29.02 Collect and analyze water samples: grab, composite and representative.			
29.03 Record data into identified database program.			
29.04 Interpret lab results.			
29.05 Evaluate data.			
29.06 Measure well volumes.			
29.07 Describe organism sampling techniques.			
30.0 Review stormwater permit procedures – the student will be able to:			
30.01 Research and demonstrate Best Management Practices (BMP), Standard Operating Procedures (SOP) and Preventive Maintains (PM).			
30.02 Describe proper ditch, pond, culvert, and manhole inspection techniques.			
30.03 Evaluate a storm cleanup and prevention plan.			
30.04 Discuss pollutants, illegal dumping and discharge and demonstrate appropriate handling procedures.			
30.05 Describe the importance of outfall structures, inlets, and treatment systems.			
30.06 Describe the procedures to clean and televisive pipes.			
30.07 Describe the importance of ditch banks and right of ways.			
30.08 Maintain, repair and replace pipe sections.			
31.0 Demonstrate the use of industry appropriate tools, equipment, and instruments – the student will be able to:		SC.912.P.10.2, 3, 10	
31.01 Select and demonstrate proper use of industry appropriate tools, equipment, and instruments.			
31.02 Demonstrate various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			
31.03 Service and maintain industry appropriate equipment, instruments, facilities, and supplies.			
32.0 Demonstrate industry specific mathematical calculations – the student will be able to:		SC.912.E.5.6; SC.912.N.1.1; SC.912.P.8.9;	



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
		SC.912.P.10.5; SC.912.P.12.2, 3	
32.01 Calculate area and volume.			
32.02 Convert temperature.			
32.03 Calculate velocities and flow rates.			
32.04 Calculate detention time.			
32.05 Calculate parts per million/pounds.			
32.06 Calculate chemical concentrations.			
32.07 Utilize conversion factors.			
32.08 Calculate ratios and percentages.			
32.09 Calculate water, brake and motor horsepower for chemical pumps.			
32.10 Calculate force.			
32.11 Calculate sedimentation and loading rates.			
32.12 Use calculations to determine activated sludge characteristics.			
32.13 Use calculations to determine sludge digestion characteristics.			
32.14 Use a variety of problem-solving strategies such as drawing a diagram, making a chart, guessing-and-checking, solving a simpler problem, writing an equation working backwards, and creating a table.			
33.0 Demonstrate industry specific science skills and techniques – the student will be able to:		SC.912.L.18.12; SC.912.P.8.1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11; SC.912.P.10.7	
33.01 Differentiate between chemical and physical properties of solids, dissolved solids, gases and liquids.			
33.02 Identify chemical symbols on the periodic table and explain their relationships.			
33.03 Interpret formula representations of molecules and compounds in water treatment.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
33.04 Characterize chemical reactions in water treatment processes for example redox, acid base, synthesis and single and double replacement reactions.			
33.05 Utilize the mole concept and the law of conservation of mass to calculate quantities of chemicals precipitating in reactions occurring in water treatment processes.			
33.06 Describe the properties of the water molecule.			
33.07 Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH in environmental processes.			
33.08 Distinguish between endothermic and exothermic chemical processes in environmental systems.			
34.0 Identify career opportunities and organizational dynamics in water resources – the student will be able to:			
34.01 Research and create a presentation about occupations in water resources.			
34.02 Determine the educational requirements and experience needed to enter and advance in water resource occupations			
34.03 Prepare a resume.			
35.0 Demonstrate water treatment techniques – the student will be able to:		SC.912.N.1.1	
35.01 Determine soil types, land slope, and other factors to consider in choosing a location for a manmade pond.			
35.02 Identify/explain environmentally safe methods of wastewater disposal.			
35.03 Identify and consult agencies regulating water quality standards in order to prevent compliance problems.			
35.04 Observe different stages of construction of ponds.			
36.0 Discuss an industrial pretreatment program/inspection – the student will be able to:		SC.912.L.18.11; SC.912.N.1.1	
36.01 Utilize spot location program.			
36.02 Survey business and industry water consumption and discharge.			
36.03 Conduct pretreatment sampling.			
36.04 Analyze data and document reports.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
36.05 Design monitoring plan.			
36.06 Monitor sites.			
37.0 Discuss comprehensive quality assurance plan – the student will be able to:			
37.01 Discuss quality assurance rules.			
37.02 Develop and follow standard operating procedures.			
37.03 Describe preventative maintenance techniques.			
37.04 Describe cleaning/decontamination techniques.			
37.05 Determine accuracy and precision of sampling techniques.			
37.06 Discuss need for corrective action.			
37.07 Document Quality Assurance per regulatory agencies.			

Daggered for Deletion

Florida Department of Education  
Student Performance Standards

Course Title:        **Advanced Environmental Water Technology**  
 Course Number:    **8007130**  
 Course Credit:     **1**

**Course Description:**

**NOTE:** This course has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
38.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Environmental Water Technology	
	38.01 Key Ideas and Details	
	38.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
	38.01.2 Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
	38.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
	38.02 Craft and Structure	
	38.02.1 Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
	38.02.2 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
	38.02.3 Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards	Correlation to CTE Program Standard #
LAFS.1112.RST.2.6	
38.03 Integration of Knowledge and Ideas	
38.03.1 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. <div style="text-align: right;">LAFS.1112.RST.3.7</div>	
38.03.2 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. <div style="text-align: right;">LAFS.1112.RST.3.8</div>	
38.03.3 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. <div style="text-align: right;">LAFS.1112.RST.3.9</div>	
38.04 Range of Reading and Level of Text Complexity	
38.04.1 By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.  38.04.2 By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. <div style="text-align: right;">LAFS.1112.RST.4.10</div>	
39.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Environmental Water Technology	
39.01 Text Types and Purposes	
39.01.1 Write arguments focused on discipline-specific content. <div style="text-align: right;">LAFS.1112.WHST.1.1</div>	
39.01.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. <div style="text-align: right;">LAFS.1112.WHST.1.2</div>	
39.02 Production and Distribution of Writing	
39.02.1 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. <div style="text-align: right;">LAFS.1112.WHST.2.4</div>	
39.02.2 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what	

Florida Standards	Correlation to CTE Program Standard #
<p>is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5</p>	
<p>39.02.3 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6</p>	
<p><b>39.03 Research to Build and Present Knowledge</b></p>	
<p>39.03.1 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7</p>	
<p>39.03.2 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8</p>	
<p>39.03.3 Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9</p>	
<p><b>39.04 Range of Writing</b></p>	
<p>39.04.1 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10</p>	
<p><b>40.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Environmental Water Technology.</b></p>	
<p>40.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1</p>	
<p>40.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1</p>	
<p>40.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1</p>	
<p>40.04 Model with mathematics. MAFS.K12.MP.4.1</p>	
<p>40.05 Use appropriate tools strategically. MAFS.K12.MP.5.1</p>	

Florida Standards	Correlation to CTE Program Standard #
40.06 Attend to precision.	MAFS.K12.MP.6.1
40.07 Look for and make use of structure.	MAFS.K12.MP.7.1
40.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA and NGSS- Sci*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
41.0 Identify professions related to the water technology field – the student will be able to:			
41.01 List duties of water technology workers such as wastewater operator, water operator, systems operator, stormwater operator, residual (bio-solids) hauler operator, cross connection operator, pretreatment operator, and meter reading/maintenance operator.			
41.02 Identify the basic terms and concepts involved in processes used in these professions.			
41.03 List potential employers in the water technology field: federal, municipal, county, state and private.			
41.04 Identify resources to assist in finding employment in the field.			
41.05 Identify professional organizations related to the water technology field.			
41.06 Identify career ladder levels in the water technology field: trainee, C Level, B Level, A Level.			
42.0 Identify scientific concepts common in water and wastewater treatment – the student will be able to:			
42.01 Identify chemical symbols used in water and wastewater treatment.			
42.02 Describe the hydrologic cycle.			
42.03 Describe the basic concepts of the pH scale and its importance in the treatment process.			
42.04 Identify the differences between mixtures, elements, and compounds, and organic and inorganic chemicals.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
42.05 Identify principle states of matter: liquid, solid, and gas.			
42.06 Identify the basic nitrogen, phosphorous, and carbon cycles.			
43.0 Identify safety hazards associated with water technologies – the student will be able to:			
43.01 Identify the types of hazards common to water technology facilities.			
43.02 Recognize unsafe conditions and prescribe corrective measures.			
43.03 Identify and safely handle hazardous chemicals common to water technology facilities.			
43.04 Recognize electrical hazards.			
43.05 Recognize fire hazards, identify types of fires, and describe appropriate extinguishing techniques.			
44.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials – the student will be able to:			
44.01 Identify the kinds of information presented on Material Safety Data Sheets.			
44.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (chapter 442, F.S.).			
45.0 Solve basic math problems common to water technologies – the student will be able to:			
45.01 Perform basic arithmetic problems, including addition, subtraction, multiplication, division, fractions, decimals, percentages, rounding (significant figures), graphing, etc.			
45.02 Identify metric measurements and perform conversions.			
45.03 Perform calculations that involve areas, volumes, capacities, retention times, pounds, mg/L, velocities, flow rates, pressure, and head.			
46.0 Define pumping and basic hydraulic principles – the student will be able to:			
46.01 Identify types of pumps.			
46.02 Discuss application and use of different types of pumps.			
46.03 Identify components/characteristics of pumps including pump operation and basic pump curves including centrifugal pumps, positive displacement pumps, and air lift pumps.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
46.04 Identify types of pipes, valves, and fittings.			
46.05 Define cross connections.			
46.06 Identify the appropriate equipment used in the treatment processes.			
47.0 Define principles of disinfection – the student will be able to:			
47.01 List the need/reasons for disinfection (list of waterborne diseases).			
47.02 Define concepts related to disinfection.			
47.03 List methods and chemicals used in disinfection.			
47.04 Define the physical properties of chlorine.			
47.05 List kinds of disinfection equipment used.			
48.0 Define sampling techniques – the student will be able to:			
48.01 Define the reasons for sampling and types of samples.			
48.02 Define methods of sample collection and handling.			
48.03 Define the basic procedure for quality control and quality assurance in sampling.			
48.04 Define the chain of custody for samples.			
48.05 Perform chlorine residual analysis.			
48.06 Perform pH analysis.			
49.0 Define federal, state, and local regulations that apply to water technologies – the student will be able to:			
49.01 List regulatory agencies and their roles in monitoring the water technology field.			
49.02 Define regulations associated with the appropriate federal, state or local agencies.			
49.03 Define training and certification requirements for water technology workers.			
50.0 Demonstrate employability skills – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
50.01 Conduct a job search.			
50.02 Secure information about a job.			
50.03 Identify documents that may be required for a job application.			
50.04 Complete a job application.			
50.05 Demonstrate competence in job-interview techniques.			
50.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.			
50.07 Identify acceptable work habits.			
50.08 Demonstrate knowledge of how to make job changes appropriately.			
50.09 Demonstrate acceptable employee-health habits for the treatment facility environment.			
50.10 Identify materials and documents needed for a professional library.			
50.11 Demonstrate productive and positive customer interactions.			
50.12 Demonstrate effective interpersonal communication skills.			
51.0 Identify sampling techniques and explain the significance of the steps – the student will be able to:			
51.01 Identify the laboratory tests that are commonly performed by operators in Florida water-treatment facilities, including those required by the Safe Drinking Water Regulation.			
51.02 Define pathogenic organisms, including bacteria, protozoa, and virus, and describe their disease associations.			
51.03 Describe the laboratory test performed for the presence of bacteria.			
51.04 Describe the correct procedure for obtaining a bacteriological sample.			
51.05 Describe correct sample collection procedures for inorganic and organic analyses.			
51.06 Describe the laboratory quality-control checks and required documentation.			
51.07 Identify the chain of custody for a sample.			
52.0 Identify chemical, biological, and physical constituents of water entering the			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
water treatment facility or distribution systems – the student will be able to:			
52.01 Determine which constituents are inherent to groundwater and/or surface water.			
52.02 Describe the relationship between turbidity and the microbiological quality of water.			
52.03 Describe the uses of chemical analysis in water-treatment operations.			
52.04 Identify symbols and common names for elements and chemical compounds.			
52.05 Select the primary constituents to be measured and the most commonly used units of measurement for each.			
52.06 Explain the importance of water treatment for the control of coliform bacteria and algae.			
53.0 Describe the principles, operational and troubleshooting practices of the aeration process – the student will be able to:			
53.01 Describe the aeration and air stripping processes and explain how they differ.			
53.02 Identify the types of aeration systems.			
53.03 Identify the benefits of aeration.			
53.04 Describe the components of an air-stripping system.			
53.05 Troubleshoot aeration and air stripping processes.			
54.0 Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes – the student will be able to:			
54.01 Define concepts such as turbidity, color, coagulation, and flocculation.			
54.02 Define the difference between sweep and enhanced coagulation.			
54.03 Identify the kinds of equipment used in the coagulation process.			
54.04 Identify coagulant chemicals used in water-treatment facilities.			
54.05 Identify the steps of coagulation, in order.			
54.06 Identify the specific sampling locations for process control in a coagulation process.			
54.07 Identify factors that would contribute to poor floc formation.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
54.08 Compute the feed rate in pounds per day (lbs/d) when the chemical coagulant (mg/l) and flow rate (MGD) are known.			
54.09 Compute the dosage (mg/l) of coagulant when the rate of flow (MGD) and the feed rate (lbs/day) of the chemical coagulant are known.			
54.10 Compute the dosage rate that is needed to treat a different flow (MGD) at the current dosage when the current rate of flow (MGD) and the current coagulant feed rate (lbs/d) are known.			
54.11 Describe troubleshooting techniques for basic mixing, coagulation, and flocculation processes.			
55.0 Describe the principles, operational and troubleshooting practices of the sedimentation process – the student will be able to:			
55.01 Describe an upflow clarifier and basin sedimentation.			
55.02 Identify factors that affect efficient sedimentation.			
55.03 Identify the measures that would be effective in preventing or controlling algae growth on surfaces of coagulation and sedimentation basins.			
55.04 Identify methods of sludge removal from sedimentation basins.			
55.05 Describe troubleshooting techniques for sedimentation and upflow clarifier processes.			
56.0 Describe the principles, operational and troubleshooting practices of the filtration process – the student will be able to:			
56.01 Explain concepts related to filtration, including types of filters, filter-system components, and the steps for normal filtration operations.			
56.02 Explain common problems of filtering systems, including head loss, mud balls, and filter media loss.			
56.03 Determine when to backwash a filter.			
56.04 Identify the steps for backwashing a filter.			
56.05 Describe troubleshooting techniques for filtration processes.			
57.0 Describe the principles, operational and troubleshooting practices of the water-softening process – the student will be able to:			
57.01 Describe the two types of hardness.			
57.02 Identify the appropriate chemical(s) to use in chemical-precipitation softening processes for the two kinds of hardness.			
57.03 Describe alkalinity and its components.			

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
57.04 Identify treatment processes used for water softening.			
57.05 Calculate the distribution of bicarbonate, carbonate, and/or hydroxide ions when given the total alkalinity and phenolphthalein alkalinity.			
57.06 Describe selective carbonate removal.			
57.07 Identify the important zones of an upflow clarifier unit.			
57.08 Describe the lime soda ash softening process, including its control.			
57.09 Compute lime demand from raw-water analyses.			
57.10 Describe the reasons for recarbonation.			
57.11 Compute carbon dioxide demands for recarbonation.			
57.12 Compute hardness removal when the ion-exchange capacity is known.			
57.13 Describe troubleshooting techniques for water-softening processes.			
58.0 Describe the principles, operational and troubleshooting practices of the stabilization process – the student will be able to:			
58.01 Identify the chemicals used in stabilization.			
58.02 Identify two stabilization indices.			
58.03 Determine water stability, using the Langelier index and the marble test.			
58.04 Troubleshoot stabilization processes.			
59.0 Describe the principles, operational and troubleshooting practices of the corrosion control process – the student will be able to:			
59.01 Identify the factors that influence corrosion.			
59.02 Describe the problems that can be created by corrosive waters.			
59.03 Describe the basic concepts related to electrolysis.			
59.04 Define electrochemical reaction.			
59.05 Identify the chemicals used in corrosion control.			
59.06 Describe the conditions for calcium carbonate film formation.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
59.07 Define cathode film formation.			
59.08 Define cathodic protection and describe its application in water-treatment facilities.			
59.09 Describe troubleshooting techniques for corrosion-control processes.			
60.0 Describe the principles, operational and troubleshooting practices of the disinfection process – the student will be able to:			
60.01 Identify the chemicals used in primary disinfection.			
60.02 Identify commonly used chlorinators and hypochlorinators.			
60.03 Determine the maximum amount of chlorine gas (in pounds) that may be taken from a cylinder in a 24-hour period.			
60.04 Identify proper maintenance procedures for equipment chlorination.			
60.05 Identify terminology related to chlorination and disinfection.			
60.06 Identify common safety problems or emergency situations that might occur during chlorination.			
60.07 Identify the properties of chlorine and describe its use in water treatment.			
60.08 Explain the points at which chlorine is applied most effectively in water treatment.			
60.09 Compute the feed rate (lbs/d) when given the rate of flow (MGD) and dosage of chlorine (mg/1).			
60.10 Compute the feed rate (lbs/d) of a hypochlorite compound that contains a given percentage of available chlorine when given a problem where the rate of flow (MGD) and the chlorine dosage (mg/1) are known.			
60.11 Compute the new rate of flow and the feed rate that will be needed to maintain the current dosage when given the current rate of flow (MGD); the current chlorine feed rate (lbs/d), and the amount by which the rate of flow is to be increased or decreased.			
60.12 Compute the feed rate needed to treat a given amount of water when given a chlorine demand and the desired chlorine residual.			
60.13 Describe troubleshooting techniques for disinfection processes.			
61.0 Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes – the student will be able to:			
61.01 Describe the formation of total trihalomethanes (TTHM).			

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
61.02 Identify the specific procedure for collecting samples to determine trihalomethane levels.			
61.03 Compute the quarterly average and the annual TTHM measurements when sample results are given.			
61.04 Identify processes that remove trihalomethane precursors.			
61.05 Identify processes that remove trihalomethanes after they are formed.			
61.06 Identify the benefits of alternate disinfectants.			
61.07 Describe chloramination as a control of TTHM.			
61.08 Describe troubleshooting techniques for the control and treatment of trihalomethanes.			
62.0 Describe the principles, operational and troubleshooting practices of the iron and manganese removal processes – the student will be able to:			
62.01 Explain the occurrence of iron and manganese in source water and in treated water.			
62.02 Describe the importance of controlling iron and manganese.			
62.03 Describe sample-collection and analysis procedures for iron and manganese.			
62.04 Describe remedial processes for controlling iron and manganese.			
62.05 Compute the potassium permanganate dosage for a known concentration of iron and manganese in the water being treated.			
62.06 Describe troubleshooting techniques for iron and manganese-removal processes.			
63.0 Describe the principles, operational and troubleshooting practices for taste and odor control – the student will be able to:			
63.01 Identify common types of complaints about water quality.			
63.02 Identify causes of tastes and odors.			
63.03 Describe how microbial growths affect tastes and odors.			
63.04 Describe how eutrophication contributes to surface-water tastes and odors.			
63.05 Describe a cross-connection.			
63.06 Identify the chemicals used in the control and treatment of tastes and			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
odors.			
63.07 Describe the Threshold Odor Number (TON) test.			
63.08 Determine the TON when dilution volumes and positive samples are given.			
63.09 Describe troubleshooting techniques for taste and odor control.			
64.0 Describe the principles, operational and troubleshooting practices of the demineralization processes – the student will be able to:			
64.01 Define concepts related to demineralization, such as reverse osmosis (RO), flux, feedwater, permeate, and salinity.			
64.02 Describe the structure, composition, and performance of an RO membrane.			
64.03 Describe feedwater impurities, physical parameters, and conditions potentially harmful to the RO process.			
64.04 Identify items included in a typical RO-facility-operation checklist.			
64.05 Describe the common causes of membrane damage.			
64.06 Describe the procedure for membrane cleaning.			
64.07 Compute the percent of recovery when product flow and feed flow are known.			
64.08 Compute the percent of mineral rejection when total dissolved solids are known for the feedwater and product water.			
64.09 Describe the basic concepts of electrodialysis (ED), such as the cathode and anode relationship and the removal of typical inorganic salts.			
64.10 Describe the most common problem of ED operation in a facility.			
64.11 Explain how the cation membrane and the anion membrane differ.			
64.12 Describe the multi-compartment unit used in the ED process.			
64.13 Describe ED operating procedures in detail.			
64.14 Describe the two most common chemical solutions used to flush ED stack membranes.			
64.15 Describe troubleshooting techniques for demineralization processes.			
65.0 Describe the principles, operational and troubleshooting practices of the fluoridation process – the student will be able to:			



CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
65.01 Define the basic concepts related to fluoridation, including its purpose and the kinds of chemicals used.			
65.02 Identify the properties of fluoride and describe its use.			
65.03 Identify the types of equipment used in fluoridation.			
65.04 Describe proper maintenance procedures for fluoridation equipment.			
65.05 Describe potential safety problems or emergency situations in the fluoridation process, and ways to avoid them.			
65.06 Compute the feed rate of chemicals used in the fluoridation process.			
65.07 Describe troubleshooting techniques for the fluoridation processes.			
66.0 Identify facility operational problems – the student will be able to:			
66.01 Respond to customer questions about taste or odor in the water.			
66.02 Respond to customer questions about red water or rust stains.			
66.03 Identify the probable cause(s) for a sudden change in chlorine demand; take corrective action.			
67.0 Describe basic hydraulics and pumping operations – the student will be able to:			
67.01 Describe the relationship between the system head and pressure, and make conversions between them.			
67.02 Describe three types of head, i.e., pressure, suction, and atmospheric.			
67.03 Describe proper operation of centrifugal and displacement pumps.			
67.04 Describe causes and methods that are effective in preventing “water hammer.”			
67.05 Troubleshoot pump operations.			
68.0 Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable water facility – the student will be able to:			
68.01 Complete the Drinking Water Bacteriological Analysis Form correctly.			
68.02 Complete the DEP daily operation report (DOR) form correctly.			
68.03 Complete the DEP monthly operation report (MOR) form correctly.			

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
68.04 Identify the DEP requirements for the operation of standby and emergency equipment.			
68.05 Identify the DEP requirements for microbiological monitoring and analyses.			
68.06 Identify the DEP requirements for sampling and testing.			
69.0 Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management – the student will be able to:			
69.01 Identify the appropriate equipment used in the treatment train, treatment residuals disposal, and solids management.			
69.02 Describe a preliminary site inspection of the equipment used in the treatment train, treatment residuals disposal, and solids management.			
69.03 Identify the maintenance needs of equipment used in the treatment train, treatment residuals disposal, and solids management, including safe procedures for maintenance.			
69.04 Describe proper record keeping for preventive and corrective maintenance.			
69.05 Describe preventive and corrective maintenance procedures for equipment used in the treatment process, treatment residuals disposal, and solids management.			

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students

### **Career and Technical Student Organization (CTSO)**

FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Daggered for Deletion

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Environmental Water Reclamation Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**NOTE:** This program has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

**Secondary – Career Preparatory**

Program Number	8007200
CIP Number	0703010400
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	ENV WAT TEC 7G
CTSO	FFA
SOC Codes (all applicable)	51-8031 - Water and Wastewater Treatment Plant and System Operators
CTE Program Resources	<a href="http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to applications of water resource management, application of safety procedures, record keeping and sampling, wetland management, reclamation treatment techniques, solid waste disposal, storm water management, hazardous material storage, government water technology regulations, filtrations, sedimentation, fluoridation process, and performs maintenance and inspections on equipment.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of three courses and one occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8007110	Introduction to Environmental Water Technology	1 credit	51-8031	2	VO
	8007120	Intermediate Environmental Water Technology	1 credit		2	VO
	8007210	Advanced Environmental Water Reclamation Technology	1 credit		2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

**Academic Alignment Table**

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

**This program is daggered and will not be aligned to academic courses.**

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Introduction to Environmental Water Technology	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%
Intermediate Environmental Water Technology	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%

Advanced Environmental Water Reclamation Technology	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%
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\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

**This program is daggered and will not be aligned to academic courses.**

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Introduction to Environmental Water Technology	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
Intermediate Environmental Water Technology	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
Advanced Environmental Water Reclamation Technology	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

### **National Standards (NS)**

Some or all of the courses in this program have been aligned with Industry or National Standards. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link:  
[https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn\\_000.pdf](https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf)

Daggered for Deletion



## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Water Reclamation Technology.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Water Reclamation Technology.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Water Reclamation Technology.
- 04.0 Identify the historical, social, cultural and potential applications of water resource management.
- 05.0 Describe and discuss hydrology.
- 06.0 Practice safety skills and procedures.
- 07.0 Demonstrate record keeping and sampling procedures.
- 08.0 Describe and discuss geologic principles of water resources.
- 09.0 Manage wetlands.
- 10.0 Identify career opportunities and organizational dynamics.
- 11.0 Apply scientific and technological principles.
- 12.0 Describe water reclamation treatment techniques.
- 13.0 Collect and dispose of solid waste.
- 14.0 Explain water treatment techniques.
- 15.0 Discuss and manage stormwater systems.
- 16.0 Describe water distribution.
- 17.0 Demonstrate the management and environmentally sound use of water resources.
- 18.0 Maintain water treatment equipment and facilities.
- 19.0 Discuss related standards and regulations.
- 20.0 Conduct site assessment.
- 21.0 Practice safety skills and procedures.
- 22.0 Manage data and physical resources.
- 23.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems.
- 24.0 Control incidents.
- 25.0 Prepare a plan.
- 26.0 Perform remediation.
- 27.0 Collect and dispose of solid waste.
- 28.0 Identify continuing education needs and opportunities.
- 29.0 Conduct recordkeeping and sampling procedures.
- 30.0 Review stormwater permit procedures.
- 31.0 Demonstrate the use of industry appropriate tools, equipment, and instruments
- 32.0 Demonstrate industry specific mathematical calculations.
- 33.0 Demonstrate industry specific science skills and techniques.
- 34.0 Identify career opportunities and organizational dynamics in water resources.

- 35.0 Demonstrate water treatment techniques.
- 36.0 Discuss an Industrial Pretreatment Program/Inspection.
- 37.0 Discuss comprehensive quality assurance plan.
- 38.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Environmental Water Reclamation Technology.
- 39.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Environmental Water Reclamation Technology.
- 40.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Environmental Water Reclamation Technology.
- 41.0 Identify professions related to the water technology field.
- 42.0 Identify scientific concepts common in water and wastewater treatment.
- 43.0 Identify safety hazards associated with water technologies.
- 44.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
- 45.0 Solve basic math problems common to water technologies.
- 46.0 Define pumping and basic hydraulic principles.
- 47.0 Define principles of disinfection.
- 48.0 Define sampling techniques.
- 49.0 Define federal, state, and local regulations that apply to water technologies.
- 50.0 Demonstrate employability skills.
- 51.0 Identify the basic characteristics and principles of wastewater treatment.
- 52.0 Identify sampling techniques and interpret the results.
- 53.0 Describe the sources of wastewater and the types of collection systems.
- 54.0 Describe the process and the operational principles for the preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal; and solids management.
- 55.0 Perform treatment-process control and troubleshooting for the treatment train, effluent disposal, and solids management.
- 56.0 Perform equipment inspection, and identify basic maintenance for the treatment train, effluent disposal, and solids management.
- 57.0 Identify and correct facility operational problems.
- 58.0 Identify appropriate federal, state, and local regulations.
- 59.0 Describe federal, state, and local laws for the handling, storage, and use of toxic and hazardous materials.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Environmental Water Technology  
**Course Number:** 8007110  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the area of hydrology, safety skills and procedures, geological principles of water resources, management of wetlands, storm water systems, environmental water resources, equipment and facility maintenance, scientific and research concepts; principles of leadership; and employability, and human relations skills. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This course has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Water Reclamation Technology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction	

Florida Standards		Correlation to CTE Program Standard #
	force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Water Reclamation Technology.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	

Florida Standards		Correlation to CTE Program Standard #
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Water Reclamation Technology.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	

Florida Standards	Correlation to CTE Program Standard #
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Identify the historical, social, cultural and potential applications of water resource management – the student will be able to:		SC.912.E.7.8; HE.912.C.1.3; SC.912.L.15.8, 13; SC.912.L.16.4, 7, 8, 9, 10, SC.912.L.17.1, 8, 11, 16, 19, 20; SC.912.L.18.12; SC.912.N.1.1	
04.01 Explain the developmental progression of water resource management.			
04.02 Research emerging problems and issues with water resource management.			
04.03 Explain the global importance of water conservation.			
04.04 Explain international issues affecting water resources and water quality.			
04.05 Compare practices that either enhance or hinder water quality.			
04.06 Differentiate between point and non-point sources of pollution.			
04.07 Identify diseases and illnesses associated with water borne pathogens.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.08 Explain methods to control and eradicate diseases and illnesses associated with water borne pathogens.			
04.09 Explain the significance genetic factors, environmental factors and pathogenic agents to health from the perspective of both individual and public health.			
04.10 Analyze how population size is affected by water quantity and quality.			
04.11 Evaluate the cost and benefits of renewable and nonrenewable resources such as water, energy, fossil fuels, flora and fauna.			
04.12 Predict the impact of individuals on water quality and quantity and how human lifestyles affect sustainability.			
04.13 Discuss the special properties of water that contribute to earth's suitability as an environment for life.			
05.0 Describe and discuss hydrology – the student will be able to:		SC.912.E.5.2, 4; SC.912.E.6.2, 3, 4, 5; SC.912.E.7.1, 3; SC.912.L.17.16; SC.912.P.8.1, 5, 7	
05.01 Define basic hydrological terms.			ESS.03.03.02.a ESS.03.03.02.b
05.02 Explain surface water systems.			ESS.03.03.02.a ESS.03.03.02.b
05.03 Explain ground water systems.			ESS.03.03.02.c ESS.03.03.03.a ESS.03.03.03.b ESS.03.03.03.C
05.04 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.			
05.05 List the components of Florida's fresh water systems (lakes, ground water, aquifer, sink holes, rivers, and swamps) and explain the importance of managing these resources.			
05.06 Identify alternative sources of water.			
05.07 Identify soil conditions as they relate to water quality.			ESS.03.02.03
05.08 Research and explain saltwater intrusion.			
05.09 Identify and discuss water wells and water reservoirs.			



CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci	National Standards
06.0	Practice safety skills and procedures – the student will be able to:		SC.912.P.8.5, 7, 11	
06.01	Demonstrate proper safety precautions and use of common laboratory, testing, and personal protective equipment.			CS.06.02.01.a CS.07.01.01.b
06.02	Identify and utilize safe work practices.			CS.06.02.01.a
06.03	Identify physical, chemical, biological, and zoological hazards.			
06.04	Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, Occupational Safety and Health Agency (OSHA), and Hazard Communication (HAZCOM) regulations.			
06.05	Determine, review, and follow regulations.			
06.06	Develop and maintain appropriate safety records.			
06.07	Identify and describe “on the job” hazards and risks including fire/explosive, lead asbestos, weather hazards and emergency response preparedness			
06.08	Perform lifting activities safely.			
06.09	Identify ladder safety and fall protection.			
06.10	Become certified in first aid/CPR and describe First Responder responsibilities.			CS.07.02.01.c
07.0	Demonstrate record keeping and sampling procedures – the student will be able to:		SC.912.N.1.1, 4, 6; SC.912.P.8.8, 11;	
07.01	Define sampling objectives, protocol and Chain of Custody.			ESS.01.01.01.a
07.02	Operate, calibrate, and maintain sampling equipment.			ESS.01.01.02.c
07.03	Develop sampling strategy.			ESS.01.01.01.b
07.04	Perform applicable field measurements including pH, dissolved oxygen, temperature, chlorine residual, and turbidity.			
07.05	Appropriately preserve, document, and dispose of samples.			
07.06	Identify cross-contamination and other risks associated with sampling.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
07.07 Describe, plan, and utilize quality assurance practices.			
07.08 Submit samples for analysis.			ESS.01.01.01.b
07.09 Perform periodic follow-up sampling.			
07.10 Identify permit requirements and procedures.			
07.11 Define and follow federal, state and local sampling guidelines.			
08.0 Describe and discuss geologic principles of water resources – the student will be able to:		SC.912.E.6.1, 2, 4; SC.912.L.17.13; SC.912.P.8.6, 7, 8, 11	
08.01 Explain the geological history of Florida.			
08.02 Create a soil profile and describe the associated components.			
08.03 Evaluate soil profiles, land-capability classes, and soil conservation practices.			
08.04 Interpret legal descriptions of land.			
08.05 Identify mapping and surveying techniques and equipment.			
08.06 Analyze local mineral resources.			
08.07 Describe lithological descriptions of local units/formations.			
08.08 Describe Florida aquifer system.			
08.09 Discuss basic groundwater chemistry.			
08.10 Describe local geology related problems.			
09.0 Manage wetlands – the student will be able to:		SC.912.E.5.4; SC.912.L.14.35; SC.912.L.17.4, 8, 16, 19, 20;	
09.01 Identify ecosystems.			
09.02 Discuss the structure and function of wetlands.			ESS.03.04.01.b

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
09.03 Define limits of wetlands.			
09.04 Discuss habitat value.			
09.05 Identify fauna and flora.			ESS.03.04.02
09.06 Determine desirable vs. nuisance plant and animal species.			
09.07 Describe changes in ecosystems resulting from seasonal variations, climate change, environmental impacts, and succession.			
09.08 Explain the general distribution of life in aquatic systems as a function of effluent discharge, stormwater runoff and drought.			
10.0 Identify career opportunities and organizational dynamics – the student will be able to:			
10.01 Describe the nature and origin of career opportunities in water, water reclamation and environmental industries.			CS.02.03.01.a
10.02 Compare supervisory and administrative responsibilities.			
10.03 Identify organizational structures.			
10.04 Identify team building communication skills.			CS.01.01.01.a
10.05 Identify problem-solving techniques.			CS.02.04.02.c
10.06 Identify employee responsibility/benefits.			
10.07 Identify legal aspects of personnel relations.			
10.08 Communicate effectively in verbal, written, and nonverbal modes.			
10.09 Recognize and demonstrate good listening skills.			
10.10 Conduct small informal and formal group meetings.			
10.11 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.			
10.12 Recognize and demonstrate effective communications skills in the workplace.			
10.13 Identify related associated professional associations.			
10.14 List and describe the careers associated with water treatment, distribution, and management.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
10.15 Determine the educational requirements and experience needed to enter and advance in water, water reclamation and environmental occupations.			
11.0 Apply scientific and technological principles – the student will be able to:			
11.01 Employ scientific measurement skills.			BS.02.02.01.b
11.02 Demonstrate safe and effective use of common laboratory equipment.			
11.03 Implement the scientific method and science process skills through the design and completion of a research project.			
11.04 Interpret, analyze, and report data.			
11.05 Evaluate advances in biotechnology and its impact on water resources.			
11.06 Compare and contrast structure and function of various types of microscopes.			
12.0 Describe reclaimed water treatment techniques – the student will be able to:		SC.912.L.17.16, 19, 20 SC.912.L.18.6, 8;	
12.01 Understand pretreatment, primary, secondary, and tertiary treatment processes of wastewater.			
12.02 Describe disposal options.			
12.03 Identify septic tanks types and functions.			
12.04 Apply principles of nutrients, water and waste management to environmental problems.			
13.0 Collect and dispose of solid waste – the student will be able to:		SC.912.17.16, 19, 20	
13.01 Describe history of solid waste disposal.			
13.02 Identify types of waste.			
13.03 Identify household hazardous waste collection and disposal programs.			
13.04 Research and evaluate solid waste disposal options. (landfill, incineration, and composting, etc.)			
14.0 Explain water treatment techniques – the student will be able to:		SC.912.E.6.5; SC.912.L.17.16, 19, 20; SC.912.L.18.6, 8;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
		SC.912.P.8.2;	
14.01 Describe drinking water treatments.			
14.02 Identify and describe the desirable water qualities.			
14.03 Explain how changes in water quality affect life cycles.			
14.04 Explain, monitor, and maintain freshwater/salt water quality standards.			
14.05 Calculate volume in circular, rectangular and irregular shaped water structures.			
14.06 List and explain sources of pollution and methods of preventing and/or correcting these pollution problems.			
15.0 Discuss and manage stormwater systems – the student will be able to:		SC.912.E.6.2; SC.912.L.17.16, 19, 20;	
15.01 Determine boundaries of watersheds.			
15.02 Identify runoff coefficients.			
15.03 Identify the relationship between construction sites and stormwater systems.			
15.04 Research rules and regulations in regards to stormwater systems.			
15.05 Contact local municipalities to determine stormwater regulations.			
15.06 Research current construction trends and methods of stormwater systems.			
15.07 Define topography and its effects on stormwater.			
15.08 Discuss the affects that uncollected stormwater has on lakes, rivers, ponds and wetlands.			
16.0 Describe water distribution – the student will be able to:		SC.912.P.12.11	
16.01 Identify the need for backflow prevention and cross connections controls.			
16.02 Identify necessary equipment for water distribution purposes e.g.; pumps, motors, valves, storage tanks, pipes and fittings.			
16.03 Read and maintain meters.			
16.04 Identify maintenance requirements for fire hydrants, pipes, and valves.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
16.05 Identify proper procedures for operation and maintenance of lift stations.			
16.06 Discuss importance of period flushing of water distribution systems.			
17.0 Demonstrate the management and environmentally sound use of water resources – the student will be able to:			
17.01 Determine quality of groundwater and surface water.			
17.02 Identify solids and dissolved solids found in water.			
17.03 Identify primary and secondary contaminants.			
17.04 Identify unregulated organic compounds.			
18.0 Maintain water treatment equipment and facilities – the student will be able to:		SC.912.N.1.1; SC.912.P.10.4, 5, 7;	
18.01 Research water treatment equipment and facility components.			
18.02 Identify appropriate temperatures and other external conditions.			
18.03 Identify the effect of weather conditions and changes.			
18.04 Describe appropriate flow rates and tank levels.			
18.05 Create a checklist and/or policies of necessary procedures to handle daily conditions, hazards and/or malfunctions.			
18.06 Describe maintenance procedures and techniques of filters, pipes, generators, meters, motors, valves, instruments, injectors, storage basins etc.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Intermediate Environmental Water Technology  
**Course Number:** 8007120  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the area of standards and regulations, site assessments, safety, managing data and physical resources, prepare a plan, perform remediation, collect and dispose of solid waste, record keeping and sampling procedures, career opportunities, leadership, teamwork, and money management concepts. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This course has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Water Reclamation Technology	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction	

Florida Standards		Correlation to CTE Program Standard #
	force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Water Reclamation Technology	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	



Florida Standards		Correlation to CTE Program Standard #
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Water Reclamation Technology	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	

Florida Standards	Correlation to CTE Program Standard #
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
19.0 Discuss related standards and regulations – the student will be able to:		SC.912.N.1, 2, 3, 4	
19.01 Explain the importance and impacts of local, state, and federal regulations and required documentation.			
19.02 Describe the Florida Administrative Code's (F.A.C.) impact on environmental issues.			
19.03 Discuss the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA).			
19.04 Identify local, state, and national regulatory agencies and discuss their roles in relation to state and federal laws and statutes.			
19.05 Research how rules and laws are made and mandated.			
19.06 Describe permitting procedures.			
19.07 Identify regulation resources.			
19.08 Describe various licensing procedures.			
19.09 Research governmental regulation authorities associated with Florida's water sources.			
19.10 Describe National Pollution Discharge Elimination System (NPDES).			
19.11 Identify appropriate agencies and their functions			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
19.12 Describe the role of environmental protection.			
19.13 Create, evaluate and present a well-head protection plan.			
19.14 Discuss the need for adequate monitoring of environmental parameters when making policy decisions.			
20.0 Conduct site assessment – the student will be able to:		SC.912.L.17.20; SC.912.N.1.1;	
20.01 Identify the purposes of site assessment.			
20.02 Describe required documentation.			
20.03 Interpret blueprints			
20.04 Demonstrate map reading			
20.05 Obtain physical and performance measurements.			
20.06 Assess needed equipment and processes.			
21.0 Practice safety skills and procedures – the student will be able to:		SC.912.N.4.2	
21.01 Identify safety procedures for: wells, pumps, electrical equipment, motor vehicles, buildings, and other necessary equipment.			
21.02 Handle compressed gasses, solids, and liquids safely.			
21.03 Summarize “Right of Access” law.			
21.04 Summarize “Confined Space” regulations.			
21.05 Identify Zero Tolerance policies.			
21.06 Identify employee limitations.			
21.07 Identify appropriate decontamination procedures.			
21.08 Identify principles of toxicology.			
21.09 Identify routes of exposure.			
21.10 Identify respirator safety procedures.			
21.11 Discuss history of hazardous materials and hazardous categories.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
21.12 Discuss common chemical compatibility.			
21.13 Describe and discuss OSHA concepts.			
21.14 Describe and discuss the Vulnerability Assessment process.			
22.0 Manage data and physical resources – the student will be able to:		SC.912.N.1, 2, 3, 4, 5, 6, 7	
22.01 Utilize word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, and security.			
22.02 Identify possible funding sources.			
22.03 Prepare budgets and purchase orders.			
22.04 Prepare a time management plan.			
22.05 Utilize information databases.			
22.06 Locate and interpret printed reference materials.			
22.07 Describe network opportunities.			
22.08 Maintain necessary/required record keeping practices and procedures.			
22.09 Keep inventory, time sheets, and equipment maintenance logs.			
22.10 Identify suppliers and technical resources.			
23.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems – the student will be able to:		SC.912.N.1.1	
23.01 Define GIS and its function.			PST.05.03.01.a PST.05.03.01.b PST.05.03.02.b
23.02 Use GIS software.			PST.05.03.01.c PST.05.03.02.c
23.03 Learn GIS applications.			PST.05.03.03.c
23.04 Develop a GIS model.			
23.05 Define GPS and its function.			
23.06 Collect GPS data and load on GIS.			PST.05.03.02.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
23.07 Research and identify other remote sensing tools.			PST.05.03.04.b
23.08 Identify and plot points on a map.			
24.0 Control incidents – the student will be able to:		SC.912.N.1.1	
24.01 Identify and describe reasons for controlling incidents.			
24.02 Describe levels of response.			
24.03 Determine and use proper chain of command.			
24.04 Determine methods of control.			
24.05 Demonstrate site access restriction methods.			
24.06 Identify appropriate authorities to be notified.			
24.07 Place equipment appropriately.			
24.08 Orient zones.			
24.09 Identify possible geographic hazards.			
24.10 Identify media protocol and procedures for communicating with the public.			
24.11 Prepare a press release for a mock incident.			
24.12 Identify abnormal event management processes utilizing the National Information Management System (NIMS).			
25.0 Prepare a plan – the student will be able to:		SC.912.N.1.1	
25.01 Describe the need for and the types of pre-planning.			
25.02 Identify and select necessary agency involvement.			
25.03 Identify possible contamination zones.			
25.04 Review contingency plans			
25.05 Create contingency plans for hurricanes, tornadoes, floods, fires, and/or nuclear accidents (emergency response plan).			
25.06 Discuss Superfund Amendments Reauthorization Act (SARA) also known as the Emergency Planning and Community Right-to-Know			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
Act (EPCRA) regulations.			
25.07 Create plan for deployment.			
25.08 Conduct mock disaster activities.			
26.0 Perform remediation – the student will be able to:		SC.912.L.17.16	
26.01 Research appropriate cleaning methods.			
26.02 Create a plan for a disaster clean up including needed materials and equipment.			
26.03 Understand entry and closure methods.			
26.04 Identify contamination removal procedures.			
26.05 Design a site/system cleanliness verification procedure.			
26.06 Identify tear down and demobilization procedures.			
27.0 Collect and dispose of solid waste – the student will be able to:		SC.912.L.17.20	
27.01 Describe history of solid waste disposal.			
27.02 Identify types of waste.			
27.03 Research and evaluate solid waste disposal options. (Landfill, incineration, and composting, etc.)			
28.0 Identify continuing education needs and opportunities – the student will be able to:			
28.01 Determine continuing education needs/goals.			
28.02 Identify available educational and financial resources.			
28.03 Identify appropriate professional associations and attend meetings where applicable.			
28.04 Read and review trade journals.			
29.0 Conduct recordkeeping and sampling procedures – the student will be able to:		SC.912.N.1.1, 2	
29.01 Demonstrate sampling, testing and recordkeeping.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
29.02 Collect and analyze water samples: grab, composite and representative.			
29.03 Record data into identified database program.			
29.04 Interpret lab results.			
29.05 Evaluate data.			
29.06 Measure well volumes.			
29.07 Describe organism sampling techniques.			
30.0 Review stormwater permit procedures – the student will be able to:			
30.01 Research and demonstrate Best Management Practices (BMP), Standard Operating Procedures (SOP) and Preventive Maintains (PM).			
30.02 Describe proper ditch, pond, culvert, and manhole inspection techniques.			
30.03 Evaluate a storm cleanup and prevention plan.			
30.04 Discuss pollutants, illegal dumping and discharge and demonstrate appropriate handling procedures.			
30.05 Describe the importance of outfall structures, inlets, and treatment systems.			
30.06 Describe the procedures to clean and televisive pipes.			
30.07 Describe the importance of ditch banks and right of ways.			
30.08 Maintain, repair and replace pipe sections.			
31.0 Demonstrate the use of industry appropriate tools, equipment, and instruments – the student will be able to:		SC.912.P.10.2, 3, 10	
31.01 Select and demonstrate proper use of industry appropriate tools, equipment, and instruments.			
31.02 Demonstrate various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			
31.03 Service and maintain industry appropriate equipment, instruments, facilities, and supplies.			
32.0 Demonstrate industry specific mathematical calculations – the student will		SC.912.E.5.6; SC.912.N.1.1;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
be able to:		SC.912.P.8.9; SC.912.P.10.5; SC.912.P.12.2, 3	
32.01 Calculate area and volume.			
32.02 Convert temperature.			
32.03 Calculate velocities and flow rates.			
32.04 Calculate detention time.			
32.05 Calculate parts per million/pounds.			
32.06 Calculate chemical concentrations.			
32.07 Utilize conversion factors.			
32.08 Calculate ratios and percentages.			
32.09 Calculate water, brake and motor horsepower for chemical pumps.			
32.10 Calculate force.			
32.11 Calculate sedimentation and loading rates.			
32.12 Use calculations to determine activated sludge characteristics.			
32.13 Use calculations to determine sludge digestion characteristics.			
32.14 Use a variety of problem-solving strategies such as drawing a diagram, making a chart, guessing-and-checking, solving a simpler problem, writing an equation working backwards, and creating a table.			
33.0 Demonstrate industry specific science skills and techniques – the student will be able to:		SC.912.L.18.12; SC.912.P.8.1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11; SC.912.P.10.7	
33.01 Differentiate between chemical and physical properties of solids, dissolved solids, gases and liquids.			
33.02 Identify chemical symbols on the periodic table and explain their relationships.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
33.03 Interpret formula representations of molecules and compounds in water treatment.			
33.04 Characterize chemical reactions in water treatment processes for example redox, acid base, synthesis and single and double replacement reactions.			
33.05 Utilize the mole concept and the law of conservation of mass to calculate quantities of chemicals precipitating in reactions occurring in water treatment processes.			
33.06 Describe the properties of the water molecule.			
33.07 Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH in environmental processes.			
33.08 Distinguish between endothermic and exothermic chemical processes in environmental systems.			
34.0 Identify career opportunities and organizational dynamics in water resources – the student will be able to:			
34.01 Research and create a presentation about occupations in water resources.			
34.02 Determine the educational requirements and experience needed to enter and advance in water resource occupations			
34.03 Prepare a resume.			
35.0 Demonstrate water treatment techniques – the student will be able to:		SC.912.N.1.1	
35.01 Determine soil types, land slope, and other factors to consider in choosing a location for a manmade pond.			
35.02 Identify/explain environmentally safe methods of wastewater disposal.			
35.03 Identify and consult agencies regulating water quality standards in order to prevent compliance problems.			
35.04 Observe different stages of construction of ponds.			
36.0 Discuss an industrial pretreatment program/inspection – the student will be able to:		SC.912.L.18.11; SC.912.N.1.1	
36.01 Utilize spot location program.			
36.02 Survey business and industry water consumption and discharge.			
36.03 Conduct pretreatment sampling.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
36.04 Analyze data and document reports.			
36.05 Design monitoring plan.			
36.06 Monitor sites.			
37.0 Discuss comprehensive quality assurance plan – the student will be able to:			
37.01 Discuss quality assurance rules.			
37.02 Develop and follow standard operating procedures.			
37.03 Describe preventative maintenance techniques.			
37.04 Describe cleaning/decontamination techniques.			
37.05 Determine accuracy and precision of sampling techniques.			
37.06 Discuss need for corrective action.			
37.07 Document Quality Assurance per regulatory agencies.			

Daggered for Deletion

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Advanced Environmental Water Reclamation Technology  
**Course Number:** 8007210  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the area of career opportunities, scientific concepts in water treatment, safety hazards, government regulations, facility operational principles, and equipment inspections. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This program has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

Florida Standards	Correlation to CTE Program Standard #
38.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Environmental Water Reclamation Technology	
38.01 Key Ideas and Details	
38.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
38.01.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
38.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
38.02 Craft and Structure	
38.02.1 Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
38.02.2 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.1112.RST.2.5	
38.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	
	LAFS.1112.RST.2.6	
38.03	Integration of Knowledge and Ideas	
38.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem.	
	LAFS.1112.RST.3.7	
38.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.	
	LAFS.1112.RST.3.8	
38.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	
	LAFS.1112.RST.3.9	
38.04	Range of Reading and Level of Text Complexity	
38.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
38.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently.	
	LAFS.1112.RST.4.10	
39.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Environmental Water Reclamation Technology	
39.01	Text Types and Purposes	
39.01.1	Write arguments focused on discipline-specific content.	
	LAFS.1112.WHST.1.1	
39.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
	LAFS.1112.WHST.1.2	
39.02	Production and Distribution of Writing	
39.02.1	Produce clear and coherent writing in which the development,	

Florida Standards	Correlation to CTE Program Standard #
<p>organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4</p>	
<p>39.02.2 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5</p>	
<p>39.02.3 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6</p>	
<p><b>39.03 Research to Build and Present Knowledge</b></p>	
<p>39.03.1 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7</p>	
<p>39.03.2 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8</p>	
<p>39.03.3 Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9</p>	
<p><b>39.04 Range of Writing</b></p>	
<p>39.04.1 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10</p>	
<p><b>40.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Environmental Water Reclamation Technology.</b></p>	
<p>40.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1</p>	
<p>40.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1</p>	
<p>40.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1</p>	

Florida Standards	Correlation to CTE Program Standard #
40.04 Model with mathematics.	MAFS.K12.MP.4.1
40.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
40.06 Attend to precision.	MAFS.K12.MP.6.1
40.07 Look for and make use of structure.	MAFS.K12.MP.7.1
40.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA and NGSS- Sci*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
41.0 Identify professions related to the water technology field – the student will be able to:			
41.01 List duties of water technology workers such as wastewater operator, water operator, systems operator, stormwater operator, residual (bio-solids) hauler operator, cross connection operator, pretreatment operator, and meter reading/maintenance operator.			
41.02 Identify the basic terms and concepts involved in processes used in these professions.			
41.03 List potential employers in the water technology field: federal, municipal, county, state and private.			
41.04 Identify resources to assist in finding employment in the field.			
41.05 Identify professional organizations related to the water technology field.			
41.06 Identify career ladder levels in the water technology field: trainee, C Level, B Level, A Level.			
42.0 Identify scientific concepts common in water and wastewater treatment – the student will be able to:			
42.01 Identify chemical symbols used in water and wastewater treatment.			

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
42.02 Describe the hydrologic cycle.			
42.03 Describe the basic concepts of the pH scale and its importance in the treatment process.			
42.04 Identify the differences between mixtures, elements, and compounds, and organic and inorganic chemicals.			
42.05 Identify principle states of matter: liquid, solid, and gas.			
42.06 Identify the basic nitrogen, phosphorous, and carbon cycles.			
43.0 Identify safety hazards associated with water technologies – the student will be able to:			
43.01 Identify the types of hazards common to water technology facilities.			
43.02 Recognize unsafe conditions and prescribe corrective measures.			
43.03 Identify and safely handle hazardous chemicals common to water technology facilities.			
43.04 Recognize electrical hazards.			
43.05 Recognize fire hazards, identify types of fires, and describe appropriate extinguishing techniques.			
44.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials – the student will be able to:			
44.01 Identify the kinds of information presented on Material Safety Data Sheets (MSDS).			
44.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (chapter 442, F.S.).			
45.0 Solve basic math problems common to water technologies – the student will be able to:			
45.01 Perform basic arithmetic problems, including addition, subtraction, multiplication, division, fractions, decimals, percentages, rounding (significant figures), graphing, etc.			
45.02 Identify metric measurements and perform conversions.			
45.03 Perform calculations that involve areas, volumes, capacities, retention times, pounds, mg/L, velocities, flow rates, pressure, and head.			
46.0 Define pumping and basic hydraulic principles – the student will be able to:			
46.01 Identify types of pumps.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
46.02 Discuss application and use of different types of pumps.			
46.03 Identify components/characteristics of pumps including pump operation and basic pump curves including centrifugal pumps, positive displacement pumps, and air lift pumps.			
46.04 Identify types of pipes, valves, and fittings.			
46.05 Define cross connections.			
46.06 Identify the appropriate equipment used in the treatment processes.			
47.0 Define principles of disinfection – the student will be able to:			
47.01 List the need/reasons for disinfection (list of waterborne diseases).			
47.02 Define concepts related to disinfection.			
47.03 List methods and chemicals used in disinfection.			
47.04 Define the physical properties of chlorine.			
47.05 List kinds of disinfection equipment used.			
48.0 Define sampling techniques – the student will be able to:			
48.01 Define the reasons for sampling and types of samples.			
48.02 Define methods of sample collection and handling.			
48.03 Define the basic procedure for quality control and quality assurance in sampling.			
48.04 Define the chain of custody for samples.			
48.05 Perform chlorine residual analysis.			
48.06 Perform pH analysis.			
49.0 Define federal, state, and local regulations that apply to water technologies – the student will be able to:			
49.01 List regulatory agencies and their roles in monitoring the water technology field.			
49.02 Define regulations associated with the appropriate federal, state or local agencies.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
49.03 Define training and certification requirements for water technology workers.			
50.0 Demonstrate employability skills – the student will be able to:			
50.01 Conduct a job search.			
50.02 Secure information about a job.			
50.03 Identify documents that may be required for a job application.			
50.04 Complete a job application.			
50.05 Demonstrate competence in job-interview techniques.			
50.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.			
50.07 Identify acceptable work habits.			
50.08 Demonstrate knowledge of how to make job changes appropriately.			
50.09 Demonstrate acceptable employee-health habits for the treatment facility environment.			
50.10 Identify materials and documents needed for a professional library.			
50.11 Demonstrate productive and positive customer interactions.			
50.12 Demonstrate effective interpersonal communication skills.			
51.0 Identify the basic characteristics and principles of wastewater treatment – the student will be able to:			
51.01 Identify the sources of wastewater and the objectives of wastewater treatment.			
51.02 Identify terms used in wastewater treatment.			
51.03 Identify the impact of wastewater on receiving bodies of water.			
51.04 Identify biological organisms present in treatment processes.			
51.05 Identify waterborne diseases.			
51.06 Identify commonly measured wastewater parameters.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
51.07 Identify factors affecting raw wastewater.			
51.08 Correlate treatment processes to types of facility influent and solids.			
52.0 Identify sampling techniques and interpret the results – the student will be able to:			
52.01 Identify the reasons for sampling and the types of samples (e.g., simple, representative, grab, composite).			
52.02 Describe methods of sample collection and handling.			
52.03 Identify specific samples (biological or chemical) and determine the significance of sample results required for process quality control, for compliance with standards, and for reporting.			
52.04 Identify representative sampling points.			
52.05 Identify the significance of the flow measurement on process control.			
53.0 Describe the sources of wastewater and the types of collection systems – the student will be able to:			
53.01 Describe the types of wastewater collection systems.			
53.02 Identify flow variations and conditions that affect plant treatment, including infiltration, inflow, and lift stations.			
53.03 Identify methods to detect and correct infiltration.			
53.04 Identify dissolved gases in wastewater and the effect of their presence/absence on treatment.			
54.0 Describe the process and the operational principles for the preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal; and solids management – the student will be able to:			
54.01 Describe concepts related to preliminary and primary treatment.			
54.02 Describe the types of preliminary treatment equipment, the way they function, and the relationship of each to the treatment train.			
54.03 Describe the types of primary treatment equipment, the way they function, and the relationship of each to the treatment train.			
54.04 Describe concepts related to secondary treatment, including attached growth processes, suspended growth processes, aeration, and clarification.			
54.05 Describe the types of secondary treatment equipment, the way they function, and the relationship of each to the treatment train.			

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
54.06 Describe concepts related to tertiary treatment processes, including sand filtration, nitrification/denitrification, oxic/anoxic, activated carbon, and artificial wetlands.			
54.07 Describe the types of tertiary treatment equipment, the way they function, and the relationship of each to the treatment train.			
54.08 Describe concepts related to disinfection and effluent disposal, including surface water, reuse reclamation, deep well, and ocean outfall.			
54.09 Describe the types of disinfection and the types of effluent-disposal equipment, the way they function, and the relationship of each to the system.			
54.10 Describe concepts related to solids management, including thickening, aerobic and anaerobic digestion, stabilization, de-watering, and reuse.			
54.11 Describe the types of solids-management equipment, the way they function, and the relationship of each to the system.			
55.0 Perform treatment-process control and troubleshooting for the treatment train, effluent disposal, and solids management – the student will be able to:			
55.01 Describe the grit-removal process and the operational efficiency of each step.			
55.02 Describe the laboratory tests performed on influent.			
55.03 Describe the primary-clarifier removal efficiencies, including settleable solids, suspended solids, total solids, BOD, and bacteria.			
55.04 Describe sampling points, frequency of sampling, and the laboratory tests and results that are used for the proper operation of the primary clarifier.			
55.05 Select and plot on a trend chart the parameters for primary clarification.			
55.06 Use the operational data required to evaluate the performance of secondary-treatment processes, including attached growth, suspended growth, aeration, and clarification.			
55.07 Describe sampling points, the frequency of sampling, and the laboratory tests and results used for proper operation of the secondary-treatment processes.			
55.08 Select and plot on a trend chart the parameters for secondary clarification.			
55.09 Describe how nitrification affects secondary processes and clarification.			

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
55.10 Describe how denitrification affects secondary processes and clarification.			
55.11 Use operational data to evaluate the performance of sand filtration.			
55.12 Describe sampling points, the frequency of sampling, and the laboratory tests and results used for checking the proper operation of sand filtration. Select and plot on a trend chart the parameters for sand filtration.			
55.13 Use operational data to evaluate the nitrification/denitrification process.			
55.14 Use operational data to evaluate the performance of effluent-disposal processes, including disinfection and dechlorination.			
55.15 Describe sampling points, the frequency of sampling, and the laboratory tests used for checking the proper operation of effluent disposal.			
55.16 Select and plot on a trend chart the parameters for effluent disposal.			
55.17 Describe various methods of effluent disinfection including UV, chlorination, and ozonation.			
55.18 Describe the chemical and physical properties of chlorine, and describe the reactions of chlorine with water, ammonia compounds, and sulfides.			
55.19 Describe the safe storage and handling of chlorine, including the use of testing compounds.			
55.20 Explain the points of application of chlorine in wastewater treatment.			
55.21 Describe the methods of dechlorination.			
55.22 Describe the methods commonly used to dispose of wastewater effluents, including reuse applications.			
55.23 Describe the laboratory tests commonly used on the reuse of effluent.			
55.24 Describe the types of sludge and their characteristics.			
55.25 Use operational data to evaluate the performance of solids management, including sludge thickening, digestion, de-watering, and disposal processes.			
55.26 Describe sampling points, the frequency of sampling, and the laboratory tests and results used for checking the proper operation of solids management and for compliance with Chapter 62-640 F.A.C.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
56.0 Perform equipment inspection, and identify basic maintenance for the treatment train, effluent disposal, and solids management – the student will be able to:			
56.01 Identify the appropriate equipment used in the treatment train, effluent disposal, and solids management.			
56.02 Describe a preliminary site inspection of the equipment used in the treatment train, effluent disposal, and solids management.			
56.03 Identify the maintenance needs of equipment used in the treatment train, effluent disposal, and solids management, including safe procedures for maintenance.			
56.04 Describe proper record keeping for preventive and corrective maintenance.			
56.05 Describe preventive and corrective maintenance procedures for equipment used in the treatment process, effluent disposal, and solids management.			
57.0 Identify and correct facility operational problems – the student will be able to:			
57.01 Describe common facility operational problems in the treatment train, effluent disposal, and solids management.			
57.02 Describe methods to evaluate operational problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.			
57.03 Select appropriate corrective actions for common problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.			
57.04 Describe the methods for monitoring results of corrective action taken for common problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.			
58.0 Identify appropriate federal, state, and local regulations – the student will be able to:			
58.01 Identify federal, state and local regulations that apply to the operation of a wastewater-treatment facility.			
58.02 Describe the operator's duties and responsibilities, certification requirements, testing, renewal, staffing, and facility classification (sections of Chapter 62-602 F.A.C.).			
58.03 Explain and describe the contents of an operating permit.			
58.04 Identify state regulations that apply to procedures such as reclaimed water, reuse, and residuals management.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
59.0 Describe federal, state and local laws for the handling, storage, and use of toxic and hazardous materials – the student will be able to:			
59.01 Identify the kinds of information presented on the MSDS.			
59.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (Chapter 442, F.S.).			
59.03 Identify the reporting requirements as specified in SARA Title III and Chapter 252, F.S.			
59.04 Describe the responsibilities toward the community as specified in SARA Title III and Chapter 252, F.S.			

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## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

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Florida Department of Education  
Curriculum Framework

**Program Title:** Environmental Water & Reclamation Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Program Number	8007300
CIP Number	0115050601
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	ENV WAT TEC 7G
CTSO	FFA
SOC Codes (all applicable)	51-8031 - Water and Wastewater Treatment Plant and System Operators
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to applications of water resource management, application of safety procedures, record keeping and sampling, wetland management, reclamation treatment techniques, solid waste disposal, storm water management, hazardous material storage, government water technology regulations, filtrations, sedimentation, fluoridation process, and perform maintenance and inspections on equipment..

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of four courses and two occupational completion point points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8007110	Introduction to Environmental Water Technology	1 credit	51-8031	2	VO
	8007120	Intermediate Environmental Water Technology	1 credit		2	VO
B	8007130	Advanced Environmental Water Technology and/or	1 credit	51-8031	2	VO
	8007210	Advanced Environmental Water Reclamation Technology	1 credit		2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Tables

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Introduction to Environmental Water Technology	7/87 8%	5/80 6%	36/83 43%	13/69 19%	33/67 49%	14/70 20%	11/69 16%	38/82 46%	10/66 15%	35/74 47%	5/72 7%
Intermediate Environmental Water Technology	3/87 3%	13/80 16%	26/83 31%	19/69 28%	27/67 30%	9/70 13%	3/69 4%	34/82 41%	11/66 17%	41/74 55%	14/72 19%
Advanced Environmental Water Technology	**	**	**	**	**	**	**	**	**	**	**

Advanced Environmental Water Reclamation Technology	**	**	**	**	**	**	**	**	**	**	**
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\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Introduction to Environmental Water Technology	**	**	**	**	**	**	**
Intermediate Environmental Water Technology	**	**	**	**	**	**	**
Advanced Environmental Water Technology	**	**	**	**	**	**	**
Advanced Environmental Water Reclamation Technology	**	**	**	**	**	**	**
Introduction to Environmental Water Technology	**	**	**	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and

proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

### **National Standards (NS)**

Some or all of the courses in this program have been aligned with Industry or National Standards. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link:

[https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn\\_000.pdf](https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf)

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Water Technology.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Water Technology.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Water Technology.
- 04.0 Identify the historical, social, cultural and potential applications of water resource management.
- 05.0 Describe and discuss hydrology.
- 06.0 Practice safety skills and procedures.
- 07.0 Demonstrate record keeping and sampling procedures.
- 08.0 Describe and discuss geologic principles of water resources.
- 09.0 Manage wetlands.
- 10.0 Identify career opportunities and organizational dynamics.
- 11.0 Apply scientific and technological principles.
- 12.0 Describe water reclamation treatment techniques.
- 13.0 Collect and dispose of solid waste.
- 14.0 Explain water treatment techniques.
- 15.0 Discuss and manage stormwater systems.
- 16.0 Describe water distribution.
- 17.0 Demonstrate the management and environmentally sound use of water resources.
- 18.0 Maintain water treatment equipment and facilities.
- 19.0 Discuss related standards and regulations.
- 20.0 Conduct site assessment.
- 21.0 Practice safety skills and procedures.
- 22.0 Manage data and physical resources.
- 23.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems.
- 24.0 Control incidents.
- 25.0 Prepare a plan.
- 26.0 Perform remediation.
- 27.0 Collect and dispose of solid waste.
- 28.0 Identify continuing education needs and opportunities.
- 29.0 Conduct recordkeeping and sampling procedures.
- 30.0 Review stormwater permit procedures.
- 31.0 Demonstrate the use of industry appropriate tools, equipment, and instruments
- 32.0 Demonstrate industry specific mathematical calculations.
- 33.0 Demonstrate industry specific science skills and techniques.
- 34.0 Identify career opportunities and organizational dynamics in water resources.

- 35.0 Demonstrate water treatment techniques.
- 36.0 Discuss an Industrial Pretreatment Program/Inspection.
- 37.0 Discuss comprehensive quality assurance plan.
- 38.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Environmental Water Technology.
- 39.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Environmental Water Technology.
- 40.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Environmental Water Technology.
- 41.0 Identify professions related to the water technology field.
- 42.0 Identify scientific concepts common in water and wastewater treatment.
- 43.0 Identify safety hazards associated with water technologies.
- 44.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
- 45.0 Solve basic math problems common to water technologies.
- 46.0 Define pumping and basic hydraulic principles.
- 47.0 Define principles of disinfection.
- 48.0 Define sampling techniques.
- 49.0 Define federal, state, and local regulations that apply to water technologies.
- 50.0 Demonstrate employability skills.
- 51.0 Identify sampling techniques and explain the significance of the steps.
- 52.0 Identify chemical, biological, and physical constituents of water entering the water treatment facility or distribution systems.
- 53.0 Describe the principles, operational and troubleshooting practices of the aeration process.
- 54.0 Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes.
- 55.0 Describe the principles, operational and troubleshooting practices of the sedimentation process.
- 56.0 Describe the principles, operational and troubleshooting practices of the filtration process.
- 57.0 Describe the principles, operational and troubleshooting practices of the water-softening process.
- 58.0 Describe the principles, operational and troubleshooting practices of the stabilization process.
- 59.0 Describe the principles, operational and troubleshooting practices of the corrosion control process.
- 60.0 Describe the principles, operational and troubleshooting practices of the disinfection process.
- 61.0 Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes.
- 62.0 Describe the principles, operational and troubleshooting practices of the iron and manganese removal processes.
- 63.0 Describe the principles, operational and troubleshooting practices for taste and odor control.
- 64.0 Describe the principles, operational and troubleshooting practices of the demineralization processes.
- 65.0 Describe the principles, operational and troubleshooting practices of the fluoridation process.
- 66.0 Identify facility operational problems.
- 67.0 Describe basic hydraulics and pumping operations.
- 68.0 Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable water facility.
- 69.0 Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management.
- 70.0 Identify the basic characteristics and principles of wastewater treatment.
- 71.0 Identify sampling techniques and interpret the results
- 72.0 Describe the sources of wastewater and the types of collection systems

- 73.0 Describe the process and the operational principles for the preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal; and solids management.
- 74.0 Perform treatment-process control and troubleshooting for the treatment train, effluent disposal, and solids management.



**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Environmental Water Technology  
**Course Number:** 8007110  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the area of hydrology, safety skills and procedures, geological principles of water resources, management of wetlands, storm water systems, environmental water resources, equipment and facility maintenance, scientific and research concepts; principles of leadership; and employability, and human relations skills. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

<b>Florida Standards</b>	<b>Correlation to CTE Program Standard #</b>
01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Water Technology.	
01.01 Key Ideas and Details	
01.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
01.01.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
01.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02 Craft and Structure	
01.02.1 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3 Analyze the author's purpose in providing an explanation, describing a	

Florida Standards		Correlation to CTE Program Standard #
	procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Water Technology.	
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	
	LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
	LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	
	LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research.	
	LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	
	LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Water Technology.	
03.01	Make sense of problems and persevere in solving them.	
	MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively.	
	MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others.	
	MAFS.K12.MP.3.1	
03.04	Model with mathematics.	
	MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically.	
	MAFS.K12.MP.5.1	
03.06	Attend to precision.	

Florida Standards	Correlation to CTE Program Standard #	
	MAFS.K12.MP.6.1	
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Identify the historical, social, cultural and potential applications of water resource management – the student will be able to:		SC.912.E.7.8; HE.912.C.1.3; SC.912.L.15.8, 13; SC.912.L.16.4, 7, 8, 9, 10, SC.912.L.17.1, 8, 11, 16, 19, 20; SC.912.L.18.12; SC.912.N.1.1	
04.01 Explain the developmental progression of water resource management.			
04.02 Research emerging problems and issues with water resource management.			
04.03 Explain the local global importance of water conservation.			
04.04 Explain international issues affecting water resources and water quality.			
04.05 Compare practices that either enhance or hinder water quality.			
04.06 Differentiate between point and non-point sources of pollution.			
04.07 Identify diseases and illnesses associated with water borne pathogens.			
04.08 Explain methods to control and eradicate diseases and illnesses associated with water borne pathogens.			
04.09 Explain the significance genetic factors, environmental factors and pathogenic agents to health from the perspective of both individual and			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
public health.			
04.10 Analyze how population size is affected by water quantity and quality.			
04.11 Evaluate the cost and benefits of various water reclamation technologies.			
04.12 Discuss the impact of individuals on water quality and quantity and how human lifestyles affect sustainability.			
04.13 Discuss the special properties of water that contribute to earth's suitability as an environment for life.			
05.0 Describe and discuss hydrology – the student will be able to:		SC.912.E.5.2, 4; SC.912.E.6.2, 3, 4, 5; SC.912.E.7.1, 3; SC.912.L.17.16; SC.912.P.8.1, 5, 7	
05.01 Define basic hydrological terms.			ESS.03.03.02.a ESS.03.03.02.b
05.02 Describe surface water systems.			ESS.03.03.02.a ESS.03.03.02.b
05.03 Describe ground water systems.			ESS.03.03.02.c ESS.03.03.03.a ESS.03.03.03.b ESS.03.03.03.C
05.04 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.			
05.05 List the components of Florida's fresh water systems (lakes, ground water, aquifer, springs, rivers, and wetlands) and explain the importance of managing these resources.			
05.06 Identify alternative sources of water.			
05.07 Identify the relationship of various soil conditions to water quality.			ESS.03.02.03
05.08 Research and explain the effects of saltwater intrusion.			
05.09 Identify and discuss water wells and water reservoirs.			
06.0 Practice safety skills and procedures – the student will be able to:		SC.912.P.8.5, 7, 11	
06.01 Demonstrate proper safety precautions and use of common laboratory, testing, and personal protective equipment.			CS.06.02.01.a CS.07.01.01.b

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
06.02 Identify and utilize safe work & laboratory practices.			CS.06.02.01.a
06.03 Identify physical, chemical, biological, and zoological hazards.			
06.04 Extract and utilize pertinent information from a container label and/or Safety Data Sheets (SDS) following Environmental Protection Agency (EPA), Worker Protection Standard, Occupational Safety and Health Administration (OSHA), and Globally Harmonized System (GHS) regulations.			
06.05 Determine, review, and follow regulations.			
06.06 Develop and maintain appropriate safety & laboratory records.			
06.07 Identify and describe “on the job” & laboratory hazards and risks including fire/explosive, lead asbestos, weather hazards and emergency response preparedness			
06.08 Describe how to conduct a Job Hazard Analysis			
06.09 Perform lifting activities safely.			
06.10 Identify ladder safety and fall protection.			
06.11 Become certified in first aid/CPR and describe First Responder responsibilities.			CS.07.02.01.c
07.0 Demonstrate record keeping and sampling procedures – the student will be able to:		SC.912.N.1.1, 4, 6; SC.912.P.8.8, 11;	
07.01 Define sampling objectives, protocol and Chain of Custody.			ESS.01.01.01.a
07.02 Operate, calibrate, and maintain sampling equipment.			ESS.01.01.02.c
07.03 Develop sampling strategy.			ESS.01.01.01.b
07.04 Perform applicable field measurements including pH, dissolved oxygen, temperature, disinfection residuals, and turbidity.			
07.05 Describe bacterial and viral sampling.			
07.06 Appropriately preserve, document, and dispose of samples.			
07.07 Identify cross-contamination and other risks associated with sampling.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
07.08 Describe, plan, and utilize quality assurance practices.			
07.09 Submit samples for analysis.			ESS.01.01.01.b
07.10 Perform periodic follow-up sampling.			
07.11 Identify permit requirements and procedures.			
07.12 Define and follow federal, state and local sampling guidelines.			
08.0 Describe and discuss geologic principles of water resources – the student will be able to:		SC.912.E.6.1, 2, 4; SC.912.L.17.13; SC.912.P.8.6, 7, 8, 11	
08.01 Explain the geological history of Florida.			
08.02 Describe Florida aquifer system.			
08.03 Discuss basic groundwater chemistry and the geological factors that contribute to the varying chemical components of water.			
08.04 Describe local geology related problems.			
09.0 Manage wetlands – the student will be able to:		SC.912.E.5.4; SC.912.L.14.35; SC.912.L.17.4, 8, 16, 19, 20;	
09.01 Identify environmental significance of ecosystems.			
09.02 Discuss the structure and function of wetlands.			ESS.03.04.01.b
09.03 Define limits of wetlands.			
09.04 Discuss habitat value.			
09.05 Identify fauna and flora.			ESS.03.04.02
09.06 Determine desirable vs. nuisance plant and animal species.			
09.07 Describe changes in ecosystems resulting from seasonal variations, climate change, environmental impacts, and succession.			
09.08 Explain the general distribution of life in aquatic systems as a function of effluent discharge, stormwater runoff and drought.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
10.0 Identify career opportunities and organizational dynamics – the student will be able to:			
10.01 Describe the nature of career opportunities in water, water reclamation and environmental industries.			CS.02.03.01.a
10.02 Compare supervisory and administrative responsibilities.			
10.03 Identify team building communication skills.			CS.01.01.01.a
10.04 Identify problem-solving techniques.			CS.02.04.02.c
10.05 Identify employee responsibility/benefits.			
10.06 Identify legal aspects of personnel relations.			
10.07 Communicate effectively in verbal, written, and nonverbal modes.			
10.08 Recognize and demonstrate good listening skills.			
10.09 Conduct small informal and formal group meetings.			
10.10 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.			
10.11 Recognize and demonstrate effective communications skills in the workplace.			
10.12 Identify related professional associations.			
10.13 List and describe the careers associated with water treatment, distribution, and management.			
10.14 Determine the educational requirements and experience needed to enter and advance in water, water reclamation and environmental occupations.			
11.0 Apply scientific and technological principles – the student will be able to:			
11.01 Employ scientific measurement skills.			BS.02.02.01.b
11.02 Demonstrate safe and effective use of common laboratory equipment.			
11.03 Implement the scientific method and science process skills through the design and completion of a research project.			
11.04 Interpret, analyze, and report data.			
11.05 Describe and evaluate emerging technologies in environmental and			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
water treatment technologies			
11.06 Compare and contrast structure and function of various types of microscopes.			
12.0 Describe reclaimed water treatment techniques – the student will be able to:		SC.912.L.17.16, 19, 20 SC.912.L.18.6, 8;	
12.01 Understand pretreatment, primary, secondary, and tertiary treatment processes of wastewater.			
12.02 Describe disposal options.			
12.03 Identify septic tanks types and functions.			
12.04 Apply principles of nutrients, water and waste management to environmental problems.			
13.0 Collect and dispose of solid waste – the student will be able to:		SC.912.17.16, 19, 20	
13.01 Describe the history of solid waste disposal.			
13.02 Identify types of waste.			
13.03 Identify household hazardous waste collection and disposal programs.			
13.04 Research and evaluate solid waste disposal options. (landfill, incineration, and composting, etc.)			
14.0 Explain water treatment techniques – the student will be able to:		SC.912.E.6.5; SC.912.L.17.16, 19, 20; SC.912.L.18.6, 8; SC.912.P.8.2;	
14.01 Describe drinking water treatments.			
14.02 Identify and describe the desirable water qualities.			
14.03 Explain how changes in water quality affect life cycles.			
14.04 Explain, monitor, and maintain freshwater/salt water quality standards.			
14.05 Calculate volume in circular, rectangular and irregular shaped water structures.			
14.06 List and explain sources of pollution and methods of preventing and/or correcting these pollution problems.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
15.0 Discuss and manage stormwater systems – the student will be able to:		SC.912.E.6.2; SC.912.L.17.16, 19, 20;	
15.01 Determine boundaries of watersheds.			
15.02 Identify runoff coefficients.			
15.03 Identify the relationship between construction sites and stormwater systems.			
15.04 Research rules and regulations in regards to stormwater systems.			
15.05 Contact local municipalities to determine stormwater regulations.			
15.06 Research current construction trends and methods of stormwater systems.			
15.07 Define topography and discuss it in relation to stormwater management.			
15.08 Discuss the effects that uncollected stormwater has on lakes, rivers, ponds and wetlands.			
16.0 Describe water distribution – the student will be able to:		SC.912.P.12.11	
16.01 Identify the need for backflow prevention and cross connections controls.			
16.02 Identify necessary equipment for water distribution purposes e.g.; pumps, motors, valves, storage tanks, pipes and fittings.			
16.03 Understand to purpose and function of water meters.			
16.04 Identify maintenance requirements for fire hydrants, pipes, and valves.			
16.05 Identify proper procedures for operation and maintenance of Booster Stations.			
16.06 Discuss importance of period flushing of water distribution systems.			
16.07 Identify water quality monitoring requirements for distribution systems.			
16.08 Explain Supervisory Control and Data Acquisition Systems (SCADA)			
17.0 Demonstrate the management and environmentally sound use of water resources – the student will be able to:			
17.01 Determine quality of groundwater and surface water.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
17.02 Identify solids and dissolved solids found in water.			
17.03 Identify primary and secondary contaminants.			
17.04 Identify unregulated organic compounds.			
18.0 Describe water treatment equipment and facilities – the student will be able to:		SC.912.N.1.1; SC.912.P.10.4, 5, 7;	
18.01 Research water treatment equipment and facility components.			
18.02 Identify appropriate temperatures and other external conditions that may affect the water treatment processes.			
18.03 Identify the effect of weather conditions and changes that may affect the water treatment processes.			
18.04 Describe appropriate flow rates and tank levels.			
18.05 Create a checklist of policies and related procedures necessary to handle daily conditions, hazards and/or malfunctions.			
18.06 Describe maintenance procedures and techniques of filters, pipes, generators, meters, motors, valves, instruments, injectors, storage basins etc.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Intermediate Environmental Water Technology  
**Course Number:** 8007120  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the area of standards and regulations, site assessments, safety, managing data and physical resources, prepare a plan, perform remediation, collect and dispose of solid waste, record keeping and sampling procedures, career opportunities, leadership, teamwork, and money management concepts. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

<b>Florida Standards</b>	<b>Correlation to CTE Program Standard #</b>
01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Environmental Water Technology	
01.01 Key Ideas and Details	
01.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
01.01.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
01.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02 Craft and Structure	
01.02.1 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3 Analyze the author's purpose in providing an explanation, describing a	

Florida Standards		Correlation to CTE Program Standard #
	procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Environmental Water Technology		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	
	LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
	LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	
	LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research.	
	LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	
	LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Environmental Water Technology	
03.01	Make sense of problems and persevere in solving them.	
	MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively.	
	MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others.	
	MAFS.K12.MP.3.1	
03.04	Model with mathematics.	
	MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically.	
	MAFS.K12.MP.5.1	
03.06	Attend to precision.	

Florida Standards	Correlation to CTE Program Standard #	
	MAFS.K12.MP.6.1	
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
19.0 Discuss related standards and regulations – the student will be able to:		SC.912.N.1, 2, 3, 4	
19.01 Explain the importance and impacts of local, state, and federal regulations and required documentation.			
19.02 Identify where local, state, and federal regulations are documented.			
19.03 Discuss the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA).			
19.04 Identify local, state, and national regulatory agencies and discuss their roles in relation to state and federal laws and statures.			
19.05 Research how rules and laws are made and mandated.			
19.06 Describe permitting procedures.			
19.07 Identify regulation resources.			
19.08 Describe various licensing procedures.			
19.09 Research governmental regulation authorities associated with Florida’s water sources.			
19.10 Describe the National Pollution Discharge Elimination System (NPDES).			
19.11 Identify appropriate agencies and their functions			
19.12 Create, evaluate and present a well-head protection plan.			
19.13 Discuss the need for adequate monitoring of environmental parameters when making policy decisions.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
20.0 Conduct site assessment – the student will be able to:		SC.912.L.17.20; SC.912.N.1.1;	
20.01 Identify the purposes of site assessment.			
20.02 Describe required documentation.			
20.03 Interpret blueprints			
20.04 Describe location and legal description of property and design a map to locate site characteristics.			
20.05 Obtain physical and performance measurements.			
20.06 Assess needed equipment and processes.			
21.0 Practice safety skills and procedures – the student will be able to:		SC.912.N.4.2	
21.01 Identify safety procedures for: wells, pumps, electrical equipment, motor vehicles, buildings, and other necessary equipment.			
21.02 Handle compressed gasses, solids, and liquids safely.			
21.03 Summarize “Right of Access” law.			
21.04 Summarize “Confined Space” regulations.			
21.05 Identify Zero Tolerance policies related to safe practices.			
21.06 Identify employee limitations.			
21.07 Identify appropriate decontamination procedures.			
21.08 Identify principles of toxicology.			
21.09 Identify routes of exposure.			
21.10 Identify respirator safety procedures.			
21.11 Discuss history of hazardous materials and hazardous categories.			
21.12 Discuss common chemical compatibility.			
21.13 Describe and discuss OSHA concepts.			
21.14 Describe and discuss the Vulnerability Assessment process.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
22.0 Manage data and physical resources – the student will be able to:		SC.912.N.1, 2, 3, 4, 5, 6, 7	
22.01 Utilize word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, and security.			
22.02 Identify possible funding sources.			
22.03 Prepare budgets and purchase orders.			
22.04 Prepare a time management plan.			
22.05 Utilize information databases.			
22.06 Locate and interpret printed reference materials.			
22.07 Describe network opportunities.			
22.08 Maintain necessary/required record keeping practices and procedures.			
22.09 Keep inventory, time sheets, and equipment maintenance logs.			
22.10 Identify suppliers and technical resources.			
23.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems – the student will be able to:		SC.912.N.1.1	
23.01 Define GIS and its function in water treatment and utilities.			PST.05.03.01.a PST.05.03.01.b PST.05.03.02.b
23.02 Use GIS software.			PST.05.03.01.c PST.05.03.02.c
23.03 Learn GIS applications.			PST.05.03.03.c
23.04 Develop a GIS model.			
23.05 Define GPS and its function in water treatment and utilities.			
23.06 Collect GPS data and load on GIS.			PST.05.03.02.c
23.07 Research and identify other remote sensing tools.			PST.05.03.04.b
23.08 Identify and plot points on a map.			
24.0 Control incidents – the student will be able to:		SC.912.N.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
24.01 Identify and describe reasons for controlling incidents.			
24.02 Describe levels of response.			
24.03 Determine and use proper chain of command.			
24.04 Determine methods of control.			
24.05 Demonstrate site access restriction methods.			
24.06 Identify appropriate authorities to be notified.			
24.07 Place equipment appropriately.			
24.08 Orient zones.			
24.09 Identify possible geographic hazards.			
24.10 Identify media protocol and procedures for communicating with the public.			
24.11 Prepare a press release for a mock incident.			
24.12 Identify abnormal event management processes utilizing the National Information Management System (NIMS).			
25.0 Prepare a plan – the student will be able to:		SC.912.N.1.1	
25.01 Describe the need for and the types of pre-planning.			
25.02 Identify and select necessary agency involvement.			
25.03 Identify possible contamination zones.			
25.04 Review contingency plans			
25.05 Understand the need for contingency plans for hurricanes, tornadoes, floods, fires, and/or nuclear accidents (emergency response plan).			
25.06 Discuss Superfund Amendments Reauthorization Act (SARA) also known as the Emergency Planning and Community Right-to-Know Act (EPCRA) regulations.			
25.07 Create plan for deployment.			
25.08 Conduct mock disaster activities.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
25.09 Review FEMA forms management and documentation			
26.0 Perform remediation – the student will be able to:		SC.912.L.17.16	
26.01 Research appropriate cleaning methods.			
26.02 Create a plan for a disaster clean up including needed materials and equipment.			
26.03 Understand entry and closure methods.			
26.04 Identify contamination removal procedures.			
26.05 Design a site/system cleanliness verification procedure.			
26.06 Identify tear down and demobilization procedures.			
27.0 Collect and dispose of solid waste – the student will be able to:		SC.912.L.17.20	
27.01 Describe the history of solid waste disposal and review the laws that regulate it.			
27.02 Identify types of waste.			
27.03 Research and evaluate solid waste disposal options. (Landfill, incineration, and composting, etc.)			
28.0 Identify continuing education needs and opportunities – the student will be able to:			
28.01 Determine continuing education needs/goals.			
28.02 Identify available educational and financial resources.			
28.03 Identify appropriate professional associations and attend meetings where applicable.			
28.04 Read and review trade journals.			
29.0 Conduct recordkeeping and sampling procedures – the student will be able to:		SC.912.N.1.1, 2	
29.01 Demonstrate sampling, testing and recordkeeping.			
29.02 Collect and analyze water samples: grab, composite and representative.			
29.03 Record data into identified database program.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
29.04 Interpret lab results.			
29.05 Evaluate data.			
29.06 Measure well volumes.			
29.07 Describe organism sampling and record observations.			
30.0 Review stormwater permit procedures – the student will be able to:			
30.01 Research and demonstrate Best Management Practices (BMP), Standard Operating Procedures (SOP) and Preventive Maintains (PM).			
30.02 Describe proper ditch, pond, culvert, and manhole inspection techniques.			
30.03 Evaluate a storm cleanup and prevention plan.			
30.04 Discuss pollutants, illegal dumping and discharge and demonstrate appropriate handling procedures.			
30.05 Describe the importance of outfall structures, inlets, and treatment systems.			
30.06 Describe the procedures to clean and televise pipes.			
30.07 Describe the importance of ditch banks and right of ways.			
30.08 Maintain, repair and replace pipe sections.			
31.0 Demonstrate the use of industry appropriate tools, equipment, and instruments – the student will be able to:		SC.912.P.10.2, 3, 10	
31.01 Select and demonstrate proper use of industry appropriate tools, equipment, and instruments.			
31.02 Demonstrate various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			
31.03 Service and maintain industry appropriate equipment, instruments, facilities, and supplies.			
32.0 Demonstrate industry specific mathematical calculations – the student will be able to:		SC.912.E.5.6; SC.912.N.1.1; SC.912.P.8.9; SC.912.P.10.5; SC.912.P.12.2, 3	
32.01 Calculate area and volume.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
32.02 Convert temperature.			
32.03 Calculate velocities and flow rates.			
32.04 Calculate detention time.			
32.05 Calculate parts per million/mg/L.			
32.06 Calculate chemical concentrations and chemical dosages.			
32.07 Utilize conversion factors.			
32.08 Calculate ratios and percentages.			
32.09 Calculate water, brake and motor horsepower for chemical pumps.			
32.10 Calculate force.			
32.11 Calculate sedimentation and loading rates.			
32.12 Use calculations to determine activated sludge characteristics.			
32.13 Use calculations to determine sludge digestion characteristics.			
32.14 Use a variety of problem-solving strategies such as drawing a diagram, making a chart, guessing-and-checking, solving a simpler problem, writing an equation working backwards, and creating a table.			
33.0 Demonstrate industry specific science skills and techniques – the student will be able to:		SC.912.L.18.12; SC.912.P.8.1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11; SC.912.P.10.7	
33.01 Differentiate between chemical and physical properties of solids, dissolved solids, gases and liquids.			
33.02 Identify chemical symbols on the periodic table and explain their relationships.			
33.03 Interpret formula representations of molecules and compounds in water treatment.			
33.04 Characterize chemical reactions in water treatment processes for example redox, acid base, synthesis and single and double replacement reactions.			
33.05 Utilize the mole concept and the law of conservation of mass to calculate quantities of chemicals precipitating in reactions occurring in			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
water treatment processes.			
33.06 Describe the properties of the water molecule.			
33.07 Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH in environmental processes.			
33.08 Distinguish between endothermic and exothermic chemical processes in environmental systems.			
34.0 Identify career opportunities and organizational dynamics in water resources – the student will be able to:			
34.01 Research and create a presentation about occupations in water resources.			
34.02 Determine the educational requirements and experience needed to enter and advance in water resource occupations			
34.03 Prepare a resume.			
35.0 Demonstrate water treatment techniques – the student will be able to:		SC.912.N.1.1	
35.01 Determine soil types, land slope, and other factors to consider in choosing a location for a manmade pond.			
35.02 Identify/explain environmentally safe methods of wastewater disposal.			
35.03 Identify and consult agencies regulating water quality standards in order to prevent compliance problems.			
35.04 Observe different stages of construction of ponds.			
36.0 Discuss an industrial pretreatment program/inspection – the student will be able to:		SC.912.L.18.11; SC.912.N.1.1	
36.01 Utilize spot location program.			
36.02 Survey business and industry water consumption and discharge.			
36.03 Conduct pretreatment sampling.			
36.04 Analyze data and document reports.			
36.05 Design monitoring plan.			
36.06 Monitor sites.			
37.0 Discuss comprehensive quality assurance plan – the student will be able to:			

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
37.01 Discuss quality assurance rules.			
37.02 Develop and follow standard operating procedures.			
37.03 Describe preventative maintenance techniques.			
37.04 Describe cleaning/decontamination techniques.			
37.05 Determine accuracy and precision of sampling techniques.			
37.06 Discuss need for corrective action.			
37.07 Document Quality Assurance per regulatory agencies.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:**        **Advanced Environmental Water Technology**  
**Course Number:**   **8007130**  
**Course Credit:**     **1**

**Course Description:**

This course is designed to develop competencies in the area of standards and regulations, site assessments, safety, managing data and physical resources, prepare a plan, perform remediation, collect and dispose of solid waste, record keeping and sampling procedures, career opportunities, leadership, teamwork, and money management concepts. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
38.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Environmental Water Technology	
	38.01 Key Ideas and Details	
	38.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. <span style="float: right;">LAFS.1112.RST.1.1</span>	
	38.01.2 Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. <span style="float: right;">LAFS.1112.RST.1.2</span>	
	38.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. <span style="float: right;">LAFS.1112.RST.1.3</span>	
	38.02 Craft and Structure	
	38.02.1 Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. <span style="float: right;">LAFS.1112.RST.2.4</span>	
	38.02.2 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. <span style="float: right;">LAFS.1112.RST.2.5</span>	
	38.02.3 Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying	



Florida Standards	Correlation to CTE Program Standard #
<p>important issues that remain unresolved.</p> <p style="text-align: right;">LAFS.1112.RST.2.6</p>	
<p>38.03 Integration of Knowledge and Ideas</p>	
<p>38.03.1 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem.</p> <p style="text-align: right;">LAFS.1112.RST.3.7</p>	
<p>38.03.2 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p style="text-align: right;">LAFS.1112.RST.3.8</p>	
<p>38.03.3 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p style="text-align: right;">LAFS.1112.RST.3.9</p>	
<p>38.04 Range of Reading and Level of Text Complexity</p>	
<p>38.04.1 By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.</p> <p>38.04.2 By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently.</p> <p style="text-align: right;">LAFS.1112.RST.4.10</p>	
<p>39.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Environmental Water Technology</p>	
<p>39.01 Text Types and Purposes</p>	
<p>39.01.1 Write arguments focused on discipline-specific content.</p> <p style="text-align: right;">LAFS.1112.WHST.1.1</p>	
<p>39.01.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p> <p style="text-align: right;">LAFS.1112.WHST.1.2</p>	
<p>39.02 Production and Distribution of Writing</p>	
<p>39.02.1 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p style="text-align: right;">LAFS.1112.WHST.2.4</p>	
<p>39.02.2 Develop and strengthen writing as needed by planning, revising,</p>	

Florida Standards	Correlation to CTE Program Standard #
<p>editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.</p> <p style="text-align: right;">LAFS.1112.WHST.2.5</p>	
<p>39.02.3 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.</p> <p style="text-align: right;">LAFS.1112.WHST.2.6</p>	
<p>39.03 Research to Build and Present Knowledge</p>	
<p>39.03.1 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.</p> <p style="text-align: right;">LAFS.1112.WHST.3.7</p>	
<p>39.03.2 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p> <p style="text-align: right;">LAFS.1112.WHST.3.8</p>	
<p>39.03.3 Draw evidence from informational texts to support analysis, reflection, and research.</p> <p style="text-align: right;">LAFS.1112.WHST.3.9</p>	
<p>39.04 Range of Writing</p>	
<p>39.04.1 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.</p> <p style="text-align: right;">LAFS.1112.WHST.4.10</p>	
<p>40.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Environmental Water Technology.</p>	
<p>40.01 Make sense of problems and persevere in solving them.</p> <p style="text-align: right;">MAFS.K12.MP.1.1</p>	
<p>40.02 Reason abstractly and quantitatively.</p> <p style="text-align: right;">MAFS.K12.MP.2.1</p>	
<p>40.03 Construct viable arguments and critique the reasoning of others.</p> <p style="text-align: right;">MAFS.K12.MP.3.1</p>	
<p>40.04 Model with mathematics.</p> <p style="text-align: right;">MAFS.K12.MP.4.1</p>	
<p>40.05 Use appropriate tools strategically.</p>	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.5.1
40.06 Attend to precision.	MAFS.K12.MP.6.1
40.07 Look for and make use of structure.	MAFS.K12.MP.7.1
40.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA and NGSS- Sci*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
41.0 Identify professions related to the water technology field – the student will be able to:			
41.01 List duties of water technology workers such as wastewater operator, water operator, systems operator, stormwater operator, residual (bio-solids) hauler operator, cross connection operator, pretreatment operator, and meter reading/maintenance operator.			
41.02 Identify the basic terms and concepts involved in processes used in these professions.			
41.03 List potential employers in the water technology field: federal, municipal, county, state and private.			
41.04 Identify resources to assist in finding employment in the field.			
41.05 Identify professional organizations related to the water technology field.			
41.06 Identify career ladder levels in the water technology field: trainee, C Level, B Level, A Level.			
42.0 Identify scientific concepts common in water and wastewater treatment – the student will be able to:			
42.01 Identify chemical symbols used in water and wastewater treatment.			
42.02 Describe how the hydrologic cycle is related to water treatment			
42.03 Describe the basic concepts of the pH scale and its importance in the treatment process.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
42.04 Identify the differences between mixtures, elements, and compounds, and organic and inorganic chemicals.			
42.05 Identify the basic nitrogen, phosphorous, and carbon cycles.			
43.0 Identify safety hazards associated with water technologies – the student will be able to:			
43.01 Identify the types of hazards common to water technology facilities.			
43.02 Recognize unsafe conditions and prescribe corrective measures.			
43.03 Identify and safely handle hazardous chemicals common to water technology facilities.			
43.04 Recognize electrical hazards.			
43.05 Recognize fire hazards, identify types of fires, and describe appropriate extinguishing techniques.			
44.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials – the student will be able to:			
44.01 Identify the kinds of information presented on Safety Data Sheets.			
44.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (chapter 442, F.S.).			
45.0 Solve basic math problems common to water technologies – the student will be able to:			
45.01 Perform basic arithmetic problems, including addition, subtraction, multiplication, division, fractions, decimals, percentages, rounding (significant figures), graphing, etc.			
45.02 Identify metric measurements and perform conversions.			
45.03 Perform calculations that involve areas, volumes, capacities, retention times, pounds, mg/L, velocities, flow rates, pressure, and head.			
46.0 Define pumping and basic hydraulic principles – the student will be able to:			
46.01 Identify types of pumps.			
46.02 Discuss application and use of different types of pumps.			
46.03 Identify components/characteristics of pumps including pump operation and basic pump curves including centrifugal pumps, positive displacement pumps, and air lift pumps.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
46.04 Identify types of pipes, valves, and fittings.			
46.05 Define cross connections.			
46.06 Identify the appropriate equipment used in the treatment processes.			
47.0 Define principles of disinfection – the student will be able to:			
47.01 List the need/reasons for disinfection (list of waterborne diseases).			
47.02 Define concepts related to disinfection.			
47.03 List methods and chemicals used in disinfection.			
47.04 Define the physical properties of chlorine.			
47.05 List kinds of disinfection equipment used.			
48.0 Define sampling techniques – the student will be able to:			
48.01 Define the reasons for sampling and types of samples.			
48.02 Define methods of sample collection and handling, transportation, and proper disposal.			
48.03 Define the basic procedure for quality control and quality assurance in sampling.			
48.04 Define the chain of custody for samples.			
48.05 Perform chlorine residual analysis.			
48.06 Perform pH analysis.			
49.0 Describe federal, state, and local regulations that apply to water technologies – the student will be able to:			
49.01 List regulatory agencies and their roles in monitoring the water technology field.			
49.02 Identify regulations associated with the appropriate federal, state or local agencies.			
49.03 Identify training and certification requirements for water technology workers.			
50.0 Demonstrate employability skills – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
50.01 Conduct a job search.			
50.02 Secure information about a job.			
50.03 Identify documents that may be required for a job application.			
50.04 Complete a job application.			
50.05 Demonstrate competence in job-interview techniques.			
50.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.			
50.07 Identify acceptable work habits and ethical behaviors.			
50.08 Demonstrate knowledge of how to make job changes appropriately.			
50.09 Demonstrate acceptable employee-health habits for the treatment facility environment.			
50.10 Identify materials and documents needed for a professional library.			
50.11 Demonstrate productive and positive customer interactions.			
50.12 Demonstrate effective interpersonal communication skills and leadership skills.			
51.0 Identify sampling techniques and explain the significance of the steps – the student will be able to:			
51.01 Identify the laboratory tests that are commonly performed by operators in Florida water-treatment facilities, including those required by the Safe Drinking Water Regulation.			
51.02 Define pathogenic organisms, including bacteria, protozoa, and virus, and describe their disease associations.			
51.03 Describe the laboratory test performed for the presence of bacteria.			
51.04 Describe the correct procedure for obtaining a bacteriological sample.			
51.05 Describe correct sample collection procedures for inorganic and organic analyses.			
51.06 Describe the laboratory quality-control checks and required documentation.			
52.0 Identify chemical, biological, and physical constituents of water entering the water treatment facility or distribution systems – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
52.01 Determine which constituents are inherent to groundwater and/or surface water.			
52.02 Describe the relationship between turbidity and the microbiological quality of water.			
52.03 Describe the uses of chemical analysis in water-treatment operations.			
52.04 Identify symbols and common names for elements and chemical compounds.			
52.05 Select the primary constituents to be measured and the most commonly used units of measurement for each.			
52.06 Explain the importance of water treatment for the control of coliform bacteria and algae.			
53.0 Describe the principles, operational and troubleshooting practices of the aeration process – the student will be able to:			
53.01 Describe the aeration and air stripping processes and explain how they differ.			
53.02 Identify the types of aeration systems.			
53.03 Identify the benefits of aeration.			
53.04 Describe the components of an air-stripping system.			
53.05 Troubleshoot aeration and air stripping processes.			
54.0 Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes – the student will be able to:			
54.01 Define concepts such as turbidity, color, coagulation, and flocculation.			
54.02 Define the difference between sweep and enhanced coagulation.			
54.03 Identify the kinds of equipment used in the coagulation process.			
54.04 Identify coagulant and coagulant aid chemicals used in water-treatment facilities.			
54.05 Identify the steps of coagulation, in order.			
54.06 Identify the specific sampling locations for process control in a coagulation process.			
54.07 Identify factors that would contribute to poor floc formation.			
54.08 Compute the feed rate in pounds per day (lbs/d) when the chemical			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
coagulant (mg/1) and flow rate (MGD) are known.			
54.09 Compute the dosage (mg/1) of coagulant when the rate of flow (MGD) and the feed rate (lbs/day) of the chemical coagulant are known.			
54.10 Compute the dosage rate that is needed to treat a different flow (MGD) at the current dosage when the current rate of flow (MGD) and the current coagulant feed rate (lbs/d) are known.			
54.11 Describe troubleshooting techniques for basic mixing, coagulation, and flocculation processes.			
55.0 Describe the principles, operational and troubleshooting practices of the sedimentation process – the student will be able to:			
55.01 Describe an upflow clarifier and basin sedimentation.			
55.02 Identify factors that contribute to efficient sedimentation.			
55.03 Identify the measures that would be effective in preventing or controlling algae growth on surfaces of coagulation and sedimentation basins.			
55.04 Identify methods of sludge removal <i>and disposal</i> from sedimentation basins			
55.05 Describe troubleshooting techniques for sedimentation and upflow clarifier processes.			
56.0 Describe the principles, operational and troubleshooting practices of the filtration process – the student will be able to:			
56.01 Describe materials and methods related to filtration, including types of filters, filter-system components, and the steps for normal filtration operations.			
56.02 Explain common problems of filtering systems, including head loss, mud balls, and filter media loss.			
56.03 Determine when to backwash a filter.			
56.04 Identify the steps for backwashing a filter.			
56.05 Describe troubleshooting techniques for filtration processes.			
57.0 Describe the principles, operational and troubleshooting practices of the water-softening process – the student will be able to:			
57.01 Describe the two types of hardness.			
57.02 Identify the appropriate chemical(s) to use in chemical-precipitation softening processes for the two kinds of hardness.			



CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
57.03 Describe alkalinity and its components.			
57.04 Identify treatment processes used for water softening.			
57.05 Calculate the distribution of bicarbonate, carbonate, and/or hydroxide ions when given the total alkalinity and phenolphthalein alkalinity.			
57.06 Describe selective carbonate removal.			
57.07 Identify the important zones of an upflow clarifier unit.			
57.08 Describe the lime soda ash softening process, including its control.			
57.09 Compute lime demand from raw-water analyses.			
57.10 Describe the reasons for recarbonation.			
57.11 Compute carbon dioxide demands for recarbonation.			
57.12 Compute hardness removal when the ion-exchange capacity is known.			
57.13 Describe troubleshooting techniques for water-softening processes.			
57.14 Describe the ion exchange softening process			
58.0 Describe the principles, operational and troubleshooting practices of the stabilization process – the student will be able to:			
58.01 Identify the chemicals used in stabilization.			
58.02 Identify two stabilization indices.			
58.03 Determine water stability, using the Langelier index and the marble test.			
58.04 Troubleshoot stabilization processes.			
59.0 Describe the principles, operational and troubleshooting practices of the corrosion control process – the student will be able to:			
59.01 Identify the factors that influence corrosion.			
59.02 Describe the problems that can be created by corrosive waters.			
59.03 Describe the basic concepts related to electrolysis.			
59.04 Define electrochemical reaction.			

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
59.05 Identify proper maintenance <i>and safety</i> procedures for equipment chlorination.			
59.06 Describe the conditions for calcium carbonate film formation.			
59.07 Define cathode film formation.			
59.08 Define cathodic protection and describe its application in water-treatment facilities.			
59.09 Describe troubleshooting techniques for corrosion-control processes.			
60.0 Describe the principles, operational and troubleshooting practices of the disinfection process – the student will be able to:			
60.01 Identify the chemicals used in primary disinfection.			
60.02 Identify commonly used chlorinators and hypochlorinators.			
60.03 Determine the maximum amount of chlorine gas (in pounds) that may be taken from a cylinder in a 24-hour period.			
60.04 Identify proper maintenance procedures for equipment chlorination.			
60.05 Identify terminology related to chlorination and disinfection.			
60.06 Identify common safety problems or emergency situations that might occur during chlorination.			
60.07 Identify the properties of chlorine and describe its use in water treatment.			
60.08 Explain the points at which chlorine is applied most effectively in water treatment.			
60.09 Compute the feed rate (lbs/d) when given the rate of flow (MGD) and dosage of chlorine (mg/l).			
60.10 Compute the feed rate (lbs/d) of a hypochlorite compound that contains a given percentage of available chlorine when given a problem where the rate of flow (MGD) and the chlorine dosage (mg/l) are known.			
60.11 Compute the new rate of flow and the feed rate that will be needed to maintain the current dosage when given the current rate of flow (MGD); the current chlorine feed rate (lbs/d), and the amount by which the rate of flow is to be increased or decreased.			
60.12 Compute the feed rate needed to treat a given amount of water when given a chlorine demand and the desired chlorine residual.			
60.13 Describe troubleshooting techniques for disinfection processes.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
61.0 Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes – the student will be able to:			
61.01 Describe the formation of total trihalomethanes (TTHM).			
61.02 Identify the specific procedure for collecting samples to determine trihalomethane levels.			
61.03 Compute the quarterly average and the annual TTHM measurements when sample results are given.			
61.04 Identify processes that remove trihalomethane precursors.			
61.05 Identify processes that remove trihalomethanes after they are formed.			
61.06 Identify the benefits of alternate disinfectants.			
61.07 Describe chloramination as a control of TTHM.			
61.08 Describe troubleshooting techniques for the control and treatment of trihalomethanes.			
62.0 Describe the principles, operational and troubleshooting practices of the iron and manganese removal processes – the student will be able to:			
62.01 Explain the occurrence of iron and manganese in source water and in treated water.			
62.02 Describe the importance of controlling iron and manganese.			
62.03 Describe sample-collection and analysis procedures for iron and manganese.			
62.04 Describe remedial processes for controlling iron and manganese.			
62.05 Compute the potassium permanganate dosage for a known concentration of iron and manganese in the water being treated.			
62.06 Describe troubleshooting techniques for iron and manganese-removal processes.			
63.0 Describe the principles, operational and troubleshooting practices for taste and odor control – the student will be able to:			
63.01 Identify common types of complaints about water quality.			
63.02 Identify causes of tastes and odors.			
63.03 Describe how microbial growths affect tastes and odors.			
63.04 Describe how eutrophication contributes to surface-water tastes and			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
odors.			
63.05 Describe a cross-connection.			
63.06 Identify the chemicals used in the control and treatment of tastes and odors.			
63.07 Describe the Threshold Odor Number (TON) test.			
63.08 Determine the TON when dilution volumes and positive samples are given.			
63.09 Describe troubleshooting techniques for taste and odor control.			
64.0 Describe the principles, operational and troubleshooting practices of the demineralization processes – the student will be able to:			
64.01 Define concepts related to demineralization, such as reverse osmosis (RO), flux, feedwater, permeate, and salinity.			
64.02 Describe the structure, composition, and performance of an RO membrane.			
64.03 Describe feedwater impurities, physical parameters, and conditions potentially harmful to the RO process.			
64.04 Identify items included in a typical RO-facility-operation checklist.			
64.05 Describe the common causes of membrane damage.			
64.06 Describe the procedure for membrane cleaning.			
64.07 Compute the percent of recovery when product flow and feed flow are known.			
64.08 Compute the percent of mineral rejection when total dissolved solids are known for the feedwater and product water.			
64.09 Describe the basic concepts of electrodialysis (ED), such as the cathode and anode relationship and the removal of typical inorganic salts.			
64.10 Describe the most common problem of ED operation in a facility.			
64.11 Explain how the cation membrane and the anion membrane differ.			
64.12 Describe the multi-compartment unit used in the ED process.			
64.13 Describe ED operating procedures in detail.			
64.14 Describe the two most common chemical solutions used to flush ED stack membranes.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
64.15 Describe troubleshooting techniques for demineralization processes.			
65.0 Describe the principles, operational and troubleshooting practices of the fluoridation process – the student will be able to:			
65.01 Define the basic concepts related to fluoridation, including its purpose and the kinds of chemicals used.			
65.02 Identify the properties of fluoride and describe its use.			
65.03 Identify the types of equipment used in fluoridation.			
65.04 Describe proper maintenance procedures for fluoridation equipment.			
65.05 Describe potential safety problems or emergency situations in the fluoridation process, and ways to avoid them.			
65.06 Compute the feed rate of chemicals used in the fluoridation process.			
65.07 Describe troubleshooting techniques for the fluoridation processes.			
66.0 Identify facility operational problems – the student will be able to:			
66.01 Respond to customer questions about taste or odor in the water.			
66.02 Respond to customer questions about red water or rust stains.			
66.03 Identify the probable cause(s) for a sudden change in chlorine demand; take corrective action.			
67.0 Describe basic hydraulics and pumping operations – the student will be able to:			
67.01 Describe the relationship between the system head and pressure, and make conversions between them.			
67.02 Describe three types of head, i.e., pressure, suction, and atmospheric.			
67.03 Describe proper operation of centrifugal and displacement pumps.			
67.04 Describe causes and methods that are effective in preventing “water hammer.”			
67.05 Troubleshoot pump operations.			
68.0 Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable water facility – the student will be able to:			
68.01 Complete the Drinking Water Bacteriological Analysis Form correctly.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
68.02 Complete the DEP daily operation report (DOR) form correctly.			
68.03 Complete the DEP monthly operation report (MOR) form correctly.			
68.04 Identify the DEP requirements for the operation of standby and emergency equipment.			
68.05 Identify the DEP requirements for microbiological monitoring and analyses.			
68.06 Identify the DEP requirements for sampling and testing.			
69.0 Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management – the student will be able to:			
69.01 Identify the appropriate equipment used in the treatment train, treatment residuals disposal, and solids management.			
69.02 Describe a preliminary site inspection of the equipment used in the treatment train, treatment residuals disposal, and solids management.			
69.03 Identify the maintenance needs of equipment used in the treatment train, treatment residuals disposal, and solids management, including safe procedures for maintenance.			
69.04 Describe proper record keeping for preventive and corrective maintenance.			
69.05 Describe preventive and corrective maintenance procedures for equipment used in the treatment process, treatment residuals disposal, and solids management.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:**        **Advanced Environmental Water Reclamation Technology**  
**Course Number:**    **8007210**  
**Course Credit:**     **1**

**Course Description:**

This course is designed to develop competencies in the area of career opportunities, scientific concepts in water treatment, safety hazards, government regulations, facility operational principles, and equipment inspections. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
38.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Environmental Water Reclamation Technology	
	38.01 Key Ideas and Details	
	38.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. <span style="float: right;">LAFS.1112.RST.1.1</span>	
	38.01.2 Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. <span style="float: right;">LAFS.1112.RST.1.2</span>	
	38.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. <span style="float: right;">LAFS.1112.RST.1.3</span>	
	38.02 Craft and Structure	
	38.02.1 Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. <span style="float: right;">LAFS.1112.RST.2.4</span>	
	38.02.2 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. <span style="float: right;">LAFS.1112.RST.2.5</span>	
	38.02.3 Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying	

Florida Standards	Correlation to CTE Program Standard #
<p>important issues that remain unresolved.</p> <p style="text-align: right;">LAFS.1112.RST.2.6</p>	
<p>38.03 Integration of Knowledge and Ideas</p>	
<p>38.03.1 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem.</p> <p style="text-align: right;">LAFS.1112.RST.3.7</p>	
<p>38.03.2 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p style="text-align: right;">LAFS.1112.RST.3.8</p>	
<p>38.03.3 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p style="text-align: right;">LAFS.1112.RST.3.9</p>	
<p>38.04 Range of Reading and Level of Text Complexity</p>	
<p>38.04.1 By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.</p> <p>38.04.2 By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently.</p> <p style="text-align: right;">LAFS.1112.RST.4.10</p>	
<p>39.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Environmental Water Reclamation Technology</p>	
<p>39.01 Text Types and Purposes</p>	
<p>39.01.1 Write arguments focused on discipline-specific content.</p> <p style="text-align: right;">LAFS.1112.WHST.1.1</p>	
<p>39.01.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p> <p style="text-align: right;">LAFS.1112.WHST.1.2</p>	
<p>39.02 Production and Distribution of Writing</p>	
<p>39.02.1 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p style="text-align: right;">LAFS.1112.WHST.2.4</p>	
<p>39.02.2 Develop and strengthen writing as needed by planning, revising,</p>	



Florida Standards	Correlation to CTE Program Standard #
<p>editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5</p>	
<p>39.02.3 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6</p>	
<p>39.03 Research to Build and Present Knowledge</p>	
<p>39.03.1 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7</p>	
<p>39.03.2 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8</p>	
<p>39.03.3 Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9</p>	
<p>39.04 Range of Writing</p>	
<p>39.04.1 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10</p>	
<p>40.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Environmental Water Reclamation Technology.</p>	
<p>40.01 Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1</p>	
<p>40.02 Reason abstractly and quantitatively. MAFS.K12.MP.2.1</p>	
<p>40.03 Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1</p>	
<p>40.04 Model with mathematics. MAFS.K12.MP.4.1</p>	
<p>40.05 Use appropriate tools strategically.</p>	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.5.1
40.06 Attend to precision.	MAFS.K12.MP.6.1
40.07 Look for and make use of structure.	MAFS.K12.MP.7.1
40.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA and NGSS- Sci*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
70.0 Identify the basic characteristics and principles of wastewater treatment – the student will be able to:			
70.01 Identify the sources of wastewater and the objectives of wastewater treatment.			
70.02 Identify terms used in wastewater treatment.			
70.03 Identify the impact of wastewater on receiving bodies of water.			
70.04 Identify biological organisms present in treatment processes.			
70.05 Identify waterborne diseases.			
70.06 Identify commonly measured wastewater parameters.			
70.07 Identify factors affecting raw wastewater.			
70.08 Correlate treatment processes to types of facility influent and solids.			
71.0 Identify sampling techniques and interpret the results – the student will be able to:			
71.01 Identify the reasons for sampling and the types of samples (e.g., simple, representative, grab, composite).			
71.02 Describe methods of sample collection and handling.			
71.03 Identify specific samples (biological or chemical) and determine the significance of sample results required for process quality control, for			

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
compliance with standards, and for reporting.			
71.04 Identify representative sampling points.			
71.05 Identify the significance of the flow measurement on process control.			
72.0 Describe the sources of wastewater and the types of collection systems – the student will be able to:			
72.01 Describe the types of wastewater collection systems.			
72.02 Identify flow variations and conditions that affect plant treatment, including infiltration, inflow, and lift stations.			
72.03 Identify methods to detect and correct infiltration.			
72.04 Identify dissolved gases in wastewater and the effect of their presence/absence on treatment.			
73.0 Describe the process and the operational principles for the preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal; and solids management – the student will be able to:			
73.01 Describe concepts related to preliminary and primary treatment.			
73.02 Describe the types of preliminary treatment equipment, the way they function, and the relationship of each to the treatment train.			
73.03 Describe the types of primary treatment equipment, the way they function, and the relationship of each to the treatment train.			
73.04 Describe concepts related to secondary treatment, including attached growth processes, suspended growth processes, aeration, and clarification.			
73.05 Describe the types of secondary treatment equipment, the way they function, and the relationship of each to the treatment train.			
73.06 Describe concepts related to tertiary treatment processes, including sand filtration, nitrification/denitrification, oxic/anoxic, activated carbon, and artificial wetlands.			
73.07 Describe the types of tertiary treatment equipment, the way they function, and the relationship of each to the treatment train.			
73.08 Describe concepts related to disinfection and effluent disposal, including surface water, reuse reclamation, deep well, and ocean outfall.			
73.09 Describe the types of disinfection and the types of effluent-disposal equipment, the way they function, and the relationship of each to the			

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
system.			
73.10 Describe concepts related to solids management, including thickening, aerobic and anaerobic digestion, stabilization, de-watering, and reuse.			
73.11 Describe the types of solids-management equipment, the way they function, and the relationship of each to the system.			
74.0 Perform treatment-process control and troubleshooting for the treatment train, effluent disposal, and solids management – the student will be able to:			
74.01 Describe the grit-removal process and the operational efficiency of each step.			
74.02 Describe the laboratory tests performed on influent.			
74.03 Describe the primary-clarifier removal efficiencies, including settleable solids, suspended solids, total solids, BOD, and bacteria.			
74.04 Describe sampling points, frequency of sampling, and the laboratory tests and results that are used for the proper operation of the primary clarifier.			
74.05 Select and plot on a trend chart the parameters for primary clarification.			
74.06 Use the operational data required to evaluate the performance of secondary-treatment processes, including attached growth, suspended growth, aeration, and clarification.			
74.07 Describe sampling points, the frequency of sampling, and the laboratory tests and results used for proper operation of the secondary-treatment processes.			
74.08 Select and plot on a trend chart the parameters for secondary clarification.			
74.09 Describe how nitrification affects secondary processes and clarification.			
74.10 Describe how denitrification affects secondary processes and clarification.			
74.11 Use operational data to evaluate the performance of sand filtration.			
74.12 Describe sampling points, the frequency of sampling, and the laboratory tests and results used for checking the proper operation of sand filtration. Select and plot on a trend chart the parameters for sand filtration.			
74.13 Use operational data to evaluate the nitrification/denitrification			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
process.			
74.14 Use operational data to evaluate the performance of effluent-disposal processes, including disinfection and dechlorination.			
74.15 Describe sampling points, the frequency of sampling, and the laboratory tests used for checking the proper operation of effluent disposal.			
74.16 Select and plot on a trend chart the parameters for effluent disposal.			
74.17 Describe various methods of effluent disinfection including UV, chlorination, and ozonation.			
74.18 Describe the chemical and physical properties of chlorine, and describe the reactions of chlorine with water, ammonia compounds, and sulfides.			
74.19 Describe the safe storage and handling of chlorine, including the use of testing compounds.			
74.20 Explain the points of application of chlorine in wastewater treatment.			
74.21 Describe the methods of dechlorination.			
74.22 Describe the methods commonly used to dispose of wastewater effluents, including reuse applications.			
74.23 Describe the laboratory tests commonly used on the reuse of effluent.			
74.24 Describe the types of sludge and their characteristics.			
74.25 Use operational data to evaluate the performance of solids management, including sludge thickening, digestion, de-watering, and disposal processes.			
74.26 Describe sampling points, the frequency of sampling, and the laboratory tests and results used for checking the proper operation of solids management and for compliance with Chapter 62-640 F.A.C.			
75.0 Identify and correct facility operational problems – the student will be able to:			
75.01 Describe common facility operational problems in the treatment train, effluent disposal, and solids management.			
75.02 Describe methods to evaluate operational problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.			
75.03 Select appropriate corrective actions for common problems in preliminary, primary, secondary, and tertiary treatment, effluent			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
disposal, and solids management.			
75.04 Describe the methods for monitoring results of corrective action taken for common problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.			
76.0 Identify appropriate federal, state, and local regulations – the student will be able to:			
76.01 Identify federal, state and local regulations that apply to the operation of a wastewater-treatment facility.			
76.02 Describe the operator's duties and responsibilities, certification requirements, testing, renewal, staffing, and facility classification (sections of Chapter 62-602 F.A.C.).			
76.03 Explain and describe the contents of an operating permit.			
76.04 Identify state regulations that apply to procedures such as reclaimed water, reuse, and residuals management.			
77.0 Describe federal, state and local laws for the handling, storage, and use of toxic and hazardous materials – the student will be able to:			
77.01 Identify the kinds of information presented on the SDS.			
77.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (Chapter 442, F.S.).			
77.03 Identify the reporting requirements as specified in SARA Title III and Chapter 252, F.S.			
77.04 Describe the responsibilities toward the community as specified in SARA Title III and Chapter 252, F.S.			

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>



**Florida Department of Education  
Curriculum Framework**

**Program Title:** Principles of Agribusiness & Management  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Program Number	8009100
CIP Number	0101010200
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICUTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	11-9013 - Farmers, Ranchers, and Other Agricultural Managers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The purpose of this program is to serve as a supplemental program to provide Agriculture, Food, and Natural Resource Education students with the opportunity, to learn the business side of agriculture commodities as well as essential functions of leadership and management.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of an agricultural mechanics core with two occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations	1 credit	11-9013	3	EQ
	8009110	Agriculture Leadership & Management	1 credit		3	VO
	8009120	Principles of Agribusiness	1 credit		3	EC

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth- Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Ag. Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%
Agriculture Leadership & Management	3/87 3%	3/80 4%	22/83 27%	3/69 4%	22/67 33%	3/70 4%	3/69 4%	3/82 4%	3/66 5%	22/74 30%	3/72 4%
Principles of Agribusiness	23/87 26%	23/80 29%	3/83 4%	22/69 32%	3/67 4%	20/70 29%	23/69 33%	10/82 12%	18/66 27%	3/74 4%	22/72 31%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%
Agriculture Leadership & Management	**	**	**	12/46 26%	12/45 27%	11/45 24%	11/45 24%
Principles of Agribusiness	25/67 37%	24/75 32%	16/54 30%	17/46 37%	17/45 38%	17/45 38%	17/45 38%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### Florida Standards for Technical Subjects

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

### **National Standards (NS)**

Some or all of the courses in this program have been aligned with Industry or National Standards. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link:  
[https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn\\_000.pdf](https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf)

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Principles of Agribusiness & Management.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Principles of Agribusiness & Management.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Principles of Agribusiness & Management.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills
- 12.0 Apply leadership and citizenship skills.
- 13.0 Compare and contrast differing theories of leadership styles.
- 14.0 Develop personal leadership qualities.
- 15.0 Associate leadership styles for specific situations.
- 16.0 Establish a clear image of what the future of the organization should look like.
- 17.0 Acquire the skills necessary to complete a project as a team.
- 18.0 Build a constituency through listening, coaching, understanding and appreciating others.
- 19.0 Conduct professional and personal activities based on ethical reasoning
- 20.0 Demonstrate personal awareness of community relations.
- 21.0 Pursue learning and growth opportunities related to professional and personal aspirations.
- 22.0 Interact with others in a manner that respects the differences of a diverse and changing society.
- 23.0 Develop awareness and apply skills necessary for achieving career success
- 24.0 Demonstrate the effective application of reasoning, thinking, and coping skills to solve problems.
- 25.0 Demonstrate leadership opportunities available in FFA
- 26.0 Prepare documents and skills for pursuing career success.
- 27.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Principles of Agribusiness & Management.
- 28.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Principles of Agribusiness & Management.
- 29.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Principles of Agribusiness & Management.
- 30.0 Explain the components of the American business system.
- 31.0 Analyze the basic concepts of agribusiness.

- 32.0 Evaluate the importance of the food and fiber system to understand the impact on global economy.
- 33.0 Examine the scope of career opportunities in and the importance of agriculture to the economy.
- 34.0 Compose and analyze a business plan for an enterprise.
- 35.0 Prepare and maintain all files needed to accomplish effective record keeping
- 36.0 Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management.
- 37.0 Maintain and interpret financial information (income statements, balance sheets, inventory, purchase orders, accounts receivable and cash-flow analyses) for businesses
- 38.0 Conduct appropriate market and marketing research
- 39.0 Develop a marketing plan
- 40.0 Develop specific tactics to market AFNR products and services.
- 41.0 Develop a production and operational plan.
- 42.0 Apply appropriate management skills to organize a business.
- 43.0 Summarize the changes in American agricultural cooperatives from their beginning to today.
- 44.0 Differentiate between agricultural cooperative principles and practices.
- 45.0 Explain the responsibilities of people involved with agriculture cooperatives.
- 46.0 Explain the benefits and limitations of agricultural cooperatives.
- 47.0 Describe the various organization that serve agricultural cooperatives.
- 48.0 Construct a plan for financing and taxation within an agricultural cooperative.
- 49.0 Explain the steps for starting an agricultural cooperative.
- 50.0 Validate the necessity of leadership skills development in conjunction with participation in The National FFA Organization (FFA) as a critical component to a well-rounded agricultural education.
- 51.0 Complete a Supervised Agricultural Experience (SAE) program as a critical component to a well-rounded agricultural education.
- 52.0 Interpret and apply state and federal rules and regulations to enterprise
- 53.0 Perform accounting activities
- 54.0 Perform communication activities.
- 55.0 Demonstrate an understanding of legal and ethical issues in a business environment.
- 56.0 Develop financial literacy skills.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Principles of Agribusiness & Management.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical	

Florida Standards		Correlation to CTE Program Standard #
	context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
01.04.2		
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Principles of Agribusiness & Management.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	



Florida Standards		Correlation to CTE Program Standard #
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Principles of Agribusiness & Management.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	

Florida Standards		Correlation to CTE Program Standard #
03.03	Construct viable arguments and critique the reasoning of others.	MAFS.K12.MP.3.1
03.04	Model with mathematics.	MAFS.K12.MP.4.1
03.05	Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06	Attend to precision.	MAFS.K12.MP.6.1
03.07	Look for and make use of structure.	MAFS.K12.MP.7.1
03.08	Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy-- The student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	CS.10.02.01
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
04.02 Analyze the impact of agriculture on the local, state, national and global economy.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
05.0 Practice agriscience safety skills and procedures--The student will be able to:		SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.01 Identify the common causes and prevention of accidents in agriscience operations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.06.03.01.a CS.07.04.01.c.
05.02 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		FPP.01.02.01. a FPP.02.01.01. a FPP.02.02.02. a FPP.02.03
05.03 Identify proper disposal of hazardous waste materials and biohazards.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.07.04.01
05.04 Describe emergency procedures for: basic first aid, CPR, chemical spills, fire extinguisher use	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ESS.04.02.02. b ESS.04.05.01
06.0 Apply scientific and technological principles to agriscience issues--The student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	CS.07.03.01.c
06.01 Employ scientific measurement skills.			
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 CS.10.01.01.a
06.03 Identify the parts and functions of plant and animal cells.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		BS.02.02.01 ESS.01.01.02. b
06.04 Describe the phases of cell reproduction.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.01.02.01.c AS.02.02.02.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8		PS.01.02.01.b. AS.02.02.03.b
06.06 Interpret, analyze, and report data.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.11.01.01 CS.11.02.01

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).	LAFS.910.W.3.7 LAFS.1112.W.3.7		BS.02.05.03.a.
07.0 Apply environmental principles to the agricultural industry--The student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	BS.01.01.03.a.
07.01 Research how different climactic and geological activity influences agriculture.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
07.02 Describe various ecosystems as they relate to the agriculture industry.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.02.06.09 CS.05.03.02
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.01.01.02.
07.04 Identify regulatory agencies that impact agricultural practices.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.L.3.6 LAFS.1112.L.3.6		PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.05 Apply Best Management Practices that enhance the natural environment.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
07.06 Identify conservation practices related to natural resources.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.03.04.01.b AS.08.01.01.c
08.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:		SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	PS.03.04.01.a
08.01 Identify and describe the specializations within the plant science industry.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.03 Examine the processes of plant growth including photosynthesis,	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.01.01.01.c.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
respiration, transpiration, absorption, transfer, storage, reproduction, etc....	LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.03.01 PS.01.03.02
08.05 Analyze information from a fertilizer label.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		PS.02.03.01
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.02.03.04
08.07 Investigate the impacts of various pests and propose solutions for their control.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.01.03 PS.03.01.02
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.03.02 PS.03.03.03 PS.03.03.04
08.09 Explore career opportunities in plant science.	LAFS.910.W.3.7 LAFS.1112.W.3.7		FPP01.01.01.a
09.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
09.02 Analyze commercially important livestock breeds in Florida.	LAFS.910.W.2.4 LAFS.1112.W.2.4		AS.02.01.02.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.	LAFS.910.L.3.6 LAFS.1112.L.3.6		AS.02.01.01.c
09.04 Compare and contrast animal welfare issues.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.01.02.a AS.05.02.01.a
09.05 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.02.02.01.c AS.02.02.05.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
			AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.06 Explore career opportunities in animal science.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
10.0 Demonstrate the use of agriscience tools, equipment, and instruments-- The student will be able to		SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c
10.01 Select and demonstrate proper use of hand tools in agriculture.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		AS.06.02.01.a FPP01.01.01.a
10.02 Operate service and maintain agriscience equipment, and instruments.			AS.01.01.02.b.
10.03 Manage facilities and supplies.			
11.0 Demonstrate agribusiness, employability and human relation skills--The student will be able to:			CS.08.01.01.b PST.02.02.02. b.
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		PST.03.04.01. b PST.03.03.02. a.
11.02 Utilize a record keeping system to collect, interpret, and analyze data.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		PST.04.04.03. a PST.04.04.06. a
11.03 Enhance oral communications through telephone, interview and presentation skills.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.08.03.01.c PST.03.02.03.c . PST.01.03.01. a.
11.04 Enhance written communication by developing resumes and	LAFS.910.W.2.4 LAFS.1112.W.2.4		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
business letters.	LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.L.1.2 LAFS.1112.L.1.2		
11.05 Demonstrate interpersonal (nonverbal) communication skills.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
11.06 Demonstrate good listening skills.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.09.02.01.b CS.10.01.01.a.
12.0 Apply leadership and citizenship skills--The student will be able to:			CS.03.01.03.b.
12.01 Identify and describe leadership characteristics.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.02 Identify opportunities to apply acquired leadership skills.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.03 Identify and demonstrate ways to be an active citizen.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.02.02
12.04 Participate in community based learning activities.			
12.05 Demonstrate the ability to work cooperatively.			CS.01.06.01.a.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		CS.02.02.02.b.
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.02.c.
12.08 Develop both a leadership and a career development plan utilizing SMART goals that include 5, 10, and 20 year benchmarks.			
13.0 Discuss components of food safety and handling practices in agriculture - The student will be able to:			
13.01 Demonstrate proper safety precautions and use of personal protective equipment.			
13.02 Evaluate the food safety responsibilities that occur along the food supply chain.			
13.03 Explain techniques and procedures for the safe handling of food products.			
13.04 Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).			

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
13.05 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.			



**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriculture Leadership & Management  
**Course Number:** 8009110  
**Course Credit:** 1

**Course Description:**

This course provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of leadership and careers within the Agriculture, Food and Natural Resources career cluster.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Principles of Agribusiness & Management	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).  LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Principles of Agribusiness & Management	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
<b>03.0</b>	<b>Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Principles of Agribusiness &amp; Management</b>	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06	Attend to precision. MAFS.K12.MP.6.1	
03.07	Look for and make use of structure.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M and NGSS- Sci*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
14.0 Compare and contrast differing theories of leadership styles – the student will be able to:			
14.01 Define different types of leadership.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
14.02 Research different theories of leadership.	LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8		
14.03 Determine expectations of a leader.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
14.04 Determine what type of leadership style best fits you.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
14.05 Compare commonalities of differing styles of leadership.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
14.06 Analyze Maslow's hierarchy of human needs as it relates to leadership development.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		
14.07 Analyze motivation necessary for a leader as it relates to perception, judgment, and groups.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		
15.0 Develop personal leadership qualities – the student will be able to:			
15.01 Define personal leadership.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.L.3.6 LAFS.1112.L.3.6		
15.02 Develop personal responsibility in leadership.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
16.0 Associate leadership styles for specific situations – the student will be able to:			
16.01 Define situational leadership.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
	LAFS.910.L.3.6 LAFS.1112.L.3.6		
16.02 Identify the different types of problem solving models and their applicability to specific situations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1 LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
16.03 Select the best leadership style for a given situation.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
17.0 Establish a clear image of what the future of the organization should look like – the student will be able to:			
17.01 Utilize visioning skills to develop a plan.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.01.03.01.b
17.02 Develop vision statements and plans for an organization.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.01.03.01.c
17.03 Analyze the risks and rewards of new experiences.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.03.03.a
17.04 Conduct a self-evaluation for personal reactions to new experiences.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.03.03.c
17.05 Describe techniques used to build consensus.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.03.04.a
17.06 Lead a meeting or activity that engages all participants in the process.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.01.03.04.c
18.0 Acquire the skills necessary to complete a project as a team – the student will be able to:			
18.01 Discuss stages of group dynamics ( eg. Inclusion, control, and intimacy).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
18.02 Create a task analysis.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4		CS.01.01.02.a
18.03 Create measurable short term, intermediate and long term goals.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4		
18.04 Set personal goals using the SMART goals method (Specific, Measurable, Approved by you, Realistic, Time-stamped).	LAFS.910.SL.2.4 LAFS.1112.SL.2.4		CS.01.01.07.a
18.05 Assess the physical, financial and professional risks associated with a particular task.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
18.06 Facilitate the movement of team members through the stages of group development.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
18.07 Evaluate the strengths/talents of team members needed to achieve a desired task.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci	National Standards
18.08	Delegate project parts equitably amongst team members to achieve a given task.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
18.09	Use a variety of strategies to evaluate goals (e.g., observe, apply, and demonstrate).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.1.2 LAFS.1112.SL.1.2		CS.01.01.07.a
18.10	Identify characteristics of effective teams.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.02.04.a
19.0	Build a constituency through listening, coaching, understanding and appreciating others – the student will be able to:			CS.01.02
19.01	Demonstrate human relation skills including compassion, empathy, unselfishness, trustworthiness, reliability and being friendly to co-workers.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.01.02.01.c
19.02	Use communication (verbal and non-verbal) skills to collaborate in a group setting.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		
19.03	Formulate a strategy in a conflict management plan that responds to obstacles.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		
19.04	Describe the role and purpose of a personal mentor.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
19.05	Synthesize strategies to successfully coach/mentor others. (eg. Building trust, praising, reprimanding).	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.7 LAFS.1112.W.3.7		
19.06	Identify strategies for motivating others.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
20.0	Conduct professional and personal activities based on ethical reasoning – the student will be able to:			
20.01	Explain a personal decision where integrity played a role in the decision.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.04.01.b
20.02	Compare and contrast the benefits of living by positive ethical choices.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
20.03	Analyze the causes for team members to accept or reject responsibility.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.04.03.c
20.04	Explain the benefits of mutual respect.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.04.04.a
20.05	Differentiate between habits, practices and behaviors consistent with principles of self-discipline.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.04.04.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
20.06 Evaluate professional and personal values and how they are applied in the service to others.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.04.06.c
21.0 Demonstrate personal awareness of community relations – the student will be able to:			
21.01 Analyze the impact of trends and issues on the community.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910W.3.7 LAFS.1112.W.3.7		CS.01.05.01.b
21.02 Articulate current issues that are important to the local, state, national and global communities.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.01.c
21.03 Identify civic leadership role opportunities.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.L.3.6 LAFS.1112.L.3.6		CS.01.05.02.a
21.04 Demonstrate responsible citizenship.			CS.01.05.02.b
21.05 Perform leadership tasks associated with citizenship.			CS.01.05.02.c
21.06 Explain benefits and challenges of working in a diverse group.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.03.a
21.07 Engage in activities to help develop personal awareness of diversity.			CS.01.05.03.b
21.08 Plan an activity that promotes appreciation of diversity.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.01.05.03.c
22.0 Pursue learning and growth opportunities related to professional and personal aspirations – the student will be able to:			CS.01.06
22.01 Explain the reasons for having a leadership/personal growth plan.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.06.01.a
22.02 Develop a plan that includes specific goals for leadership and personal growth.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.01.06.01.b
22.03 Explain the importance of self-concept.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
22.04 Use problem solving strategies to solve a professional or personal issue.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7		CS.01.06.03.c
22.05 Use various emerging technologies to enhance a program or project.	LAFS.910.W.2.6 LAFS.1112.W.2.6 LAFS.910.SL.2.5 LAFS.1112.SL.2.5		CS.01.06.04.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
22.06 Describe the value of being a life-long learner and the need for continuous development.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7		CS.01.06.05.a
23.0 Interact with others in a manner that respects the differences of a diverse and changing society – the student will be able to:			CS.02.02
23.01 Discover the different cultures that exist in one’s community.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7		CS.02.02.01.a
23.02 Compare and contrast the customs of different cultures.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7		CS.02.02.01.b
23.03 Engage in a project that educates others about different cultures from within the community.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4 LAFS.910.RI.1.2 LAFS.1112.RI.1.2		CS.02.02.01.c
23.04 Demonstrate proper conduct and appearances for diverse settings.			CS.02.02.02.a
23.05 Practice personal etiquette that is respectful of your environment.			
24.0 Develop awareness and apply skills necessary for achieving career success – the student will be able to:			CS.02.03
24.01 Implement a plan to achieve career goals and priorities.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.03.02.01.c
24.02 Determine the level of acceptable non-essential actions/tasks related to a balanced personal and work life.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.02.03.02.b
24.03 Identify employability skills for a specific career.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.02.03.03.a
24.04 Identify successful time management strategies.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
24.05 Develop a model for managing stress related to personal and work environments.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
25.0 Demonstrate the effective application of reasoning, thinking, and coping skills to solve problems – the student will be able to:			
25.01 Discuss the benefits of thinking critically and creatively.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.02.04.01.b



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
25.02 Demonstrate critical and creative thinking skills while completing a task.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4		CS.02.04.01.c
25.03 Analyze problems that were solved well and problems that were not solved well.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		CS.02.04.02.b
25.04 Implement effective problem solving strategies.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.02.04.02.c
25.05 Discuss the skills and techniques needed to negotiate effectively.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.02.04.03.a
25.06 Demonstrate the skills needed to negotiate with others.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4		CS.02.04.03.c
26.0 Demonstrate leadership opportunities available in FFA – the student will be able to:			
26.01 Assess the leadership opportunities available in the leadership organization, including SAE, conferences, scholarships and travel.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
26.02 Identify key leaders in the history of the FFA organization.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
26.03 State the National FFA’s mission, and structure.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
26.04 Submit a proficiency award application based on your SAE.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
26.05 Submit application for FFA degree status.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
26.06 Participate in an FFA Career Development Event.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4		
27.0 Prepare documents and skills for pursuing career success – the student will be able to:			
27.01 Complete a college / job application.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
27.02 Write a resume.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.03.01.02.b
27.03 Participate in a mock interview.	LAFS.910.SL.2.4 LAFS.1112.SL.2.4		
27.04 Write a sample college admission, scholarship, or employment essay.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
27.05 Complete financial aid or employment documents.	LAFS.910.W.2.4 LAFS.1112.W.2.4		

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Principles of Agribusiness  
**Course Number:** 8009120  
**Course Credit:** 1

**Course Description:**

This course provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agribusiness sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to apply the economic and business principles involved in the organization, operation and management of farms and agricultural business. Subject matter includes finance, laws, labor, machinery, facilities, and marketing, as well as leadership, communication, employability and human relations skills.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
28.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Principles of Agribusiness & Management	
28.01	Key Ideas and Details	
28.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.  LAFS.1112.RST.1.1	
28.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.1112.RST.1.2	
28.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.1112.RST.1.3	
28.02	Craft and Structure	
28.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.  LAFS.1112.RST.2.4	
28.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.1112.RST.2.5	
28.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	
	LAFS.1112.RST.2.6	
28.03	Integration of Knowledge and Ideas	
28.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem.	
	LAFS.1112.RST.3.7	
28.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.	
	LAFS.1112.RST.3.8	
28.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	
	LAFS.1112.RST.3.9	
28.04	Range of Reading and Level of Text Complexity	
28.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
28.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently.	
	LAFS.1112.RST.4.10	
29.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Principles of Agribusiness & Management	
29.01	Text Types and Purposes	
29.01.1	Write arguments focused on discipline-specific content.	
	LAFS.1112.WHST.1.1	
29.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
	LAFS.1112.WHST.1.2	
29.02	Production and Distribution of Writing	
29.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
	LAFS.1112.WHST.2.4	

Florida Standards		Correlation to CTE Program Standard #
29.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
29.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
29.03	Research to Build and Present Knowledge	
29.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
29.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
29.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
29.04	Range of Writing	
29.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
30.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Principles of Agribusiness & Management	
30.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
30.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
30.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
30.04	Model with mathematics. MAFS.K12.MP.4.1	

Florida Standards		Correlation to CTE Program Standard #
30.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1	
30.06 Attend to precision.	MAFS.K12.MP.6.1	
30.07 Look for and make use of structure.	MAFS.K12.MP.7.1	
30.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: Social Studies alignments are included in this course to show the alignment for Financial Literacy Standards in the Social Studies content area.*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
31.0 Explain the components of the American business system – the student will be able to:			
31.01 Compare different forms of business organizations.	LAFS.910.SL.1.1 LAFS.1112.SL1.1	SS.912.E.1.5	
31.02 Distinguish and identify between the characteristics of each type of market structures (monopoly, oligopoly, monopolistic competition, pure competition).	LAFS.910.SL.1.1 LAFS.1112.SL1.1	SS.912.E.1.6	
31.03 Evaluate the advantages and disadvantages provided by each business method.	LAFS.910.SL.1.1 LAFS.1112.SL1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7		
31.04 Research the factors that contribute to the four phases of the business cycle (peak, contraction – unemployment, trough, expansion – inflation).	LAFS.910.W.3.8 LAFS.1112.W.3.8	SS.912.E.1.12	
31.05 Determine how changes in government legislation (spending, taxation, regulations, subsidies, etc...) can affect American businesses and the national debt.	LAFS.910.SL.1.1 LAFS.1112.SL1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7		
31.06 Evaluate how cooperative principles and practices differentiate cooperatives from other businesses.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
32.0 Analyze the basic concepts of agribusiness – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
32.01 Explain the following concepts: <ul style="list-style-type: none"> <li>• business cycle</li> <li>• profit / loss</li> <li>• competition</li> <li>• supply/ demand</li> <li>• quantity supplied – graphically illustrate situations that would cause change</li> <li>• quantity demanded – graphically illustrate situations that would cause change</li> <li>• equilibrium price</li> </ul>	LAFS.910.SL.1.1 LAFS.1112.SL1.1 LAFS.910.L.3.6 LAFS.1112.L.3.6	SS.912.E1.4	
32.02 Identify and discuss ethical issues in agribusiness.	LAFS.910.SL.1.1 LAFS.1112.SL1.1		
33.0 Evaluate the importance of the food and fiber system to understand the impact on global economy – the student will be able to:			
33.01 Assess the agricultural impact upon the US gross national product and the total global economy.	LAFS.910.SL.1.1 LAFS.1112.SL1.1		
33.02 Discuss the impact global trade has US agribusiness industries, including barriers and regulations.	LAFS.910.SL.1.1 LAFS.1112.SL1.1	SS.912.E.3.3	
33.03 Compare regulations in the US to those in other countries we import from.	LAFS.910.SL.1.1 LAFS.1112.SL1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.RI.3.9 LAFS.1112.RI.3.9		
33.04 Examine the use of subsidies in American agriculture.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		
33.05 Research new and emerging technologies and their impact on the economy.	LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8		
34.0 Examine the scope of career opportunities in and the importance of agriculture to the economy – the student will be able to:			
34.01 Evaluate and explore the agribusiness career opportunities in agriculture.	LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8	SS.912.FL.1.1	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
34.02 Calculate the total educational cost of an agricultural career.	LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 MAFS.912.N-Q.1.3	SS.912.FL.1.2	
34.03 Compare and contrast different types of student loans available for agriculture careers.	LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8		
34.04 Construct a one year budget plan for a specific career path including expenses and construction of a credit plan for purchasing a major item.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 MAFS.912.N-Q.1.1 MAFS.912.N-Q.1.2 MAFS.912.N-Q.1.3	SS.912.FL.1.3 SS.912.E.1.16	
34.05 Analyze how changes in the market and changes in product quality can affect wages, and employment status.		SS.912.FL.1.4 SS.912.FL.1.5	
35.0 Compose and analyze a business plan for an enterprise – the student will be able to:			
35.01 Analyze quality AFNR business plan components that have been developed using the SMART (specific, measurable, attainable, realistic and timely) format.	LAFS.910.RI.3.9 LAFS.1112.RI.3.9 LAFS.910.SL.1.1 LAFS.1112.SL1.1		ABS.02.01.01.a
35.02 Identify components of business plans and demonstrate how to write such components using the SMART format.	LAFS.910.SL.1.1 LAFS.1112.SL1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		ABS.02.01.01.b
35.03 Identify and observe ethical standards in planning and operating AFNR businesses.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.RI.1.1 LAFS.1112.RI.1.1		ABS.02.01.02.a
35.04 Utilize methods of AFNR business enterprise analysis, such as SWOT (strengths, weaknesses, opportunities and threats).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ABS.02.01.02.c
36.0 Prepare and maintain all files needed to accomplish effective record keeping – the student will be able to:			
36.01 Maintain production and agribusiness records.	LA.910.W.2.4 LA1112.W.2.4		ABS.03.01.01.a
36.02 Analyze records to improve efficiency and profitability of an AFNR business.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ABS.03.01.01.b

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
	LAFS.910.RI.1.2 LAFS.1112.RI.1.2 MAFS.912.S-IC.2.6		
36.03 Demonstrate understanding of inventory relative to maintaining optimal levels and calculating costs.	MAFS.912.F-LE.1.1 MAFS.912.F-LE.1.2 MAFS.912.F-LE.1.3 MAFS.912.F-LE.1.4 MAFS.912.F-LE.2.5		ABS.03.02.01.a
37.0 Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management – the student will be able to:			
37.01 Identify financial concepts associated with production and profit and compare various economic systems (traditional, market, command, mixed) in how they answer the questions 1) what to produce, 2) how to produce, 3) for whom to produce.	LAFS.910.SL.1.1 LAFS.1112.SL1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7	SS.912.E.1.3	ABS.04.01.02.a
37.02 Evaluate characteristics of lines of credit, loan terms and alternatives in sources of capital such as savings and investment services.	LAFS.910.RI.3.8 LAFS.1112.RI.3.8	SS.912.FL.4.3 SS.912.FL.4.4	ABS.04.01.02.c
37.03 Explain the importance of return on investment for an agribusiness enterprise.	LAFS.910.SL.1.1 LAFS.1112.SL1.1		ABS.04.01.03.a
37.04 Analyze contracts, leases and other legal documents.	LAFS.910.RI.3.9 LAFS.1112.RI.3.9		
37.05 Determine the tax structure applicable to different agribusinesses.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1	SS.912.FL.1.6	
38.0 Maintain and interpret financial information (income statements, balance sheets, inventory, purchase orders, accounts receivable and cash-flow analyses) for businesses – the student will be able to:			ABS.05.01
38.01 Maintain accounting information needed to prepare an income statement, balance sheet and cash-flow analysis for an AFNR business.	LA.910.W.2.4 LA1112.W.2.4 MAFS.912.A-REI.2.3		ABS.05.01.01.b
38.02 Name and explain the impact of external economic factors on an AFNR business such as inflation.	LAFS.910.SL.1.1 LAFS.1112.SL1.1	SS.912.E.2.7	ABS.05.01.02.a
38.03 Predict the consequences of delayed payment of expenses, prepayment of expenses and delayed receipts on a financial statement.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1 MAFS.912.S-MD.2.5	SS.912.FL.4.5	ABS.05.01.02.c
38.04 Interpret and evaluate financial statements, including income statements, balance sheets and cash-flow analyses.	LAFS.910.RI.1.2 LAFS.1112.RI.1.2 MAFS.912.S-IC.2.6		ABS.05.01.04.c
39.0 Conduct appropriate market and marketing research – the student will be able to:			ABS.06.01



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
39.01 Investigate the meaning and methods of marketing in AFNR as related to agricultural commodities, products and services and to agricultural goods in domestic and international markets including why firms engage in price and non-price competition.	LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8	SS.912.E.1.8	ABS.06.01.01.a
39.02 Apply benefit/cost analysis to marketing in AFNR businesses.	MAFS.912.S-MD.2.5		ABS.06.01.01.b
39.03 Implement and evaluate marketing strategies with agricultural commodities, products and services.	LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8		ABS.06.01.01.c
39.04 Evaluate alternative marketing strategies, such as valueadding, branding and niche marketing, and propose and implement appropriate modifications to achieve AFNR business goals.	LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8	SS.912.FL.2.1	ABS.06.01.02.c
39.05 Use data to compare historical rates of return on investments with investment claims to make informed decisions and identify potential fraud.	LAFS.910.RI.1.2 LAFS.1112.RI.1.2 MAFS.912.S-MD.2.5 MAFS.912.S-MD.2.6 MAFS.912.S-MD.2.7 MAFS.912.S-IC.2.6	SS.912.F.4.14	
39.06 Explain how buyer and sellers actions can determine the rate of return on an investment.		SS.912.FL.5.3	
40.0 Develop a marketing plan – the student will be able to:			ABS.06.02
40.01 Identify the purpose, components and developmental processes of marketing plans.	LAFS.910.W.3.7 LAFS.1112.W.3.7		ABS.06.02.01.a
40.02 Perform a marketing analysis, including evaluation of the competitors, customers, international and domestic policy environment, regulations and rules, standards and AFNR business resources.	LAFS.910.W.3.8 LAFS.1112.W.3.8	SS.912.FL.2.2	ABS.06.02.01.b
40.03 Establish marketing plan goals/objectives, including monitoring, measuring and analyzing goal achievement.	LAFS.910.W.2.4 LAFS.1112.W.2.4		ABS.06.02.01.c
41.0 Develop specific tactics to market AFNR products and services – the student will be able to:			ABS.06.03
41.01 Explain the meaning and use of the four Ps (product, price, place, and promotion) in marketing.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	SS.912.FL.2.3 SS.912.FL.2.4	ABS.06.03.01.a
41.02 Develop advertising campaigns that promote products and services.	LAFS.910.W.1.1 LAFS.1112.W.1.1	SS.912.FL.2.5 SS.912.FL.4.2	ABS.06.03.01.b
41.03 Implement sales goals and incentive programs, and identify pricing strategies used by competitors.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.7	SS.912.FL.2.5 SS.912.FL.4.2	ABS.06.03.01.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
	LAFS.1112.W.3.7 LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
42.0 Develop a production and operational plan – the student will be able to:			
42.01 Prepare a flowchart that shows production processes, including the resources and capital needed for each step and graphically explain how to determine prices and output through marginal cost analysis.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.1.2 LAFS.1112.W.1.2 LAFS.910.W.2.6 LAFS.1112.W.2.6	SS.912.E.1.7	ABS.07.01.01.a
42.02 Develop and implement a product supply and distribution plan that meets the goals and objectives of an AFNR business.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		ABS.07.02.01.c
42.03 Develop a production facility plan that includes building, equipment, personnel, utilities and logistics components.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		ABS.07.02.02.c
43.0 Apply appropriate management skills to organize a business – the student will be able to:			
43.01 Identify organizational structures and chains of command in AFNR businesses.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ABS.02.03.01.a
43.02 Identify management types in AFNR businesses.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ABS.02.03.01.b
43.03 Determine appropriate human resources for AFNR businesses.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7		ABS.02.01.02.b
43.04 Identify usual employee benefits and wages in AFNR businesses.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7	SS.912.E.1.9	ABS.02.04.02.a
44.0 Summarize the changes in American agricultural cooperatives from their beginning to today – the student will be able to:			
44.01 Describe the basis for the original formation of agricultural cooperatives and how they were organized.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
44.02 Construct a timeline of important dates involved with cooperatives that includes highlights contributions of entrepreneurs, inventors, and other key individuals in the development of agriculture cooperatives.	LAFS.910.W.2.4 LAFS.1112.W.2.4		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
45.0 Differentiate between agricultural cooperative principles and practices – the student will be able to:			
45.01 Identify and describe the Rochdale Principles.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
45.02 Examine and simplify the seven traditional principles and practices of cooperatives.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7		
45.03 Explain the contemporary principles of a cooperative.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
46.0 Explain the responsibilities of people involved with agriculture cooperatives – the student will be able to:			
46.01 Understand and explain the responsibilities of members in a cooperative.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
46.02 Understand and explain the responsibilities of the board of directors in a cooperative.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
46.03 Understand and explain the responsibilities of a manager in a cooperative.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
46.04 Understand and explain the responsibilities of an employee in a cooperative.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
47.0 Explain the benefits and limitations of agricultural cooperatives – the student will be able to:			
47.01 Understand and evaluate the benefits of being a cooperative member.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
47.02 Compare and contrast the successes and failures of a cooperative.	LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8		
47.03 Evaluate the importance of knowing the benefits and successes/failures of a cooperative.	LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8		
48.0 Describe the various organization that serve agricultural cooperatives – the student will be able to:			
48.01 Identify and evaluate the different cooperatives involved in communities.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
48.02 Identify and evaluate the organizations that serve cooperatives.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
49.0 Construct a plan for financing and taxation within an agricultural			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
cooperative – the student will be able to:			
49.01 Explain the difference between the two forms of capital debt and equity.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
49.02 Explain how equity capital is provided.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
49.03 Describe the various ways a cooperative can obtain borrowed capital.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
49.04 Explain the single-tax principle and how it works for cooperatives and differentiate between direct and indirect taxes and describe the progressivity of taxes.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	SS.912.FL.1.7 SS.912.E.2.8	
50.0 Explain the steps for starting an agricultural cooperative – the student will be able to:			
50.01 Become familiar with the basic legal and financial documents needed to operate a cooperative business.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7		
50.02 Learn how a cooperative business functions and operates.	LAFS.910.RI.1.2 LAFS.1112.RI.1.2		
51.0 Validate the necessity of leadership skills development in conjunction with participation in The National FFA Organization (FFA) as a critical component to a well-rounded agricultural education – the student will be able to:			
51.01 Acquire and demonstrate communication skills such as writing, public speaking, and listening while refining oral, written, and verbal skills.	LAFS.910.SL.2.4, 2.6 LAFS.1112.SL.2.4, 2.6 LAFS.910.W.2.5 LAFS.1112.W.2.5		
51.02 Recognize and explain the role of the FFA in the development of leadership, education, employability, communications and human relations skills.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
51.03 Examine roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7		
51.04 Acquire the skills necessary to positively influence others.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
52.0 Complete a Supervised Agricultural Experience (SAE) program as a critical component to a well-rounded agricultural education – the student will be able to:			
52.01 Explain the nature of and become familiar with those terms related to an SAE program.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
52.02 Explore the numerous possibilities for an SAE program which a student might develop.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
52.03 Develop an individual SAE program and implement record keeping skills.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
52.04 Compose an FFA Proficiency Application or State Degree Application.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
53.0 Interpret and apply state and federal rules and regulations to enterprise – the student will be able to:			
53.01 List agencies responsible for inspecting and regulating operation or product.	LAFS.910.L.3.6 LAFS.1112.L.3.6	SS.912.FL.2.7	
53.02 Investigate EPA, DEP, and FDAC environmental policies.	LAFS.910.RI.3.9 LAFS.910.RI.3.9		
53.03 Determine the impact of water restriction on agribusiness operations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
53.04 Maintain a file of current rules and regulations relative to operation.			
53.05 List reasons for the necessity of inspections, certification and regulations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	SS.912.FL.2.7	
53.06 Diagram and explain the problems that occur when government institutes wage and price controls, and explain the rational for these controls	LAFS.910.SL.2.5 LAFS.1112.SL.2.5 LAFS.910.W.2.4 LAFS.1112.W.2.4 MAFS.912.N-Q.1.2 MAFS.912.F-IF.3.7	SS.912.E.2.4	
54.0 Perform accounting activities – the student will be able to:			
54.01 Prepare a balance sheet.			
54.02 Prepare a cash flow statement.			
54.03 Demonstrate knowledge of checking account records and bank reconciliation.			
54.04 Interpret financial statements.	MAFS.912.S-IC.2.6 MAFS.912.S-MD.2.5 MAFS.912.S-MD.2.6		
54.05 Demonstrate knowledge of the accounting cycle.			
54.06 Create and interpret a budget for one year.			
54.07 Establish a plan to pay off debt.		SS.912.FL.3.1 SS.912.FL.4.2	

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci &amp; Soc. Studies</b>	<b>National Standards</b>
54.08 Calculate and record depreciation, net worth, and income.			
54.09 Explain cash management strategies including debit accounts, checking accounts, and savings accounts.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1	SS.912.FL.4.2	
54.10 Analyze credit scores and reports and their uses.	MAFS.912.S-IC.2.6	SS.912.FL.4.2 SS.912.FL.4.5 SS.912.FL.4.6 SS.912.FL.4.7 SS.912.FL.4.13	
54.11 Complete a profit and loss statement.			
54.12 Calculate the finance charges and total amount due on a credit card bill; include any fees that could be included.	MAFS.912.A-REI.2.3	SS.912.FL.4.1 SS.912.FL.4.2	
54.13 Examine inflation, its effects on interest, value of goods & services, and employment.		SS.912.FL.3.2 SS.912.FL.3.3	
54.14 Analyze consequences for not repaying a loan, or having missing/late payments on loans or credit cards.		SS.912.FL.4.7 SS.912.FL.4.8	
54.15 Compare different tax models at the federal, state, and local level.		SS.912.FL.5.1	
<b>55.0 Perform communication activities – the student will be able to:</b>			
55.01 Compose business correspondence and related documents and demonstrate correct spelling, grammar, punctuation, and word choice.	LAFS.910.SL.W.2.4 LAFS.1112.SL.W.2.4 LAFS.910.L.1.2 LAFS.1112.L.1.2		
55.02 Prepare visual material, including electronic media, to support an oral presentation.	LAFS.910.SL.2.5 LAFS.1112.SL.2.5		
55.03 Demonstrate ability to communicate effectively with diverse populations.	LAFS.910.SL.W.2.4 LAFS.1112.SL.W.2.4 LAFS.910.SL.2.6 LAFS.1112.SL.2.6		
<b>56.0 Demonstrate an understanding of legal and ethical issues in a business environment – the student will be able to:</b>			
56.01 Demonstrate understanding of intellectual property rights.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
56.02 Demonstrate understanding of appropriate use of employer property.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
56.03 Demonstrate understanding of confidentiality.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
56.04 Demonstrate understanding of role of ethical decision making in dealing with stakeholders.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
56.05 Demonstrate knowledge of legal and privacy issues regarding e-mail, voice mail, internet, telephone, and other communication methods.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
56.06 Explain regulations or laws that are put in place to regulate financial institutions and protect business or consumers.		SS.912.FL.3.5 SS.912.FL.4.12 SS.912.FL.5.12	
57.0 Develop financial literacy skills – the student will be able to:			
57.01 Analyze types of loans, including the importance of down payments, and collateral on securing funding sources.		SS.912.FL.4.11	
57.02 Calculate the effects on the monthly payment in the change of interest rate based on an adjustable rate mortgage.	MAFS.912.F-LE.2.5 MAFS.912.F-LE.1.3 MAFS.912.S-ID.1.4 MAFS.912.N-Q.1.3 MAFS.912.A-SSE.1.1		
57.03 Analyze diversification in investments.		SS.912.FL.5.4 SS.912.FL.5.5 SS.912.FL.5.6	
57.04 Explain the risk benefit in investment areas.		SS.912.FL.5.6 SS.912.FL.5.7 SS.912.FL.5.9 SS.912.FL.5.10	
57.05 Analyze stock with a set amount of money, and follow the process through gains, losses, and selling.		SS.912.FL.3.4 SS.912.FL.5.8 SS.912.FL.6.1	
57.06 Compare and contrast income from purchase of common stock, preferred stock, and bonds.		SS.912.FL.5.5 SS.912.FL.6.1	
57.07 Given current exchange rates be able to convert from one form of currency to another.	MAFS.912.A-REI.2.3 MAFS.912.N-Q.1.2 MAFS.912.N-Q.1.3	SS.912.FL.5.8	
57.08 Compare different insurance options and fees.		SS.912.FL.6.2 SS.912.FL.6.3 SS.912.FL.6.6 SS.912.FL.6.7	
57.09 Compare and contrast the role of insurance as a device to mitigate risk and calculate expenses of various options.		SS.912.FL.6.2 SS.912.FL.6.3 SS.912.FL.6.7	
57.10 Collect, organize, and interpret data to determine an effective retirement savings plan to meet personal financial goals.	MAFS.912.A-SSE.1.1 MAFS.912.F-LE.1.1 MAFS.912.F-LE.1.2 MAFS.912.F-LE.1.3		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci & Soc. Studies	National Standards
	MAFS.912.F-LE.1.4 MAFS.912.F-LE.2.5 MAFS.912.S-IC.2.6		
57.11 Calculate, compare, and contrast different types of retirement plans, including IRAs, ROTH accounts, and annuities.	MAFS.912.S-IC.2.6		
57.12 Discuss when bankruptcy should be used as an action and the repercussions involved with filing.		SS.912.FL.4.10	
57.13 Determine how identity theft can occur and what assistance is in place for victims.		SS.912.FL.6.9 SS.912.FL.6.10	



## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly

indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Floral Design and Marketing  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Program Number	8012100
CIP Number	0201060801
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	AGRICULTUR 1 @2 Retailing@7 7G MKTG 1
CTSO	FFA
SOC Codes (all applicable)	41-2031 - Retail Salespersons 27-1023 - Floral Designers 41-1011 - First-Line Supervisors of Retail Sales Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning and preparing floral designs, selling, buying, transporting, storing, advertising, displaying, and managing the floral goods and services industry.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of three occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8012110	Introductory Floral Design	1 credit	27-1023	2	PA
	8012120	Floral Design 2	1 credit		2	PA
B	8012130	Floral Design and Marketing Services 3	1 credit	41-2031	2	PA
C	8012140	Floral Design and Management 4	1 credit	41-1011	2	PA

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Tables

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth- Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Introductory Floral Design	1/53 2%	11/52 21%	11/56 20%	14/55 25%	13/58 22%	**	5/35 14%	**	16/42 38%	13/56 23%	11/53 21%
Floral Design 2	2/53 4%	2/52 4%	8/56 14%	5/55 9%	6/58 10%	**	2/35 6%	**	11/42 26%	6/56 11%	3/53 6%
Floral Design and Marketing Services 3	1/53 2%	12/52 23%	6/56 11%	13/55 24%	12/58 21%	**	3/35 9%	**	12/42 29%	12/56 21%	12/53 22%
Floral Design and Management 4	1/53 2%	9/52 17%	4/56 7%	12/55 21%	8/58 14%	**	2/35 6%	**	8/42 19%	9/56 16%	9/53 17%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Introductory Floral Design	**	**	**	**	**	**	**
Floral Design 2	**	**	**	**	**	**	**
Floral Design and Marketing Services 3	**	**	**	**	**	**	**
Floral Design and Management 4	**	**	**	**	**	**	**
Introductory Floral Design	**	**	**	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Floral Design and Marketing.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Floral Design and Marketing
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Floral Design and Marketing
- 04.0 Discuss the floral design and marketing industry.
- 05.0 Demonstrate the application of post-harvest care and handling of floral products.
- 06.0 Identify procedures for creating floral designs.
- 07.0 Identify mechanical components of floral design.
- 08.0 Demonstrate knowledge in non-floral and gift packaging.
- 09.0 Identify procedures to create fresh and permanent floral designs
- 10.0 Demonstrate effective communication skills.
- 11.0 Apply techniques for post-harvest care and handling of floral products.
- 12.0 Create fresh and permanent floral designs
- 13.0 Demonstrate order processing skills.
- 14.0 Perform merchandising operations unique to floral marketing.
- 15.0 Apply sales techniques and procedures to the marketing of floral products.
- 16.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Floral Design and Marketing.
- 17.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Floral Design and Marketing.
- 18.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Floral Design and Marketing.
- 19.0 Create designs for live plants.
- 20.0 Identify factors for the promotion of florist store products and services
- 21.0 Demonstrate knowledge of merchandising activities
- 22.0 Apply sales promotion techniques and procedures to the marketing of floral products.
- 23.0 Create fresh and permanent special occasion floral pieces
- 24.0 Create fresh and/or permanent sympathy designs.
- 25.0 Create fresh and/or permanent wedding designs.
- 26.0 Demonstrate distribution skills involved in floral marketing.
- 27.0 Identify factors to consider when opening/managing a floral business.
- 28.0 Demonstrate an understanding of the functions of management.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Floral Design 1  
**Course Number:** 8012110  
**Course Credit:** 1

**Course Description:**

This course is designed to develop the fundamental competencies necessary for employment in the floral design industry. Topics include: introduction to the floral industry, safety regulations, mechanical components of design, history of design, and basic floral design techniques.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Floral Design and Marketing	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).  LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	



Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Floral Design and Marketing	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
<b>03.0</b>	<b>Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Floral Design and Marketing</b>	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06	Attend to precision. MAFS.K12.MP.6.1	
03.07	Look for and make use of structure.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	
	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
04.0 Discuss the floral design and marketing industry – the student will be able to:		
04.01 Identify careers in the floral design and marketing industry.		
04.02 Describe trends in the floral design and marketing industry.		SC.912.N.1.4, 6
04.03 Explain floral services.		
04.04 Discuss global floral sourcing.		SC.912.L.17.11, 13, 19, 20 SC.912.L.15.13
05.0 Demonstrate the application of post-harvest care and handling of floral products – the student will be able to:		
05.01 Identify safety procedures.		
05.02 Identify varieties of flowers and plants utilized in floral arrangements.		
05.03 Perform specialized care and handling of flowers and plants utilized in floral arrangements.		SC.912.E.5.4
05.04 Store plants, flowers, and prepared floral arrangements according to established procedures.		SC.912.L.17.17 SC.912.E.5.4 SC.912.E.7.4
05.05 Demonstrate maintenance of fresh flowers and foliage.		SC.912.E.7.4
06.0 Identify procedures and creating floral designs – the student will be able to:		
06.01 Identify and practice safety procedures.		
06.02 Identify fundamentals of the elements of design.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
06.03 Identify principles of design.		
06.04 Apply fundamentals of creativity.		
06.05 Identify, use, and maintain hand tools and equipment.		
06.06 Select appropriate containers based on mechanics of design.		
07.0 Identify mechanical components of floral design – the student will be able to:		
07.01 Demonstrate proper wiring techniques.		
07.02 Demonstrate appropriate use of floral oasis.		
07.03 Create different types of bows.		
07.04 Select containers for specific designs.		
07.05 Demonstrate proper use of a helium tank.		
08.0 Demonstrate knowledge in non-floral and gift packaging – the student will be able to:		
08.01 Create balloon arrangements.		
08.02 Identify mechanics of gift baskets.		
08.03 Construct presentation of non-floral and packaging items.		
08.04 Create a non-floral product.		
09.0 Identify procedures to create fresh and permanent floral designs – the student will be able to:		
09.01 Create geometric designs.		
09.02 Create horizontal and vertical designs.		
09.03 Create symmetrical and asymmetrical designs.		
09.04 Create personal flowers to wear.		
09.05 Apply principles of mass production skills.		
10.0 Demonstrate effective communication skills – the student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
10.01 Discuss the role of communications in marketing.		
10.02 Demonstrate a proficiency in the effective use of speech and vocabulary.		
10.03 Demonstrate effective written communication skills.		
10.04 Demonstrate effective oral communication skills.		
10.05 Demonstrate effective listening skills.		

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Floral Design 2  
**Course Number:** 8012120  
**Course Credit:** 1

**Course Description:**

This course prepares the student in the skills of merchandising math, pricing, and selling. In addition the course includes skills for ordering fresh and silk flowers, maintaining stock, receiving and processing wholesale and retail sales orders, pricing stock, and utilizing appropriate sales techniques and customer relations.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Floral Design and Marketing.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
01.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.1112.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
01.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
01.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Floral Design and Marketing	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	

Florida Standards		Correlation to CTE Program Standard #
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
<b>03.0</b>	<b>Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Floral Design and Marketing</b>	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06	Attend to precision. MAFS.K12.MP.6.1	



Florida Standards		Correlation to CTE Program Standard #
03.07	Look for and make use of structure.	MAFS.K12.MP.7.1
03.08	Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
11.0 Apply techniques for post-harvest care and handling of floral products – the student will be able to:		
11.01 Discuss operation of underwater floral cutting equipment.		SC.912.E.7.1, 4
11.02 Discuss use of electric floral stem stripper.		SC.912.L.14.2, 3, 6
11.03 Apply knowledge in the use of floral preservatives and pre-hydrating solutions.		SC.912.L.14.2 SC.912.L.17.4, 11, 17
11.04 Demonstrate knowledge and application of refrigeration, sanitation, and ethylene control.		SC.912.L.14.6 SC.912.L.17.11
11.05 Identify grower-packaging quantities used for cut flowers and foliage.		
11.06 Apply knowledge of specialized techniques for conditioning post-harvest plant material.		SC.912.L.14.2, 3, 6 SC.912.E.7.1, 4 SC.912.L.17.11, 16, 11
11.07 Discuss the benefits of chain of life.		SC.912.E.7.1
12.0 Create fresh and permanent floral designs – the student will be able to:		
12.01 Identify and create advanced geometric designs.		
12.02 Identify design styles.		
12.03 Apply knowledge of the color wheel.		
12.04 Apply use of color harmonies.		
12.05 Describe differences in period design.		
12.06 Create seasonal arrangements.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
13.0 Demonstrate order processing skills – the student will be able to:		
13.01 Tag floral orders.		
13.02 Package products.		
13.03 Price orders.		
14.0 Perform merchandising operations unique to floral marketing – the student will be able to:		
14.01 Demonstrate correct procedures for handling customer sales transactions.		
14.02 Explain pricing policies.		
14.03 Calculate mark-up of floral products.		
14.04 Describe opening and closing procedures for a floral operation.		
15.0 Apply sales techniques and procedures to the marketing of floral products – the student will be able to:		
15.01 Demonstrate steps of a sale utilizing floral products.		SC.912.L.17.1 SC.912.N.1.5
15.02 Perform telephone sales.		SC.912.L.17.1 SC.912.N.1.5
15.03 Distinguish between a local, incoming, and outgoing order.		SC.912.L.17.1 SC.912.N.1.5
15.04 Demonstrate the process of using both telephone and computer wire service.		SC.912.L.17.1 SC.912.N.1.5

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Floral Design and Marketing Services 3  
**Course Number:** 8012130  
**Course Credit:** 1

**Course Description:**

This course prepares the student to market floral designs. Content includes construction and use of display items, sales promotions, and inventory control. Content will also help build team building skills, and build critical thinking skills.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
16.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Floral Design and Marketing	
16.01	Key Ideas and Details	
16.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.  LAFS.1112.RST.1.1	
16.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.1112.RST.1.2	
16.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.1112.RST.1.3	
16.02	Craft and Structure	
16.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.  LAFS.1112.RST.2.4	
16.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.  LAFS.1112.RST.2.5	
16.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.  LAFS.1112.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
16.03	Integration of Knowledge and Ideas	
16.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
16.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
16.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
16.04	Range of Reading and Level of Text Complexity	
16.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
16.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
17.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Floral Design and Marketing	
17.01	Text Types and Purposes	
17.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
17.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
17.02	Production and Distribution of Writing	
17.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
17.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
17.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
17.03 Research to Build and Present Knowledge		
17.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
17.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
17.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
17.04 Range of Writing		
17.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
18.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Floral Design and Marketing	
18.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
18.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
18.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
18.04	Model with mathematics. MAFS.K12.MP.4.1	
18.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
18.06	Attend to precision. MAFS.K12.MP.6.1	
18.07	Look for and make use of structure.	

Florida Standards	Correlation to CTE Program Standard #	
	MAFS.K12.MP.7.1	
18.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
19.0 Create designs for live plants – the student will be able to:		
19.01 Construct dish gardens		
19.02 Decorate blooming plants.		
20.0 Identify factors for the promotion of florist store products and services – the student will be able to:		
20.01 Identify the major classifications of retail flower operations.		
20.02 Describe product presentation and importance of window and store display.		
20.03 Identify primary goals of display.		
21.0 Demonstrate knowledge of merchandising activities – the student will be able to:		
21.01 Explain the role of buying and purchasing in a retailing situation.		
21.02 Follow accepted procedures for inventory control.		
21.03 Demonstrate stock-keeping procedures.		
21.04 Operate appropriate weighing and measuring devices for floral products and materials.		
22.0 Apply sales promotion techniques and procedures to the marketing of floral products – the student will be able to:		
22.01 Discuss the purposes of advertising, display, and public relations.		
22.02 Explain the importance of sales promotion.		
22.03 Identify various forms of advertising media including the Internet		

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSS-Sci</b>
22.04 Plan and present a sales promotion for a product.		

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Floral Design and Management 4  
**Course Number:** 8012140  
**Course Credit:** 1

**Course Description:**

This course prepares the student with basic skills in specialty designs, weddings, funerals, and special events. The course allows the students opportunities to use creative concepts to create floral designs and personal pieces, beginning management and business skills are also part of the course.

Florida Standards		Correlation to CTE Program Standard #
16.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Floral Design and Marketing	
16.01	Key Ideas and Details	
16.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
16.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
16.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
16.02	Craft and Structure	
16.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
16.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
16.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	



Florida Standards		Correlation to CTE Program Standard #
	LAFS.1112.RST.2.6	
16.03	Integration of Knowledge and Ideas	
16.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
16.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
16.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
16.04	Range of Reading and Level of Text Complexity	
16.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
16.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
17.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Floral Design and Marketing	
17.01	Text Types and Purposes	
17.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
17.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
17.02	Production and Distribution of Writing	
17.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
17.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	

Florida Standards		Correlation to CTE Program Standard #
17.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
<b>17.03 Research to Build and Present Knowledge</b>		
17.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
17.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
17.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
<b>17.04 Range of Writing</b>		
17.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
<b>18.0</b>	<b>Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Floral Design and Marketing</b>	
18.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
18.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
18.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
18.04	Model with mathematics. MAFS.K12.MP.4.1	
18.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
18.06	Attend to precision. MAFS.K12.MP.6.1	

Florida Standards		Correlation to CTE Program Standard #
18.07	Look for and make use of structure.	MAFS.K12.MP.7.1
18.08	Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
23.0 Create fresh and permanent special occasion floral pieces – the student will be able to:		
23.01 Create unique corsages & boutonnieres.		
23.02 Create seasonal/holiday designs.		
23.03 Create special event pieces: conventions, parties, banquets, showers, and receptions.		
24.0 Create fresh and/or permanent sympathy designs – the student will be able to:		
24.01 Create a casket spray.		
24.02 Create funeral baskets.		
24.03 Create set pieces (using manufactured form).		
24.04 Create easel pieces.		
24.05 Create interior lid pieces.		
24.06 Create a non-traditional memorial design.		
24.07 Conduct a funeral consultation.		
25.0 Create fresh and/or permanent wedding designs – the student will be able to:		
25.01 Create designs for church/synagogue weddings.		
25.02 Create designs for theme weddings.		
25.03 Create designs for wedding receptions.		

<b>CTE Standards and Benchmarks</b>		<b>FS-M/LA</b>	<b>NGSSS-Sci</b>
25.04	Design a bridal bouquet.		
25.05	Create designs for wedding party members.		
25.06	Conduct a wedding consultation.		
26.0	Demonstrate distribution skills involved in floral marketing – the student will be able to:		
26.01	Route and organize deliveries according to priority, location, and time.		
26.02	Make confirmation phone calls.		
26.03	Maintain general floral shop upkeep.		
27.0	Identify factors to consider when opening/managing a floral business – the student will be able to:		
27.01	Identify primary functions of a retail flower shop.		
27.02	Explain the characteristics of store location options.		
27.03	Characterize the principle responsibilities of employees.		
27.04	Summarize the key management responsibilities required for a successful and profitable flower shop.		
28.0	Demonstrate an understanding of the functions of management – the student will be able to:		
28.01	Identify and describe steps in the planning process.		SC.912.N.1.4
28.02	Define Management by Objectives (MBO).		
28.03	Develop an organizational chart to illustrate line and staff relationships.		SC.912.N.1.5
28.04	Describe the responsibilities for selecting, training, and appraising employees.		SC.912.N.1.4
28.05	Define the principles of “chain of command” and “span of control.”		
28.06	Justify the importance of accountability.		
28.07	Name and define the functions of management (planning, organizing, staffing, directing, controlling).		
28.08	Explain how motivation, leadership, and communication influence people within an organization.		SC.912.N.1.5

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Introduction to Agriculture, Food, & Natural Resources  
**Course Type:** Orientation/Exploratory  
**Career Cluster:** Agriculture, Food, and Natural Resources

**Secondary – Middle School**

Course Number	8021100
CIP Number	148021100M
Grade Level	6-8
Standard Length	Semester
Teacher Certification	Agriculture 1 @2 EXP AG @4
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate an understanding of the Food Products & Processing Systems career pathway.
- 02.0 Demonstrate an understanding of the Plant Systems career pathway.
- 03.0 Demonstrate an understanding of the Animal Systems career pathway.
- 04.0 Demonstrate an understanding of the Power, Structure, and Technical Systems career pathway.
- 05.0 Demonstrate an understanding of the Natural Resource Systems career pathway.
- 06.0 Demonstrate an understanding of the Environmental Service Systems career pathway.
- 07.0 Demonstrate an understanding of the Agribusiness Systems career pathway.
- 08.0 Apply leadership and communication skills.
- 09.0 Describe how information technology is used in the Agriculture, Food & Natural Resources career cluster.
- 10.0 Use information technology tools.



Florida Department of Education  
Student Performance Standards

Course Title: Introduction to Agriculture, Food, & Natural Resources  
Course Number: 8021100  
Course Length: Semester

Course Description:

Beginning with a broad overview of the Agriculture, Food, and Natural Resources career cluster, students are introduced to the terminology, careers, history, required skills, and technologies associated with each pathway in the Agriculture, Food, and Natural Resources career cluster. Additionally, they will be provided with opportunities to acquire and demonstrate beginning leadership skills.

<b>CTE Standards and Benchmarks</b>	
01.0	Demonstrate an understanding of the Food Products & Processing Systems career pathway – the student will be able to:
01.01	Define and use proper terminology associated with the Food Products & Processing Systems career pathway.
01.02	Describe some of the careers available in the Food Products & Processing Systems career pathway.
01.03	Identify common characteristics of the careers in the Food Products & Processing Systems career pathway.
01.04	Research the history of the Food Products & Processing Systems career pathway and describe how the associated careers have evolved and impacted society.
01.05	Identify skills required to successfully enter any career in the Food Products & Processing Systems career pathway.
01.06	Describe technologies associated in careers within the Food Products & Processing Systems career pathway.
02.0	Demonstrate an understanding of the Plant Systems career pathway – the student will be able to:
02.01	Define and use proper terminology associated with the Plant Systems career pathway.
02.02	Describe some of the careers available in the Plant Systems career pathway.
02.03	Identify common characteristics of the careers in the Plant Systems career pathway.
02.04	Research the history of the Plant Systems career pathway and describe how the careers have evolved and impacted society.
02.05	Identify skills required to successfully enter any career in the Plant Systems career pathway.
02.06	Describe technologies associated in careers within the Plant Systems career pathway.

## CTE Standards and Benchmarks

03.0 Demonstrate an understanding of the Animal Systems career pathway – the student will be able to:

03.01 Define and use proper terminology associated with the Animal Systems career pathway.

03.02 Describe some of the careers available in the Animal Systems career pathway.

03.03 Identify common characteristics of the careers in the Animal Systems career pathway.

03.04 Research the history of the Animal Systems career pathway and describe how the careers have evolved and impacted society.

03.05 Identify skills required to successfully enter any career in the Animal Systems career pathway.

03.06 Describe technologies associated in careers within the Animal Systems career pathway.

04.0 Demonstrate an understanding of the Power, Structural and Technological Systems career pathway – the student will be able to:

04.01 Define and use proper terminology associated with the Power, Structural and Technological Systems career pathway.

04.02 Describe some of the careers available in the Power, Structural and Technological Systems career pathway.

04.03 Identify common characteristics of the careers in the Power, Structural and Technological Systems career pathway.

04.04 Research the history of the Power, Structural and Technological Systems career pathway and describe how the careers have evolved and impacted society.

04.05 Identify skills required to successfully enter any career in the Power, Structural and Technological Systems career pathway.

04.06 Describe technologies associated in careers within the Power, Structural, and Technological Systems career pathway.

05.0 Demonstrate an understanding of the Natural Resource Systems career pathway – the student will be able to:

05.01 Define and use proper terminology associated with the Natural Resource Systems career pathway.

05.02 Describe some of the careers available in the Natural Resource Systems career pathway.

05.03 Identify common characteristics of the careers in the Natural Resource Systems career pathway.

05.04 Research the history of the Natural Resource Systems career pathway and describe how the careers have evolved and impacted society.

05.05 Identify skills required to successfully enter any career in the Natural Resource Systems career pathway.

05.06 Describe technologies associated in careers within the Natural Resource Systems career pathway.

06.0 Demonstrate an understanding of the Environmental Service Systems career pathway – the student will be able to:

## CTE Standards and Benchmarks

06.01	Define and use proper terminology associated with the Environmental Service Systems career pathway.
06.02	Describe some of the careers available in the Environmental Service Systems career pathway.
06.03	Identify common characteristics of the careers in Environmental Service Systems career pathway.
06.04	Research the history of the Environmental Service Systems career pathway and describe how the careers have evolved and impacted society.
06.05	Identify skills required to successfully enter any career in the Environmental Service Systems career pathway.
06.06	Describe technologies associated in careers within the Environmental Service Systems career pathway.
07.0	Demonstrate an understanding of the Agribusiness Systems career pathway – the student will be able to:
07.01	Define and use proper terminology associated with the Agribusiness Systems career pathway.
07.02	Describe some of the careers available in the Agribusiness Systems career pathway.
07.03	Identify common characteristics of the careers in Environmental Service Systems career pathway.
07.04	Research the history of the Agribusiness Systems career pathway and describe how the careers have evolved and impacted society.
07.05	Identify skills required to successfully enter any career in the Agribusiness Systems career pathway.
07.06	Describe technologies associated in careers within the Agribusiness Systems career pathway.
08.0	Apply leadership and communication skills – the student will be able to:
08.01	Discuss the establishment and history of the FFA organization.
08.02	Identify the characteristics and responsibilities of organizational leaders.
08.03	Demonstrate parliamentary procedure skills during a meeting.
08.04	Participate on a committee which has an assigned task and report to the class.
08.05	Demonstrate effective communication skills through delivery of a speech, a slide presentation, or conducting a demonstration.
08.06	Use a computer to assist in the completion of project related to the Agriculture, Food, & Natural Resources career cluster.
09.0	Describe how information technology is used in the Agriculture, Food & Natural Resources career cluster – the student will be able to:
09.01	Identify information technology (IT) careers in the Agriculture, Food & Natural Resources career cluster, including the responsibilities, tasks and skills they require.

## CTE Standards and Benchmarks

09.02	Relate information technology project management concepts and terms to careers in the Agriculture, Food & Natural Resources career cluster.
09.03	Manage information technology components typically used in professions of the Agriculture, Food & Natural Resources career cluster.
09.04	Identify security-related ethical and legal IT issues faced by professionals in the Agriculture, Food & Natural Resources career cluster.
10.0	Use information technology tools – the student will be able to:
10.01	Identify the functions of web browsers, and use them to access the World Wide Web and other computer resources typically used in the Agriculture, Food & Natural Resources career cluster.
10.02	Use e-mail clients to send simple messages and files to other Internet users.
10.03	Demonstrate ways to communicate effectively using Internet technology.
10.04	Use different types of web search engines effectively to locate information relevant to the Agriculture, Food & Natural Resources career cluster.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

### **Career and Technical Student Organization (CTSO)**

National FFA Organization (FFA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Introduction to Agriculture, Food, & Natural Resources and Career Planning  
**Course Type:** Orientation/Exploratory  
**Career Cluster:** Agriculture, Food, and Natural Resources

Secondary – Middle School	
Course Number	8021110
CIP Number	148021100M
Grade Level	6-8
Standard Length	Semester
Teacher Certification	Agriculture 1 @2 EXP AG @4
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate an understanding of the Food Products & Processing Systems career pathway.
- 02.0 Demonstrate an understanding of the Plant Systems career pathway.
- 03.0 Demonstrate an understanding of the Animal Systems career pathway.
- 04.0 Demonstrate an understanding of the Power, Structure, and Technical Systems career pathway.
- 05.0 Demonstrate an understanding of the Natural Resource Systems career pathway.
- 06.0 Demonstrate an understanding of the Environmental Service Systems career pathway.
- 07.0 Demonstrate an understanding of the Agribusiness Systems career pathway.
- 08.0 Apply leadership and communication skills.
- 09.0 Describe how information technology is used in the Agriculture, Food & Natural Resources career cluster.
- 10.0 Use information technology tools.

### **Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes.**

- 11.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.
- 12.0 Develop skills to locate, evaluate, and interpret career information.
- 13.0 Identify and demonstrate processes for making short and long term goals.
- 14.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
- 15.0 Understand the relationship between educational achievement and career choices/postsecondary options.
- 16.0 Identify a career cluster and related pathways through an interest assessment that match career and education goals.
- 17.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
- 18.0 Demonstrate knowledge of technology and its application in career fields/clusters.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Agriculture, Food, & Natural Resources and Career Planning  
**Course Number:** 8021110  
**Course Length:** Semester

**Course Description:**

Beginning with a broad overview of the Agriculture, Food, and Natural Resources career cluster, students are introduced to the terminology, careers, history, required skills, and technologies associated with each pathway in the Agriculture, Food, and Natural Resources career cluster. Additionally, they will be provided with opportunities to acquire and demonstrate beginning leadership skills.

<b>CTE Standards and Benchmarks</b>	
01.0	Demonstrate an understanding of the Food Products & Processing Systems career pathway – the student will be able to:
01.01	Define and use proper terminology associated with the Food Products & Processing Systems career pathway.
01.02	Describe some of the careers available in the Food Products & Processing Systems career pathway.
01.03	Identify common characteristics of the careers in the Food Products & Processing Systems career pathway.
01.04	Research the history of the Food Products & Processing Systems career pathway and describe how the associated careers have evolved and impacted society.
01.05	Identify skills required to successfully enter any career in the Food Products & Processing Systems career pathway.
01.06	Describe technologies associated in careers within the Food Products & Processing Systems career pathway.
02.0	Demonstrate an understanding of the Plant Systems career pathway – the student will be able to:
02.01	Define and use proper terminology associated with the Plant Systems career pathway.
02.02	Describe some of the careers available in the Plant Systems career pathway.
02.03	Identify common characteristics of the careers in the Plant Systems career pathway.
02.04	Research the history of the Plant Systems career pathway and describe how the careers have evolved and impacted society.
02.05	Identify skills required to successfully enter any career in the Plant Systems career pathway.
02.06	Describe technologies associated in careers within the Plant Systems career pathway.



## CTE Standards and Benchmarks

03.0 Demonstrate an understanding of the Animal Systems career pathway – the student will be able to:

03.01 Define and use proper terminology associated with the Animal Systems career pathway.

03.02 Describe some of the careers available in the Animal Systems career pathway.

03.03 Identify common characteristics of the careers in the Animal Systems career pathway.

03.04 Research the history of the Animal Systems career pathway and describe how the careers have evolved and impacted society.

03.05 Identify skills required to successfully enter any career in the Animal Systems career pathway.

03.06 Describe technologies associated in careers within the Animal Systems career pathway.

04.0 Demonstrate an understanding of the Power, Structural and Technological Systems career pathway – the student will be able to:

04.01 Define and use proper terminology associated with the Power, Structural and Technological Systems career pathway.

04.02 Describe some of the careers available in the Power, Structural and Technological Systems career pathway.

04.03 Identify common characteristics of the careers in the Power, Structural and Technological Systems career pathway.

04.04 Research the history of the Power, Structural and Technological Systems career pathway and describe how the careers have evolved and impacted society.

04.05 Identify skills required to successfully enter any career in the Power, Structural and Technological Systems career pathway.

04.06 Describe technologies associated in careers within the Power, Structural, and Technological Systems career pathway.

05.0 Demonstrate an understanding of the Natural Resource Systems career pathway – the student will be able to:

05.01 Define and use proper terminology associated with the Natural Resource Systems career pathway.

05.02 Describe some of the careers available in the Natural Resource Systems career pathway.

05.03 Identify common characteristics of the careers in the Natural Resource Systems career pathway.

05.04 Research the history of the Natural Resource Systems career pathway and describe how the careers have evolved and impacted society.

05.05 Identify skills required to successfully enter any career in the Natural Resource Systems career pathway.

05.06 Describe technologies associated in careers within the Natural Resource Systems career pathway.

06.0 Demonstrate an understanding of the Environmental Service Systems career pathway – the student will be able to:

## CTE Standards and Benchmarks

06.01	Define and use proper terminology associated with the Environmental Service Systems career pathway.
06.02	Describe some of the careers available in the Environmental Service Systems career pathway.
06.03	Identify common characteristics of the careers in Environmental Service Systems career pathway.
06.04	Research the history of the Environmental Service Systems career pathway and describe how the careers have evolved and impacted society.
06.05	Identify skills required to successfully enter any career in the Environmental Service Systems career pathway.
06.06	Describe technologies associated in careers within the Environmental Service Systems career pathway.
07.0	Demonstrate an understanding of the Agribusiness Systems career pathway – the student will be able to:
07.01	Define and use proper terminology associated with the Agribusiness Systems career pathway.
07.02	Describe some of the careers available in the Agribusiness Systems career pathway.
07.03	Identify common characteristics of the careers in Environmental Service Systems career pathway.
07.04	Research the history of the Agribusiness Systems career pathway and describe how the careers have evolved and impacted society.
07.05	Identify skills required to successfully enter any career in the Agribusiness Systems career pathway.
07.06	Describe technologies associated in careers within the Agribusiness Systems career pathway.
08.0	Apply leadership and communication skills – the student will be able to:
08.01	Discuss the establishment and history of the FFA organization.
08.02	Identify the characteristics and responsibilities of organizational leaders.
08.03	Demonstrate parliamentary procedure skills during a meeting.
08.04	Participate on a committee which has an assigned task and report to the class.
08.05	Demonstrate effective communication skills through delivery of a speech, a slide presentation, or conducting a demonstration.
08.06	Use a computer to assist in the completion of project related to the Agriculture, Food, & Natural Resources career cluster.
09.0	Describe how information technology is used in the Agriculture, Food & Natural Resources career cluster – the student will be able to:
09.01	Identify information technology (IT) careers in the Agriculture, Food & Natural Resources career cluster, including the responsibilities, tasks and skills they require.

## CTE Standards and Benchmarks

09.02 Relate information technology project management concepts and terms to careers in the Agriculture, Food & Natural Resources career cluster.

09.03 Manage information technology components typically used in professions of the Agriculture, Food & Natural Resources career cluster.

09.04 Identify security-related ethical and legal IT issues faced by professionals in the Agriculture, Food & Natural Resources career cluster.

10.0 Use information technology tools – the student will be able to:

10.01 Identify the functions of web browsers, and use them to access the World Wide Web and other computer resources typically used in the Agriculture, Food & Natural Resources career cluster.

10.02 Use e-mail clients to send simple messages and files to other Internet users.

10.03 Demonstrate ways to communicate effectively using Internet technology.

10.04 Use different types of web search engines effectively to locate information relevant to the Agriculture, Food & Natural Resources career cluster.

### **Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes.**

The student will be able to:

11.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.

12.0 Develop skills to locate, evaluate, and interpret career information.

13.0 Identify and demonstrate processes for making short and long term goals.

14.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.

15.0 Understand the relationship between educational achievement and career choices/postsecondary options.

16.0 Identify a career cluster and related pathways that match career and education goals.

17.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.

18.0 Demonstrate knowledge of technology and its application in career fields/clusters.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career Planning**

The requirements of section 1003.4156 (1) (e), Florida Statutes, have been integrated into this course. The statute requires that students take a career and education planning course that must result in a completed personalized academic and career plan for the student; must emphasize the importance of entrepreneurship skills; must emphasize technology or the application of technology in career fields; and, beginning in the 2014-2015 academic year, must provide information from the Department of Economic Opportunity's economic security report as described in section 445.07, Florida Statutes. For additional information on the Middle School Career and Education Planning course requirements, go to <http://www.fldoe.org/workforce/ced/>.

### **Career and Technical Student Organization (CTSO)**

National FFA Organization (FFA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Fundamentals of Agriculture, Food, and Natural Resource Systems  
**Course Type:** Orientation/Exploratory  
**Career Cluster:** Agriculture, Food, and Natural Resources

**Secondary – Middle School**

Course Number	8021300
CIP Number	148021300M
Grade Level	6-8
Standard Length	year
Teacher Certification	Agriculture 1 @2 EXP AG @4
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Summarize the evolution of production agriculture.
- 02.0 Differentiate between animal welfare and ethical treatment of animals
- 03.0 Explain skills and principles used in dairy production.
- 04.0 Explain skills and principles used in livestock production.
- 05.0 Explain skills and principles used in poultry production.
- 06.0 Explain skills and principles used in aquaculture production
- 07.0 Explain skills and principles used in vegetable production.
- 08.0 Investigate and demonstrate skills and principles used in nursery production.
- 09.0 Apply scientific and technical skills in production agriculture.
- 10.0 Manage leadership and communication skills
- 11.0 Examine good work habits, and career planning in agriculture production.
- 12.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in production agriculture.
- 13.0 Identify components of network systems.
- 14.0 Describe and use communication features of information technology.

Florida Department of Education  
Student Performance Standards

Course Title: Fundamentals of Agriculture, Food, and Natural Resource Systems  
Course Number: 8021300  
Course Length: Year

Course Description:

Beginning with a broad overview of the Agriculture, Food, and Natural Resources career cluster, students are introduced to the terminology, careers, history, required skills, and technologies associated with each pathway in the Agriculture, Food, and Natural Resources career cluster. Additionally, they will be provided with opportunities to acquire and demonstrate beginning leadership skills.

<b>CTE Standards and Benchmarks</b>	
01.0	Summarize the evolution of production agriculture – the student will be able to:
01.01	Describe the importance of agriculture on a world, national, state and community scale.
01.02	Distinguish the major agricultural production areas of the United States.
01.03	Distinguish agriculture products produced in Florida.
01.04	Interpret how changes in production practices, population, and land use have influenced the agriculture economy.
01.05	Demonstrate how development of new technology has affected agriculture production.
01.06	Examine the changes in agriculture careers that reflect the changes in production methods.
02.0	Differentiate between animal welfare and ethical treatment of animals – the student will be able to:
02.01	Describe the proper handling of production animals.
02.02	Compare animal welfare and animal rights.
02.03	Explain how animal welfare and animal rights advocate groups impact production agriculture.
02.04	Summarize animal cruelty and the consequences of cruel treatment of animals.
03.0	Explain skills and principles used in dairy production – the student will be able to:
03.01	Explain the difference between breeds of dairy cattle.



## CTE Standards and Benchmarks

03.02 Demonstrate knowledge of proper health and nutrition for dairy animals.

03.03 Explain the safety procedures used for dairy products.

03.04 Compare different styles of dairies and milking parlors.

03.05 Identify the varieties of dairy products and the methods of processing.

03.06 Create a dairy product.

04.0 Explain skills and principles used in livestock production – the student will be able to:

04.01 Compare the different breeds of livestock.

04.02 Differentiate the different cuts and grading of meat.

04.03 Evaluate proper health and nutrition for livestock animals.

04.04 Demonstrate knowledge of terminology for animals based on species and condition (eg. age, sex, bred, etc...)

04.05 Determine different reproduction methods, and the process of selective breeding.

04.06 Explain how the use of biotechnology has impacted the livestock industry.

05.0 Explain skills and principles used in poultry production – the student will be able to:

05.01 Compare different types of poultry and their uses in production agriculture.

05.02 Differentiate proper techniques for classification and grading of poultry and poultry products.

05.03 Describe proper safe handling techniques for poultry products.

05.04 Evaluate knowledge of health and nutrition for poultry.

05.05 Explain how the use of biotechnology has impacted the poultry industry.

06.0 Explain skills and principles used in aquaculture production – the student will be able to:

06.01 Compare the different breeds of aquatic species.

06.02 Evaluate proper health and nutrition for aquatic species.

06.03 Demonstrate knowledge of terminology for aquatic species.

## CTE Standards and Benchmarks

06.04 Determine different reproduction methods.

06.05 Explain how the use of biotechnology has impacted the aquatic species industry.

07.0 Explain skills and principles used in vegetable production – the student will be able to:

07.01 Produce a vegetable crop.

07.02 Compare the components of soil.

07.03 Perform a soil test.

07.04 Describe how climate can affect crop production.

07.05 Compile knowledge of growing seasons for a geographic region.

07.06 Explain the use of Best Management Practices in crop production.

07.07 Investigate the impact of pests on crop yields.

07.08 Model the safety precautions on a pesticide and fertilizer label.

07.09 Assess proper irrigation methods for crops.

07.10 Analyze knowledge of harvesting techniques and equipment

07.11 Compare types of storage facilities.

07.12 Explain how the use of biotechnology has impacted vegetable crop production.

08.0 Explain skills and principles used in nursery production – the student will be able to:

08.01 Perform plant propagation.

08.02 Develop a growing schedule for nursery plants.

08.03 Model methods for Integrated Pest Management.

08.04 Compare types of growing media.

08.05 Identify nutrients necessary for plant growth from the periodic table and their functions.

08.06 Identify plants based on common and scientific names.

## CTE Standards and Benchmarks

08.07 Describe principles for plant growth.

08.08 Explain different methods of irrigation.

08.09 Explain how the use of biotechnology has impacted plant production.

09.0 Apply scientific and technical skills in production agriculture – the student will be able to:

09.01 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.

09.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications

10.0 Manage leadership and communication skills – the student will be able to:

10.01 Discuss the establishment and history of the FFA organization.

10.02 Compare the characteristics and responsibilities of organizational leaders.

10.03 Demonstrate parliamentary procedure skills during a meeting.

10.04 Participate on a committee which has an assigned task and report to the class.

10.05 Demonstrate effective communication skills through delivery of a speech or conducting a demonstration.

10.06 Use a computer to assist in the completion of an agricultural project.

11.0 Demonstrate good work habits, and career planning in agriculture production – the student will be able to:

11.01 Identify attitudes and habits necessary to achieve career success.

11.02 Describe personality aspects to consider when choosing a career.

11.03 Identify the basic steps in career planning.

11.04 Identify and research careers within a specific area of agriscience.

12.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in production agriculture – the student will be able to:

12.01 Apply basic mathematics operations to solve agricultural problems.

12.02 Correctly use measuring devices and utilize measurements to solve agricultural problems.

12.03 Prepare written and/or oral materials using correct English grammar.

## CTE Standards and Benchmarks

12.04 Identify the main idea in oral presentations and/or written materials.

12.05 Locates, organizes, and interprets information from a variety of agricultural sources.

12.06 Describe the historical evolution of agriculture.

12.07 Select and study a problem that can be tested under controlled conditions to establish a hypothesis or to illustrate a known law.

13.0 Identify components of network systems – the student will be able to:

13.01 Identify structure to access internet, including hardware and software components.

13.02 Identify and configure user customization features in web browsers, including preferences, caching, and cookies.

13.03 Recognize essential database concepts.

13.04 Define and use additional networking and internet services.

14.0 Describe and use communication features of information technology – the student will be able to:

14.01 Define important internet communications protocols and their roles in delivering basic Internet services.

14.02 Identify basic principles of the Domain Name System (DNS).

14.03 Identify security issues related to Internet clients.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

National FFA Organization (FFA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Fundamentals of Agriculture, Food and Natural Resource Services  
**Course Type:** Orientation/Exploratory  
**Career Cluster:** Agriculture, Food and Natural Resources

Secondary – Middle School	
Course Number	8021400
CIP Number	148021400M
Grade Level	6-8
Standard Length	year
Teacher Certification	Agriculture 1 @2 EXP AG @4
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Identify components of agribusiness.
- 02.0 Recommend appropriate agriculture communications concepts
- 03.0 Summarize skills used in landscape services.
- 04.0 Incorporate knowledge and skills involved with food science.
- 05.0 Construct a floral design.
- 06.0 Communicate skills gained from small, companion animal care.
- 07.0 Recommend leadership and communication styles.
- 08.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology.
- 09.0 Recognize the value of responsibility, good work habits, and planning for career opportunities in agriculture services.
- 10.0 Identify components of network systems
- 11.0 Describe and use communication features of information technology

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Fundamentals of Agriculture, Food and Natural Resource Services  
**Course Number:** 8021400  
**Course Length:** 1 Year

**Course Description:**

This course is designed to develop competencies in the area of agriculture services. This includes: the global impact of agribusiness, communications, landscaping, food science, floral design, companion animal care, as well leadership skills. Laboratory-based activities are an integral part of this course. These include safe use and application of appropriate technology, scientific testing and observation equipment.

<b>CTE Standards and Benchmarks</b>	
01.0	Identify components of agribusiness – the student will be able to:
01.01	Describe the business cycle.
01.02	Complete a profit/loss statement.
01.03	Distinguish between types of competition practices.
01.04	Demonstrate proper methods of recording merchandise.
01.05	Summarize proper use of customer service skills.
01.06	Explain proper management techniques.
02.0	Recommend appropriate agriculture communications concepts – the student will be able to :
02.01	Sort and classify types of communication used in Agriculture.
02.02	Create messages using various forms of communication.
02.03	Generate a speech.
02.04	Compare and contrast different types of media.
02.05	Create a photo story.
02.06	Demonstrate proper ethics in communication.



## CTE Standards and Benchmarks

02.07 Identify and compare regulating agencies.

02.08 Evaluate careers in agriculture communications.

03.0 Summarize skills used in landscape services – the student will be able to:

03.01 Distinguish plants based on common and scientific name.

03.02 Conduct a soil test.

03.03 Construct an irrigation system.

03.04 Compare and contrast landscape styles.

03.05 Select plants based on environmental factors.

03.06 Design a landscape.

03.07 Model personal safety and knowledge of equipment.

03.08 Explain proper procedures for applying pesticides and fertilizer based on Best Management practices.

03.09 Inventory an ecosystem.

03.10 Apply knowledge of invasive plants.

03.11 Apply knowledge of customer interactions

04.0 Incorporate knowledge and skills involved with food science – the student will be able to:

04.01 Explain the process from farm to consumer

04.02 Investigate safe food handling practices, and their regulating agencies

04.03 Document changes in food preservation and how it impacted our civilization

04.04 Recognize food processing and packaging procedures.

04.05 Explain how to develop and market a food product.

04.06 Describe the components of a nutrition label

04.07 Create and market a food product.

## CTE Standards and Benchmarks

05.0 Construct a floral design – the student will be able to:

05.01 Compare and contrast historical and cultural contributions to design.

05.02 Identify types of arrangements and products.

05.03 Demonstrate knowledge of floral pricing.

05.04 Verify flowers by common and scientific name.

05.05 Assemble a floral arrangement.

05.06 Summarize knowledge of inventory skills.

05.07 Develop a marketing plan.

06.0 Communicate skills gained from small, companion animal care – the student will be able to:

06.01 Demonstrate knowledge of proper nutrition and health in small and companion animals.

06.02 Differentiate between animal welfare and animal rights.

06.03 Describe the training process for service animals

06.04 Compare and contrast career opportunities available for companion animals based on animal type and breed.

06.05 Explain proper care for a small animal.

07.0 Recommend leadership and communication styles – the student will be able to:

07.01 Explore the establishment and history of the FFA organization.

07.02 Analyze the characteristics and responsibilities of organizational leaders.

07.03 Demonstrate parliamentary procedure skills during a meeting.

07.04 Evaluate a committee which has an assigned task and report to the class.

07.05 Demonstrate effective communication skills through delivery of a speech or conducting a demonstration.

07.06 Use a computer to assist in the completion of an agricultural project.

08.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology – the student will be able to:

## CTE Standards and Benchmarks

08.01	Apply basic mathematics operations to solve agricultural problems.
08.02	Correctly use measuring devices and utilize measurements to solve agricultural problems.
08.03	Apply the scientific method to solve an agricultural problem.
08.04	Prepare written and/or oral materials using correct English grammar.
08.05	Identify the main idea in oral presentations and/or written materials.
08.06	Locates, organizes, and interprets information from a variety of agricultural sources.
08.07	Describe the historical evolution of agriculture.
09.0	Recognize the value of responsibility, good work habits, and planning for career opportunities in agriculture services – the student will be able to:
09.01	Identify attitudes and habits necessary to achieve career success.
09.02	Describe personality aspects to consider when choosing a career.
09.03	Identify the basic steps in career planning.
09.04	Develop basic career plan.
09.05	Identify and research careers within a specific area of agriscience.
10.0	Identify components of network systems – the student will be able to:
10.01	Identify structure to access internet, including hardware and software components.
10.02	Identify and configure user customization features in web browsers, including preferences, caching, and cookies.
10.03	Recognize essential database concepts.
10.04	Define and use additional networking and internet services.
11.0	Describe and use communication features of information technology – the student will be able to:
11.01	Define important internet communications protocols and their roles in delivering basic Internet services.
11.02	Identify basic principles of the Domain Name System (DNS).
11.03	Identify security issues related to Internet clients.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

National FFA Organization (FFA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Agriculture, Food and Natural Resource Directed Study  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Course Number	8100100
CIP Number	0101999901
Grade Level	11-12, 30, 31
Standard Length	Multiple credits
Teacher Certification	AGRICULTUR 1 @2 ANY AG EDUC G
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The purpose of this course is to provide students with learning opportunities in a prescribed program of study within the Agriculture, Food and Natural Resources cluster that will enhance opportunities for employment in the career field chosen by the student.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Course Structure**

The content is prescribed by the instructor based upon the individual student's assessed needs for directed study. This course may be taken only by a student who has completed or is currently completing a specific secondary job preparatory program or occupational completion point for additional study in this career cluster. A student may earn multiple credits in this course.

The selected standards and benchmarks, which the student must master to earn credit, must be outlined in an instructional plan developed by the instructor.

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate expertise in a specific occupation contained within the career cluster.
- 02.0 Conduct investigative research on a selected topic related to the career cluster using approved research methodology, interpret findings, and prepare presentation to defend results.
- 03.0 Apply enhanced leadership and professional career skills.
- 04.0 Demonstrate higher order critical thinking and reasoning skills appropriate for the selected program of study.

Florida Department of Education  
Student Performance Standards

Course Title: Agriculture, Food and Natural Resource Directed Study  
 Course Number: 8100100  
 Course Credit: 1

<b>CTE Standards and Benchmarks</b>	
01.0	Demonstrate expertise in a specific occupation within the career cluster – the student will be able to:
01.01	The benchmarks will be selected from the appropriate curriculum frameworks and determined by the instructor based upon the individual students assessed needs.
02.0	Conduct investigative research on a selected topic related to the career cluster using approved research methodology, interpret findings, and prepare presentation to defend results--The student will be able to:
02.01	Select investigative study referencing prior research and knowledge.
02.02	Collect, organize and analyze data accurately and precisely.
02.03	Design procedures to test the research.
02.04	Report, display and defend the results of investigations to audiences that may include professionals and technical experts.
03.0	Apply enhanced leadership and professional career skills – the student will be able to:
03.01	Develop and present a professional presentation offering potential solutions to a current issue.
03.02	Enhance leadership and career skills through work-based learning including job placement, job shadowing, entrepreneurship, internship, or a virtual experience.
03.03	Participate in leadership development opportunities available through the appropriate student organization and/or other professional organizations.
03.04	Enhance written and oral communications through the development of presentations, public speaking, and live and/or virtual interviews.
04.0	Demonstrate higher order critical thinking and reasoning skills appropriate for the selected program of study – the student will be able to:
04.01	Use mathematical and/or scientific skills to solve problems encountered in the chosen occupation.
04.02	Read and interpret information relative to the chosen occupation.
04.03	Locate and evaluate key elements of oral and written information.
04.04	Analyze and apply data and/or measurements to solve problems and interpret documents.



**CTE Standards and Benchmarks**

04.05 Construct charts/tables/graphs using functions and data.

04.06 Enhance leadership and career skills through work-based learning including job placement, job shadowing, entrepreneurship, internship, or a virtual experience.

04.07 Participate in leadership development opportunities available through the appropriate student organization and/or other professional organizations.

04.08 Enhance written and oral communications through the development of presentations, public speaking, and live and/or virtual interviews.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

## **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Orientation to Agriscience and Career Planning  
**Course Type:** Orientation/Exploratory and Career Planning  
**Career Cluster:** Agriculture Food and Natural Resources

**Secondary – Middle School**

Course Number	8100110
CIP Number	01019910CE
Grade Level	6-8
Standard Length	Semester
Teacher Certification	AGRICULTUR 1 @2 EXP AG @4
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate knowledge and skills in agriscience research.
- 02.0 Demonstrate knowledge and skills plant sciences.
- 03.0 Demonstrate knowledge and skills in animal sciences.
- 04.0 Demonstrate knowledge and skills in food science.
- 05.0 Demonstrate knowledge and skills in agriscience laboratories.
- 06.0 Demonstrate product knowledge and skills in agricultural processing and marketing.
- 07.0 Demonstrate knowledge and skills in environmental resources.
- 08.0 Demonstrate leadership and communication skills.
- 09.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology.

### **Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes.**

- 10.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.
- 11.0 Develop skills to locate, evaluate, and interpret career information.
- 12.0 Identify and demonstrate processes for making short and long term goals.
- 13.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
- 14.0 Understand the relationship between educational achievement and career choices/postsecondary options.
- 15.0 Identify a career cluster and related pathways through an interest assessment that match career and education goals.
- 16.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
- 17.0 Demonstrate knowledge of technology and its application in career fields/clusters.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Orientation to Agriscience and Career Planning  
**Course Number:** 8100110  
**Course Length:** Semester

**Course Description:**

This course is designed to provide an understanding of the agricultural food system, environmental resources, and strategies used to produce and market agricultural products, and an exploration of research through the use of the scientific method.

<b>CTE Standards and Benchmarks</b>	
01.0	Demonstrate knowledge and skills in agriscience research – the student will be able to:
01.01	Define agriscience.
01.02	Describe products of agriscience.
01.03	Define the scope of research in agriscience.
01.04	Discuss the impact of research on agriculture and on consumers of agricultural products.
01.05	Identify the process by which agricultural research is conducted including the scientific method.
01.06	Apply the scientific method to solve an agricultural problem.
02.0	Demonstrate knowledge and skills in plant sciences – the student will be able to:
02.01	Distinguish between nursery and landscape plants and crops for consumption.
02.02	Identify horticultural forestry and agronomic plants.
02.03	Propagate and grow an agricultural plant.
02.04	Identify supplies and services industries related to plant science.
02.05	Develop a specimen collection of local plant materials.
02.06	Demonstrate proper planting techniques.
02.07	Identify nursery and landscape plants and crops for consumption.

## CTE Standards and Benchmarks

03.0 Demonstrate knowledge and skills in animal sciences – the student will be able to:

03.01 Distinguish between food, service and companion animals.

03.02 Identify breeds of food, service and companion animals.

03.03 Identify supplies and services industries related to animal science.

03.04 Demonstrate the proper care of an animal.

03.05 Identify consumer foods and products derived from animals.

04.0 Demonstrate knowledge and skills in food science – the student will be able to:

04.01 Describe the proper handling and storage of food products.

04.02 List and explain methods of food preservation.

04.03 Conduct a food taste test.

04.04 Develop a production and marketing plan for a food product.

04.05 Read and interpret a food label.

05.0 Demonstrate knowledge and skills in agriscience laboratories and workshops – the student will be able to:

05.01 Demonstrates proper laboratory safety techniques.

05.02 Complete a project demonstrating the safe use of agricultural tools, machinery and equipment.

05.03 Define the scope of agricultural mechanization and engineering.

05.04 Discuss the impact of agricultural mechanization and engineering on society.

05.05 Identify tools, machines and equipment used in agriculture.

05.06 Conduct an experiment using proper laboratory techniques.

05.07 Demonstrate proper workshop safety techniques.

06.0 Demonstrate product knowledge and skills in agricultural processing and marketing – the student will be able to:

06.01 Define agricultural product processing and marketing.

06.02 Describe the processing and marketing of an agriculture product from farm to consumer.

## CTE Standards and Benchmarks

06.03 Prepare process and market an agricultural product.

07.0 Demonstrate knowledge and skills in environmental resources – the student will be able to:

07.01 Define and identify renewable and nonrenewable natural resources.

07.02 Describe agricultural management practices that conserve natural resources.

07.03 Describe effects of pollution on the environment.

07.04 Demonstrate how to Recycle or conserve a natural resource.

07.05 Define organic agriculture and traditional agriculture.

08.0 Demonstrate leadership and communication skills – the student will be able to:

08.01 Describe the aims and purposes of the FFA organization.

08.02 Identify opportunities available to FFA members.

08.03 Identify characteristics of a good leader.

08.04 Participate in a cooperative leadership development activity or FFA Career Development Event.

08.05 Identify the importance of effective communication skills.

08.06 Demonstrate effective communication skills.

09.0 Integrate the use of science, mathematics, reading, geography, history, writing and communication in agriscience and technology – the student will be able to:

09.01 Apply basic mathematic operations to solve agricultural problems.

09.02 Correctly use measuring instruments and utilize measurements to solve agricultural problems.

09.03 Apply the scientific method to solve an agricultural problem.

09.04 Prepare written and oral materials using correct English grammar.

09.05 Identify the main idea in oral presentations and written materials.

09.06 Locates, organizes and interprets information from a variety of agricultural sources.

09.07 Describe the historical evolution of agriculture.

09.08 Identify specific areas of commodity production in the state, nation and world.



## CTE Standards and Benchmarks

Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes.

The student will be able to:

- |      |   |
|------|---|
| 10.0 | Describe the influences that societal, economic, and technological changes have on employment trends and future training.                       |
| 11.0 | Develop skills to locate, evaluate, and interpret career information.   |
| 12.0 | Identify and demonstrate processes for making short and long term goals.  |
| 13.0 | Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship. |
| 14.0 | Understand the relationship between educational achievement and career choices/postsecondary options.   |
| 15.0 | Identify a career cluster and related pathways that match career and education goals.   |
| 16.0 | Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.      |
| 17.0 | Demonstrate knowledge of technology and its application in career fields/clusters.  |

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

### **Career Planning**

The requirements of section 1003.4156 (1) (e), Florida Statutes, have been integrated into this course. The statute requires that students take a career and education planning course that must result in a completed personalized academic and career plan for the student; must emphasize the importance of entrepreneurship skills; must emphasize technology or the application of technology in career fields; and, beginning in the 2014-2015 academic year, must provide information from the Department of Economic Opportunity's economic security report as described in section 445.07, Florida Statutes. For additional information on the Middle School Career and Education Planning course requirements, go to <http://www.fldoe.org/workforce/ced/>.

### **Career and Technical Student Organization (CTSO)**

National FFA Organization (FFA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

## **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Introduction to Agriscience  
**Course Type:** Orientation/Exploratory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Middle School**

Course Number	8100120
CIP Number	01019921EX
Grade Level	6-8
Standard Length	Semester
Teacher Certification	AGRICULTUR 1 @2 EXP AG @4
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Identify the importance of agriculture.
- 02.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology.
- 03.0 Describe chains between producer and consumer for agricultural products.
- 04.0 Use selected techniques to produce finished products from agricultural materials.
- 05.0 Describe the importance of plants and animals in agriculture.
- 06.0 Describe leadership and communication skills.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Agriscience  
**Course Number:** 8100120  
**Course Length:** Semester

**Course Description:**

This course is designed to develop competencies in the areas of agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture.

<b>CTE Standards and Benchmarks</b>	
01.0	Identify the importance of agriculture – the student will be able to:
01.01	Define agriculture and explain its diversity and scope.
01.02	Describe the importance of agriculture on a world, national, state and community scale.
01.03	Describe the importance of agriculture in each individual's life.
01.04	Collect and discuss information on current agricultural events.
01.05	Trace the evolution of agriculture from its begins to current applications.
01.06	Identify conditions necessary for agricultural production.
01.07	Identify the major agricultural production areas of the United States and of Florida.
01.08	Describe the diversity of career opportunities in agriscience and technology.
01.09	Describe the relationship between environmental resources and agriculture.
01.10	Describe technology used in agricultural production.
01.11	Describe technology used in processing and marketing agricultural products.
02.0	Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology – the student will be able to:
02.01	Apply basic mathematics operations to solve agricultural problems.
02.02	Correctly use measuring devices and utilize measurements to solve agricultural problems.

## CTE Standards and Benchmarks

02.03 Prepare written and oral materials using correct English grammar.

02.04 Identify the main idea in oral presentations and written materials.

02.05 Locates, organizes, and interprets information from a variety of agricultural sources.

02.06 Describe the historical evolution of agriculture in Florida.

03.0 Describe chains between producer and consumer for agricultural products – the student will be able to:

03.01 Identify the agricultural source of consumer products.

03.02 Trace the development of an agricultural product from the producer to the consumer.

01.01 Evaluate proper health and nutrition for livestock animals.

04.0 Use selected techniques to produce finished products from agricultural materials – the student will be able to:

04.01 Complete a project safely using the appropriate agricultural tools, machinery or equipment.

04.02 Prepare and process an agricultural product.

04.03 Propagate horticulture plants.

05.0 Describe the importance of plants and animals in agriculture – the student will be able to:

05.01 Identify plants important to agriculture.

05.02 Identify animals important to agriculture.

05.03 Demonstrate the proper handling and ethical care of animals.

05.04 Describe animal rights and animal welfare.

05.05 Define organic farming and traditional farming.

06.0 Describe leadership and communication skills – the student will be able to:

06.01 Describe the aims and purposes of the FFA organization.

06.02 Identify opportunities available to FFA members.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Special Notes**

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

### **Career and Technical Student Organization (CTSO)**

National FFA Organization (FFA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

### **Additional Resources**



For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:  
<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Exploration of Agriscience  
**Course Type:** Orientation/Exploratory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Middle School**

Course Number	8100210
CIP Number	01019920EX
Grade Level	6-8
Standard Length	Semester
Teacher Certification	AGRICULTUR 1 @2 EXP AG @4
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Apply knowledge and skills in biotechnology.
- 02.0 Apply knowledge and skills in plant sciences.
- 03.0 Apply knowledge and skills in animal sciences.
- 04.0 Demonstrate knowledge and skills in food science.
- 05.0 Apply knowledge and skills in processing and marketing.
- 06.0 Apply knowledge and skills in environmental resources.
- 07.0 Demonstrate the value of responsibility, good work habits, and planning for career opportunities in agriculture.
- 08.0 Apply leadership and communication skills.
- 09.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Exploration of Agriscience  
**Course Number:** 8100210  
**Course Length:** Semester

**Course Description:**

This course is designed to provide instruction that explores the tasks, training, education and physical requirements of a broad range of agriscience and natural resources careers develop competencies in the areas of agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture.

<b>CTE Standards and Benchmarks</b>	
01.0	Apply knowledge and skills in biotechnology – the student will be able to:
01.01	Define biotechnology.
01.02	Discuss current and future uses of genetic engineering.
01.03	Identify issues associated with biotechnology.
01.04	Explain the history of genetic engineering and biotechnology in agriculture.
02.0	Apply knowledge and skills in plant sciences – the student will be able to:
02.01	Produce an agricultural crop.
02.02	Discuss the technology involved in the development of improved crops.
02.03	Identify agribusinesses that provide supplies and services to plant science industries in the local area.
02.04	Identify the recommended uses and safety precautions from a pesticide label.
02.05	Compare landscaping methods.
02.06	Develop a landscape design.
02.07	Develop a care and maintenance program for horticultural, forestry, and/or agronomic crops.
02.08	Identify pests, pathogens, parasites, and predators of horticultural, forestry, and agronomic crops.

## CTE Standards and Benchmarks

02.09 Describe the major components of soil.

02.10 Explain methods of soil conservation.

02.11 Identify the major forest regions of the United States and Florida.

02.12 Describe the importance of forests and forest products.

02.13 Describe how trees grow, reproduce, and components of forest health.

02.14 Use tools and techniques common to the forest industry.

02.15 Describe various forms of fertilizer.

02.16 Demonstrate how to read a fertilizer label.

02.17 Demonstrate proper fertilizer use.

03.0 Apply knowledge and skills in animal sciences – the student will be able to:

03.01 Describe the differences between animal welfare and animal rights.

03.02 Raise and care for an agricultural animal.

03.03 Discuss the technology involved in the development of improved animal products.

03.04 Identify agribusinesses that provide supplies and services to animal science industries in the local area.

04.0 Demonstrate knowledge and skills in food science – the student will be able to:

04.01 Demonstrate the proper handling and storage of food products.

04.02 Demonstrate at least one method of food preservation.

04.03 Conduct a food taste test.

04.04 Produce and market a food product.

04.05 Read, interpret, and develop a food label.

04.06 Describe the components of a balance diet.

05.0 Apply knowledge and skills in agricultural processing and marketing – the student will be able to:

## CTE Standards and Benchmarks

05.01 Identify processing and packaging techniques used in agriculture.

05.02 Discuss the difference in marketing strategies between perishable and nonperishable commodities.

05.03 Develop a merchandising plan for an agricultural product.

05.04 Identify and compare USDA standards and grades for agricultural products.

05.05 Describe how processing, packaging, and marketing affects the price of an item.

05.06 Recognize misleading advertising.

05.07 Describe how competition benefits the consumer.

05.08 Record the market price of an agricultural commodity over a period of time.

06.0 Apply knowledge and skills in environmental resources – the student will be able to:

06.01 Identify methods or practices of conserving natural resources.

06.02 Demonstrate a method or practice of conservation.

06.03 Identify major ecosystems in Florida.

06.04 Discuss the importance of the ecosystems to agriculture, society and each other.

06.05 Define Best Management Practices.

06.06 Explain the use of Best Management Practices in agriculture.

07.0 Demonstrate the value of responsibility, good work habits, and planning for career opportunities in agriculture – the student will be able to:

07.01 Identify attitudes and habits necessary to achieve career success.

07.02 Identify the basic steps in career planning.

07.03 Develop basic career plan.

07.04 Identify and research careers within a specific area of agriscience.

08.0 Apply leadership and communication skills – the student will be able to:

08.01 Discuss the establishment and history of the FFA organization.

## CTE Standards and Benchmarks

08.02 Identify the characteristics and responsibilities of organizational leaders.

08.03 Demonstrate parliamentary procedure skills during a meeting.

08.04 Demonstrate effective communication skills through delivery of a speech or conducting a demonstration.

08.05 Identify state and community organizations associated with agricultural promotion.

09.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology – the student will be able to:

09.01 Apply basic mathematics operations to solve agricultural problems.

09.02 Correctly use measuring devices and utilize measurements to solve agricultural problems.

09.03 Apply the scientific method to solve an agricultural problem.

09.04 Prepare written and/or oral materials using correct English grammar.

09.05 Identify the main idea in oral presentations and/or written materials.

09.06 Locates, organizes, and interprets information from a variety of agricultural sources.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Special Notes**

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

### **Career and Technical Student Organization (CTSO)**

National FFA Organization (FFA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

### **Additional Resources**



For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:  
<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Orientation to Agriscience  
**Course Type:** Orientation/Exploratory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Middle School**

Course Number	8100310
CIP Number	01019910OR
Grade Level	6-8
Standard Length	Semester
Teacher Certification	AGRICULTUR 1 @2 EXP AG @4
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate knowledge and skills in agriscience research.
- 02.0 Demonstrate knowledge and skills plant sciences.
- 03.0 Demonstrate knowledge and skills in animal sciences.
- 04.0 Demonstrate knowledge and skills in food science.
- 05.0 Demonstrate knowledge and skills in agriscience laboratories.
- 06.0 Demonstrate product knowledge and skills in agricultural processing and marketing.
- 07.0 Demonstrate knowledge and skills in environmental resources.
- 08.0 Demonstrate leadership and communication skills.
- 09.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Orientation to Agriscience  
**Course Number:** 8100310  
**Course Length:** Semester

**Course Description:**

This course is designed to provide an understanding of the agricultural food system, environmental resources, and strategies used to produce and market agricultural products, and an exploration of research through the use of the scientific method.

<b>CTE Standards and Benchmarks</b>	
01.0	Demonstrate knowledge and skills in agriscience research – the student will be able to:
01.01	Define agriscience.
01.02	Describe products of agriscience.
01.03	Define the scope of research in agriscience.
01.04	Discuss the impact of research on agriculture and on consumers of agricultural products.
01.05	Identify the process by which agricultural research is conducted including the scientific method.
01.06	Apply the scientific method to solve an agricultural problem.
02.0	Demonstrate knowledge and skills in plant sciences – the student will be able to:
02.01	Distinguish between nursery and landscape plants and crops for consumption.
02.02	Identify horticultural forestry and agronomic plants.
02.03	Propagate and grow an agricultural plant.
02.04	Identify supplies and services industries related to plant science.
02.05	Develop a specimen collection of local plant materials.
02.06	Demonstrate proper planting techniques.

## CTE Standards and Benchmarks

02.07 Identify nursery and landscape plants and crops for consumption.

03.0 Demonstrate knowledge and skills in animal sciences – the student will be able to:

03.01 Distinguish between food, service and companion animals.

03.02 Identify breeds of food, service and companion animals.

03.03 Identify supplies and services industries related to animal science.

03.04 Demonstrate the proper care of an animal.

03.05 Identify consumer foods and products derived from animals.

04.0 Demonstrate knowledge and skills in food science – the student will be able to:

04.01 Describe the proper handling and storage of food products.

04.02 List and explain methods of food preservation.

04.03 Conduct a food taste test.

04.04 Develop a production and marketing plan for a food product.

04.05 Read and interpret a food label.

05.0 Demonstrate knowledge and skills in agriscience laboratories and workshops – the student will be able to:

05.01 Demonstrates proper laboratory safety techniques.

05.02 Complete a project demonstrating the safe use of agricultural tools, machinery and equipment.

05.03 Define the scope of agricultural mechanization and engineering.

05.04 Discuss the impact of agricultural mechanization and engineering on society.

05.05 Identify tools, machines and equipment used in agriculture.

05.06 Conduct an experiment using proper laboratory techniques.

05.07 Demonstrate proper workshop safety techniques.

06.0 Demonstrate product knowledge and skills in agricultural processing and marketing – the student will be able to:

## CTE Standards and Benchmarks

06.01 Define agricultural product processing and marketing.

06.02 Describe the processing and marketing of an agriculture product from farm to consumer.

06.03 Prepare process and market an agricultural product.

07.0 Demonstrate knowledge and skills in environmental resources – the student will be able to:

07.01 Define and identify renewable and nonrenewable natural resources.

07.02 Describe agricultural management practices that conserve natural resources.

07.03 Describe effects of pollution on the environment.

07.04 Demonstrate how to Recycle or conserve a natural resource.

07.05 Define organic agriculture and traditional agriculture.

08.0 Demonstrate leadership and communication skills – the student will be able to:

08.01 Describe the aims and purposes of the FFA organization.

08.02 Identify opportunities available to FFA members.

08.03 Identify characteristics of a good leader.

08.04 Participate in a cooperative leadership development activity or FFA Career Development Event.

08.05 Identify the importance of effective communication skills.

08.06 Demonstrate effective communication skills.

09.0 Integrate the use of science, mathematics, reading, geography, history, writing and communication in agriscience and technology – the student will be able to:

09.01 Apply basic mathematic operations to solve agricultural problems.

09.02 Correctly use measuring instruments and utilize measurements to solve agricultural problems.

09.03 Apply the scientific method to solve an agricultural problem.

09.04 Prepare written and oral materials using correct English grammar.

09.05 Identify the main idea in oral presentations and written materials.

**CTE Standards and Benchmarks**

09.06 Locates, organizes and interprets information from a variety of agricultural sources.

09.07 Describe the historical evolution of agriculture.

09.08 Identify specific areas of commodity production in the state, nation and world.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Special Notes**

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters.

### **Career and Technical Student Organization (CTSO)**

National FFA Organization (FFA) is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

### **Additional Resources**



For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:  
<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Fundamentals of Agriscience  
**Course Type:** Non Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Non Career Preparatory**

Course Number	8100320
CIP Number	01019931PA
Grade Level	9-12, 30, 31
Standard Length	1 credit
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
CTE Program Resources	<a href="http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This course offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of Agriculture, Food and Natural Resources career cluster.

The purpose of this course is to give students an opportunity to apply knowledge and skills related to the area of Agriculture, Food and Natural Resources.

The content includes but is not limited to instruction in plant science, animal science, soil science, agricultural mechanics, natural resources and conservation, communication and employability skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Academic Alignment Tables**

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State

Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth- Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Fundamentals of Agriscience	6/87 7%	3/80 4%	39/83 47%	7/69 10%	25/67 37%	17/70 24%	8/69 12%	35/82 43%	13/66 20%	31/74 42%	4/72 6%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Fundamentals of Agriscience	#	#	#	9/46 20%	9/45 20%	9/45 20%	9/45 20%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Fundamentals of Agriscience.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Fundamentals of Agriscience.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Fundamentals of Agriscience.
- 04.0 Describe the unique relationship between agriscience and the environment.
- 05.0 Initiate a Supervised Agricultural Experience (SAE) program based on identified career opportunities.
- 06.0 Demonstrate basic leadership skills in parliamentary procedure, public speaking, and group dynamics.
- 07.0 Demonstrate basic skills in natural resources.
- 08.0 Demonstrate basic skills in pest management.
- 09.0 Demonstrate the fundamental skills in plant science.
- 10.0 Demonstrate the aesthetic and environmental use of plants.
- 11.0 Demonstrate the basic skills in animal science.
- 12.0 Demonstrate the fundamental skills in food science and technology.
- 13.0 Demonstrate the basic skills in agricultural business management.
- 14.0 Demonstrate the basic mechanical skills.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Fundamentals of Agriscience  
**Course Number:** 8100320  
**Course Credit:** 1

**Course Description:**

This course teaches knowledge and skills related to the area of plant science, animal science, soil science, agricultural mechanics, natural resources and conservation, communication and employability skills.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Fundamentals of Agriscience.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).  LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Fundamentals of Agriscience.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Fundamentals of Agriscience.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06	Attend to precision. MAFS.K12.MP.6.1	
03.07	Look for and make use of structure.	



Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	
	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
04.0 Describe the unique relationship between agriscience and the environment – the student will be able to:		
04.01 Identify the major sciences that explain the development, existence, and improvement of living things.	LAFS.910.SL.2.4 LAFS.910.SL.3.6	SC.912.N.1.1; SC.912.L.14.10
04.02 Describe the elements of a healthful environment.	LAFS.910.SL.2.4 LAFS.910.SL.3.6	SC.912.L.17.7, 17
04.03 Describe the efforts made to improve the environment.	LAFS.910.SL.2.4 LAFS.910.SL.3.6	SC.912.L.17.15, 17;
05.0 Initiate a Supervised Agricultural Experience (SAE) program based on identified career opportunities – the student will be able to:		
05.01 Identify career opportunities in agriscience.		
05.02 Identify how careers are classified and determine preparation requirements.		
05.03 Plan a supervised agricultural experience program.	LAFS.910.W.3.7, 8, 9 LAFS.910.L.1.2 LAFS.910.SL.3.6	
05.04 Demonstrate employability skills.		
06.0 Demonstrate basic leadership skills in parliamentary procedure, public speaking, and group dynamics – the student will be able to:		
06.01 Explain the importance of effective leadership in agriscience.		
06.02 Prepare and present an oral report.	LAFS.910.W.1.2, LAFS.910.SL.2.6 LAFS.910.L.3.6	
06.03 Prepare and submit a written report on an agriscience topic.	LAFS.910.W.1.2, LAFS.910.SL.2.6 LAFS.910.L.3.6, LAFS.910.L.1.2	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
06.04 Describe the opportunities available through the FFA organization.	LAFS.910.SL.2.4, LAFA.910.L.3.6	
07.0 Demonstrate basic skills in natural resources – the student will be able to:		
07.01 Determine the major sources of air pollution and identify procedures for maintaining and improving air quality.		SC.912.L.17.15, 16, 18; SC.912.E.6.6
07.02 Determine the relationships between water and soil in our environment and determine practices for conserving these resources.		SC.912.L.17.16; SC.912.L.18.12; SC.912.E.7.3
07.03 Determine the origin and classification of soils, and identify effective procedures for soils and hydroponics management.		SC.912.E.7.3; SC.912.L.17.19
07.04 Compare the relationship of forests to our environment and select practices for utilizing forest resources.		SC.912.L.17.11, 17;
07.05 Describe the relationship between wildlife and the environment and identify approved practices in managing wildlife enterprises.		
07.06 Identify the biological requirements necessary for the production of aquatic plants and animals.		
08.0 Demonstrate basic skills in pest management – the student will be able to:		
08.01 Identify the major pest groups and the importance of effective pest management programs.		SC.912.L.17.13, 17;
08.02 Classify the nature of chemicals used to control pests.		SC.912.P.8.7 SC.912.L.14.46
08.03 Define terms regarding chemical safety.	LAFS.910.L.3.6	SC.912.L.17.16
08.04 Demonstrate safety in the use of chemicals.		SC.912.L.14.6; SC.912.L.17.16
09.0 Demonstrate the fundamental skills in plant science – the student will be able to:		
09.01 Identify the major parts of plants and state the important functions of each.		SC.912.L.14.53; SC.912.L.14.7
09.02 State how plants make food.	LAFS.910.SL.1.1, LAFS.910.L.3.6	SC.912.L.18.7, 9;
09.03 Describe the relationships among air, soil, water, and essential plant nutrients.	LAFS.910.SL.2.4, LAFS.910.L.3.6	SC.912.L.17.10; SC.912.L.14.7
09.04 Identify the methods used by plants to reproduce themselves and demonstrate propagation technology.		
09.05 Plan, plant and manage a garden.		
09.06 Identify the basic principles of fruit and nut production.		SC.912.L.14.7, 8;
09.07 Identify the basic principles of vegetable production.		SC.912.L.14.7

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci
09.08 Identify the major crops grown for grain, oil, and special purposes.		SC.912.L.14.53
09.09 Identify the major crops grown for forage and pasture.		SC.912.L.14.53
10.0 Demonstrate the aesthetic and environmental uses of plants – the student will be able to:		
10.01 Identify and maintain indoor plants.		SC.912.L.17.8, 20; SC.912.L.18.7, 9; SC.912.N.4.2
10.02 State the basic cultural practices for turfgrass production and maintenance.	LAFS.910.SL.2.4 LAFS.910.L.3.6	SC.912.L.17.8, 10, 11, 12, 13, 16, 17, 20; SC.912.N.4.2
10.03 Identify and maintain trees and shrubs.		SC.912.L.17.4, 8, 10, 11, 13; SC.912.L.18.7, 9; SC.912.N.4.2
11.0 Demonstrate the basic skills in animal science – the student will be able to:		
11.01 Determine the basic nutritional requirements of animals.		SC.912.L.18.1, 2, 3, 4; SC.912.L.14.46; SC.912.N.2.4
11.02 Identify the factors promoting and maintaining animal health.		SC.912.L.18.1, 2, 3, 4; SC.912.L.14.6, 31, 32, 33; SC.912.N.2.4
11.03 Define terms associated with animal genetics and reproduction, and describe the principles of genetics.	LAFS.910.L.3.6	SC.912.L.15.15; SC.912.L.16.2, 4, 9; SC.912.L.14.33; SC.912.N.2.4
11.04 Identify the types, uses, care, and management of small animals.		SC.912.L.14.6; SC.912.L.15.4, 5; SC.912.L.17.1, 6; SC.912.N.2.4
11.05 Identify major types and classes of livestock and horses.		SC.912.L.15.4, 5; SC.912.L.17.6, 20; SC.912.L.17.6
12.0 Demonstrate the fundamental skills in food science and technology – the student will be able to:		
12.01 Compare procedures for marketing plants and animal products.		SC.912.N.4.2
12.02 Describe the elements, trends, and career opportunities in the food industry.	LAFS.910.SL.2.4 LAFS.910.L.3.6	
12.03 Describe the nutrient requirements for human health.	LAFS.910.SL.2.4 LAFS.910.L.3.6	SC.912.L.14.46; SC.912.L.18.1, 2, 3, 4

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci
12.04 Identify the processes used in food science.		SC.912.P.8.2, 8; SC.912.N.2.4
13.0 Demonstrate the basic skills in agricultural business management – the student will be able to:		
13.01 Define management terms and determine how decisions are made.	LAFS.910.L.3.6	
13.02 Define and describe entrepreneurship.	LAFS.910.L.3.6	
13.03 Solve basic arithmetic problems associated with agribusiness management.		
14.0 Demonstrate the basic mechanical skills – the student will be able to:		
14.01 Identify basic hardware and fasteners.		
14.02 State the safety precautions and demonstrate appropriate behavior while working in the shop area.	LAFS.910.SL.2.4 LAFS.910.L.3.6	
14.03 Identify the basic principles and use of electricity.		SC.912.P.10.15
14.04 Identify and correctly use hand and power tools common to the agricultural shop.		SC.912.P.12.2
14.05 Identify the controls and safely operate a farm tractor.		SC.912.P.12.2
14.06 Describe the basic operation of internal combustion engines.	LAFS.910.SL.2.4 LAFS.910.L.3.6	SC.912.P.12.10
14.07 Service and operate small gasoline engines.		
14.08 Plan and construct a small woodworking project.		
14.09 Solve basic arithmetic problems associated with agriculture mechanics.		

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Course Title:**        **Advanced Concepts of Agriscience**  
**Course Type:**       **Career Preparatory**  
**Career Cluster:**    **Agriculture, Food and Natural Resources**

**Secondary – Career Preparatory**

Course Number	8100330
CIP Number	0101999902
Grade Level	11-12, 30, 31
Standard Length	1 credit
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

The purpose of this course is to provide students who have completed or are currently completing an OCP (occupational completion point) in an agricultural program, a capstone experience in agriscience education. This course is designed to enhance competencies in the areas of agricultural science and research; biological and physical science; environmental principles; and principles of leadership. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This course may be taken only by a student who has completed or is currently completing an occupational completion point in a job preparatory program. Standards 1-3 are required for all students. Each student will complete one or more of Standards 4-7 depending on the program the student has completed or is completing.

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8100330	Advanced Concepts of Agriscience	1 credit		2	VO

*(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)*

**Academic Alignment Tables**

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Advanced Concepts of Agriscience	**	**	**	**	**	**	**	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Advanced Concepts of Agriscience	**	**	**	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course



## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Conduct a research project in agriculture using the scientific method, interpret research information, and prepare and present a research project.
- 02.0 Apply enhanced leadership and professional career skills.
- 03.0 Illustrate agricultural applications of physical science concepts and principles.

## **Optional Standards:**

- 04.0 Investigate the concepts, principles, and theories associated with the classification, growth, function, and reproduction of plants and soils.
- 05.0 Investigate concepts associated with animal taxonomy, life at the cellular level, organ systems, genetics, ecology, and related current issues to understand animal life and animal science as it pertains to agriculture.
- 06.0 Investigate how chemistry and physics principles are applied to the composition of foods, food nutrition, and microbiology as it is associated with the food science segment of agriculture.
- 07.0 Apply enhanced agricultural communication and/or agricultural sales skills.

Florida Department of Education  
Student Performance Standards

Course Title:        **Advanced Concepts of Agriscience**  
Course Number:     **8100330**  
Course Credit:      **1**

<b>CTE Standards and Benchmarks</b>	
01.0	Conduct a research project in agriculture using the scientific method, interpret research information, and prepare and present a research project–The student will be able to:
01.01	Formulate hypotheses referencing prior research and knowledge.
01.02	Conduct controlled experiments or simulations to test hypotheses.
01.03	Collect, organize and analyze data accurately and precisely.
01.04	Formulate hypotheses referencing prior research and knowledge.
01.05	Design procedures to test the selected hypotheses.
01.06	Conduct systematic controlled experiments to test the selected hypotheses.
01.07	Report, display and defend the results of investigations to audiences that may include professionals and technical experts.
01.08	Estimate and suggest ways to reduce the degree of risk involved in activities in agriculture and related sciences.
02.0	Apply enhanced leadership and professional career skills–The student will be able to:
02.01	Identify and investigate a current agricultural issue.
02.02	Develop and present a professional presentation offering potential solutions to a current agricultural issue.
02.03	Enhance work-based learning through an expanded Supervised Agricultural Experience (SAE).
02.04	Identify the opportunities for enhanced leadership development available through the National FFA Organization and/or professional organizations.
02.05	Enhance written and oral communications through developing resumes and interviews.
03.0	Illustrate agricultural applications of physical science concepts and principles–The student will be able to:
03.01	Compare physical, ecological and behavioral factors that influence interactions and interdependence of organisms.
03.02	Identify a design problem that has practical applications and propose possible solutions, considering such constraints as available tools, materials, time, and costs.

03.03	Analyze the properties of materials (e.g., mass, boiling point, melting point, hardness) in relation to their physical and/or chemical structures.
03.04	Analyze factors that influence the relative motion of an object (e.g., friction, wind shear, cross currents, potential differences).
03.05	Analyze reactions (e.g., burning of fuel, decomposition of waste) in natural and man-made energy systems.
03.06	Describe the need for organization, supervision, rules, policies and procedures.
<b>Optional Standards:</b> Each program offering this course will provide instruction in one or more of the following standards. Selection of standard(s) will be based on the agriscience education program the student has completed or is completing.	
04.0	Investigate the concepts, principles, and theories associated with the classification, growth, function, and reproduction of plant and soils-- The student will be able to:
04.01	Describe biotechnology and genetic engineering.
04.02	Discuss the benefits and risks of biotechnology.
04.03	Describe the functions of water in plant growth.
04.04	Identify major sources of water pollution and possible measures for its control.
04.05	Contrast the biochemistry and functions of plant cell membranes and cell walls.
04.06	Describe and give functions for common plant cell types.
04.07	Identify cell types and functions associated with the vascular, dermal and ground tissue systems in woody and herbaceous plant parts.
04.08	Compare and contrast periderm and epidermis and xylem and phloem.
04.09	Explain how differential gene expression is what determines which proteins are made, and how the proteins decide the characteristics and functions of a particular cell.
04.10	Describe methods of producing transgenic plants and ways in which they are used.
05.0	Investigate concepts associated with animal taxonomy, life at the cellular level, organ systems, genetics, ecology, and related current issues to understand animal life and animal science as it pertains to agriculture--The student will be able to:
05.01	Identify the major features of chordates, identify the highlights of vertebrate evolution (development of jaws, cartilage to bone, and water to land), and identify the distinguishing characters of fish, birds, and mammals.
05.02	Compare and contrast three types of chemical bonds: hydrogen, ionic and covalent bonds.
05.03	Describe the biochemistry and functions of animal cell membranes. In doing so, describe the fluid mosaic model of the membrane and the role of the cell membrane proteins in transporting materials in and out of cells.
05.04	Using examples relevant to animal science, track the events involved in expression of individual genes and compartmentalization of the resulting proteins.
05.05	Discuss four basic tissue types: epithelial, connective, muscle, and nervous.

05.06	Describe the chemical process in the formation of bones and muscles and the process of calcification and its impact on animal growth.
05.07	Describe homeostasis and how it is controlled.
05.08	Explain the flow of genetic information, and identify the central dogma: DNA transcription-mRNA-translation-protein.
05.09	Describe the purpose, function, and production of RNA, and explain how protein synthesis works.
06.0	Investigate how chemistry and physics principles are applied to the composition of foods, food nutrition, and microbiology as it is associated with the food science segment of agriculture--The student will be able to:
06.01	Describe composition and arrangement of functional groups found in biological systems.
06.02	Discuss the chemical composition and structure of protein molecules including primary, secondary, tertiary, and quaternary structures.
06.03	Discuss the biochemical and physiological functions of proteins, carbohydrates, lipids, vitamins and minerals.
06.04	Explain thermodynamics and kinetics (e.g., reaction rates for affecting quality and destroying nutrients).
06.05	Compare and contrast the chemical reactions initiated by the effect of heat, oxygen, acid, and light during processing and storage of foods.
06.06	Identify the various food spoilage methods including microbial spoilage, chemical spoilage and their effect on food product shelf-life.
07.0	Apply enhanced agricultural communication and/or agricultural sales skills--The student will be able to:
07.01	Evaluate the effectiveness of a current communications or marketing campaign.
07.02	Develop and implement a communications or marketing campaign for an agricultural product or issue.
07.03	Apply enhanced written and oral communication skills by selecting the correct style, tone, and format appropriate for a variety of settings.
07.04	Demonstrate characteristics of a responsible/ethical agricultural communicator.
07.05	Select the proper communication medium and target audience for a current agricultural issue.

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

## **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Course Title:** Agriculture, Food, and Natural Resources Cooperative Education OJT  
**Course Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Cooperative Education - OJT**

Course Number	8100410
CIP Number	01019999CP
Grade Level	9-12, 30, 31
Standard Length	Multiple credits
Teacher Certification	AGRICULTUR 1 @2 ††ANY AG ED G
CTSO	FFA
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources cluster.

**Each student job placement must be related to the job preparatory program in which the student is enrolled or has completed.**

The purpose of this course is to provide the on-the-job training component when the **cooperative method of instruction** is appropriate. Whenever the cooperative method is offered, the following is required for each student: a training agreement; a training plan signed by the student, teacher and employer, including instructional objectives; a list of on-the-job and in-school learning experiences; a workstation which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal; and a site supervisor with a working knowledge of the selected occupation. The workstation may be in an industry setting or in a virtual learning environment. The student **must be compensated** for work performed.

The teacher/coordinator must meet with the site supervisor a minimum of once during each grading period for the purpose of evaluating the student's progress in attaining the competencies listed in the training plan.



Agriculture, Food, and Natural Resources Cooperative Education OJT may be taken by a student for one or more semesters. A student may earn multiple credits in this course. The specific student performance standards which the student must achieve to earn credit are specified in the Cooperative Education - OJT Training Plan.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Perform designated job skills.
- 02.0 Demonstrate work ethics.

Florida Department of Education  
 Student Performance Standards

Program Title: Agriculture, Food, and Natural Resources Cooperative Education - OJT  
 Secondary Number: 8100410

<b>Standards and Benchmarks</b>	
01.0	Perform designated job skills – the student will be able to:
01.01	Perform tasks as outlined in the training plan.
01.02	Demonstrate job performance skills.
01.03	Demonstrate safety procedures on the job.
01.04	Maintain appropriate records.
01.05	Attain an acceptable level of productivity.
01.06	Demonstrate appropriate dress and grooming habits.
02.0	Demonstrate work ethics – the student will be able to:
02.01	Follow directions.
02.02	Demonstrate good human relations skills on the job.
02.03	Demonstrate good work habits.
02.04	Demonstrate acceptable business ethics.

## **Additional Information**

### **Special Notes**

The **Cooperative Education Manual** is available on-line and has guidelines for students, teachers, employers, parents and other administrators and sample training agreements. It can be accessed on the DOE Website at <http://www.fldoe.org/core/fileparse.php/3/urllt/steps-manual.pdf>

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization(s) for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities may need additional time (beyond the regular school year) to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:  
<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Agricultural Machinery Operations  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

**Secondary – Career Preparatory**

Program Number	8103200
CIP Number	0101020400
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	AGRICULTUR 1 @2 AGRI MECH #7
CTSO	FFA
SOC Codes (all applicable)	45-2091 - Agricultural Equipment Operators
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agriculture mechanics industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations 1	1 credit	45-2091	3	EQ
	8103120	Agricultural Mechanics 2	1 credit		2	VO
	8103130	Agricultural Mechanics 3	1 credit		2	VO
B	8103210	Agricultural Machinery Operations 4	1 credit	45-2091	2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

## Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

**This program is daggered and will not be aligned to academic courses.**

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Ag. Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

## **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.



## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Machinery Operations.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Machinery Operations.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Operations.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Practice personal, equipment, and shop safety.
- 14.0 Select and use hand and power tools.
- 15.0 Install simple electrical circuits.
- 16.0 Demonstrate employability skills.
- 17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 18.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Machinery Operations.
- 19.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Machinery Operations.
- 20.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Operations.
- 21.0 Demonstrate electric and gas welding.
- 22.0 Service and maintain small gasoline engines.
- 23.0 Perform preventive maintenance, checks, and services for tractors.
- 24.0 Perform minor repairs on an irrigation system.
- 25.0 Apply basic financial-management skills.
- 26.0 Demonstrate employability skills.
- 27.0 Keep records.
- 28.0 Practice soil conservation.
- 29.0 Operate, service, and maintain agricultural machinery and equipment.
- 30.0 Apply business-management skills and identify appropriate legal documents.

31.0 Demonstrate positive customer-relations skills.

Daggereed for Deletion

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Machinery Operations.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text,	

Florida Standards		Correlation to CTE Program Standard #
	including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Machinery Operations.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	

Florida Standards		Correlation to CTE Program Standard #
		LAFS.910.WHST.2.4
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	
		LAFS.910.WHST.2.5
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	
		LAFS.910.WHST.2.6
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
		LAFS.910.WHST.3.7
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	
		LAFS.910.WHST.3.8
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research.	
		LAFS.910.WHST.3.9
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	
		LAFS.910.WHST.4.10
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Operations.	
03.01	Make sense of problems and persevere in solving them.	
		MAFS.K12.MP.1.1
03.02	Reason abstractly and quantitatively.	
		MAFS.K12.MP.2.1
03.03	Construct viable arguments and critique the reasoning of others.	
		MAFS.K12.MP.3.1
03.04	Model with mathematics.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.4.1
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy – the student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.			CS.10.02.01
04.02 Analyze the impact of agriculture on the local, state, national and global economy.			
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.			
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.			
05.0 Practice agriscience safety skills and procedures – the student will be able to:	MAFS.912.S-IC.2;	SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
05.01 Identify the common causes and prevention of accidents in agriscience operations.			
05.02 Demonstrate proper safety precautions and use of personal protective equipment.			CS.06.03.01.a CS.07.04.01.c.
05.03 Evaluate the food safety responsibilities that occur along the food supply chain.			FPP.01.02.01.a FPP.02.01.01.a FPP.02.02.02.a FPP.02.03
05.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.			CS.07.04.01
05.05 Identify proper disposal of hazardous waste materials and biohazards.			ESS.04.02.02.b ESS.04.05.01
05.06 Describe emergency procedures.			CS.07.03.01.c
06.0 Apply scientific and technological principles to agriscience issues – the student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	
06.01 Employ scientific measurement skills.			BS.02.02.01 CS.10.01.01.a
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 ESS.01.01.02.b
06.03 Identify the parts and functions of plant and animal cells.			PS.01.02.01.c AS.02.02.02.b
06.04 Describe the phases of cell reproduction.			PS.01.02.01.b. AS.02.02.03.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.			CS.11.01.01 CS.11.02.01
06.06 Interpret, analyze, and report data.			



CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.			BS.02.05.03.a.
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).			BS.01.01.03.a.
07.0 Apply environmental principles to the agricultural industry – the student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	
07.01 Research how different climactic and geological activity influences agriculture.			NRS.02.06.09 CS.05.03.02
07.02 Describe various ecosystems as they relate to the agriculture industry.			NRS.01.01.02.
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.			PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.04 Identify regulatory agencies that impact agricultural practices.			
07.05 Apply Best Management Practices that enhance the natural environment.			PS.03.04.01.b AS.08.01.01.c
07.06 Identify conservation practices related to natural resources.			PS.03.04.01.a
08.0 Investigate and utilize basic scientific skills and principles in plant science – the student will be able to:	MAFS.912.S-IC.2	SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L.15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	
08.01 Identify and describe the specializations within the plant science industry.			
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.			PS.01.01.01.c.
08.03 Examine the processes of plant growth including photosynthesis and respiration.			PS.01.03.01 PS.01.03.02
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.			PS.02.03.01

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
08.05 Analyze information from a fertilizer label.			PS.02.03.04
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.03.01.03 PS.03.01.02
08.07 Investigate the impacts of various pests and propose solutions for their control.			PS.03.03.02 PS.03.03.03 PS.03.03.04
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.			FPP01.01.01.a
08.09 Explore career opportunities in plant science.			
09.0 Investigate and utilize basic scientific skills and principles in animal science – the student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.			AS.02.01.02.c
09.02 Categorize animals according to use, type, breed, and scientific classification.			AS.02.01.01.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.			AS.02.01.02.a AS.05.02.01.a
09.04 Compare basic internal and external anatomy of animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.			AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
09.06 Compare and contrast animal welfare issues.			AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
09.07 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.06.02.01.a FPP01.01.01.a
09.08 Explore career opportunities in animal science.			AS.01.01.02.b.
10.0 Demonstrate the use of agriscience tools, equipment, and instruments – the student will be able to	MAFS.912.S-IC.2	SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	
10.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.			CS.08.01.01.b PST.02.02.02.b.
10.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			PST.03.04.01.b PST.03.03.02.a.
10.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.			PST.04.04.03.a PST.04.04.06.a
10.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.			CS.08.03.01.c PST.03.02.03.c. PST.01.03.01.a.
11.0 Demonstrate agribusiness, employability and human relation skills – the student will be able to:			
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).			
11.02 Utilize a record keeping system to collect, interpret, and analyze data.			CS.09.02.01.b CS.10.01.01.a.
11.03 Enhance oral communications through telephone, interview and presentation skills.			CS.03.01.03.b.
11.04 Enhance written communication by developing resumes and business letters.			CS.03.01.01 CS.03.01.02
11.05 Demonstrate interpersonal (nonverbal) communication skills.			CS.03.01.01 CS.03.01.02
11.06 Demonstrate good listening skills.			CS.01.02.02
12.0 Apply leadership and citizenship skills – the student will be able to:			
12.01 Identify and describe leadership characteristics.			CS.01.06.01.a.
12.02 Identify opportunities to apply acquired leadership skills.			CS.02.02.02.b.
12.03 Identify and demonstrate ways to be an active citizen.			CS.01.05.02.c.
12.04 Participate in community based learning activities.			CS.01.05.01.c.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
12.05 Demonstrate the ability to work cooperatively.			CS.01.02.02.b.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.			
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.			

Daggered for Deletion

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Mechanics 2  
**Course Number:** 8103120  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of safety; selection and use of tools; electrical circuits; and employability skills.

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

Florida Standards	Correlation to CTE Program Standard #
01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Machinery Operations.	
01.01 Key Ideas and Details	
01.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. <span style="float: right;">LAFS.910.RST.1.1</span>	
01.01.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. <span style="float: right;">LAFS.910.RST.1.2</span>	
01.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. <span style="float: right;">LAFS.910.RST.1.3</span>	
01.02 Craft and Structure	
01.02.1 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. <span style="float: right;">LAFS.910.RST.2.4</span>	
01.02.2 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). <span style="float: right;">LAFS.910.RST.2.5</span>	

Florida Standards		Correlation to CTE Program Standard #
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Mechanics.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most	

Florida Standards		Correlation to CTE Program Standard #
	significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Operations.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	

Florida Standards	Correlation to CTE Program Standard #
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
13.0 Practice personal, equipment, and shop safety – the student will be able to:			
13.01 Identify and eliminate hazards in agricultural mechanics settings.			
13.02 Observe color-coded warnings in work areas and on equipment and machinery.			
13.03 Describe appropriate actions in case of fire, accident, or other emergencies.			
13.04 Describe personal protective equipment (PPE) and appropriate clothing.			
13.05 Demonstrate safety procedures and workplace "housekeeping" practices.			
13.06 Safely handle and store flammable and non-restricted chemicals.			
13.07 Operate machinery and equipment according to the safety recommendations of the manufacturers.			
13.08 Comply with the Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) rules and regulations.			
13.09 Describe the Florida "Right-to-Know" law (as recorded in Florida Statutes, Chapter 442).			
14.0 Select and use hand and power tools – the student will be able to:			
14.01 Identify the capabilities and limitations of hand and power tools.			
14.02 Select and safely use hand and power tools.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
14.03 Select and use proper PPE for hand and power tools.			
14.04 Identify worn, damaged, or abused tools.			
14.05 Select and demonstrate the appropriate procedures for sharpening tools.			
15.0 Install simple electrical circuits – the student will be able to:			
15.01 Demonstrate the principles of AC and DC circuitry.			
15.02 Demonstrate series and parallel circuitry.			
15.03 Explain the scientific principles of electrical systems.			
15.04 Plan and install a simple wiring system.			
15.05 Test electrical circuits.			
16.0 Demonstrate employability skills – the student will be able to:			
16.01 Conduct group meetings, using parliamentary procedures and public-speaking skills.			
16.02 Identify the documents that are required for a job application.			
16.03 Complete a job application form.			
16.04 Demonstrate competencies in job-interview techniques.			
17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance – the students will be able to:			
17.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.			
17.02 Explain emergency procedures to follow in response to workplace accidents.			
17.03 Create a disaster and/or emergency response plan.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Mechanics 3  
**Course Number:** 8106510  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of welding; small gasoline engine service and repair; preventative maintenance procedures; irrigation system repair; financial management skills and employability skills.

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
18.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Machinery Operations.	
18.01	Key Ideas and Details	
18.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
18.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
18.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
18.02	Craft and Structure	
18.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
18.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	

Florida Standards		Correlation to CTE Program Standard #
18.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
18.03 Integration of Knowledge and Ideas		
18.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
18.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
18.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
18.04 Range of Reading and Level of Text Complexity		
18.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
18.04.2		
19.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Machinery Operations.	
19.01 Text Types and Purposes		
19.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
19.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
19.02 Production and Distribution of Writing		
19.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
19.02.2	Develop and strengthen writing as needed by planning, revising, editing,	

Florida Standards		Correlation to CTE Program Standard #
	rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
19.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
19.03 Research to Build and Present Knowledge		
19.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
19.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
19.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
19.04 Range of Writing		
19.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
20.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Operations.		
20.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
20.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
20.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
20.04	Model with mathematics. MAFS.K12.MP.4.1	
20.05	Use appropriate tools strategically.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.5.1
20.06 Attend to precision.	MAFS.K12.MP.6.1
20.07 Look for and make use of structure.	MAFS.K12.MP.7.1
20.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
21.0 Demonstrate electric and gas welding – the student will be able to:			
21.01 Select and use gas-welding equipment.			
21.02 Select and use electric arc-welding equipment and materials.			
22.0 Service and maintain small gasoline engines – the student will be able to:			
22.01 Explain the scientific principles of small engines.			
22.02 Identify major parts and describe the general operation of small gasoline engines (2- and 4-stroke cycle).			
22.03 Practice appropriate safety precautions.			
22.04 Troubleshoot and perform minor repairs on small gasoline engines.			
23.0 Perform preventive maintenance, checks, and services for tractors – the student will be able to:			
23.01 Explain the scientific principles of hydraulic and transmission systems.			
23.02 Perform daily operator maintenance checks for tractors.			
23.03 Determine the preventive-maintenance procedures, using the tractor operator's manual.			
23.04 Perform scheduled preventive-maintenance procedures.			
23.05 Interpret and perform operator's trouble-shooting procedures as described in the manual.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
23.06 Keep records of tractor maintenance and services.			
24.0 Perform minor repair on an irrigation system – the student will be able to:			
24.01 Identify the basic components of irrigation systems.			
24.02 Differentiate various types of irrigation systems.			
24.03 Identify state and local regulatory agencies for water management.			
24.04 Perform minor repair on an irrigation system.			
25.0 Apply basic financial-management skills – the student will be able to:			
25.01 Complete basic financial records.			
25.02 Demonstrate the use of banking procedures.			
25.03 Calculate interest on loans.			
25.04 Complete selected income-tax-return forms.			
26.0 Demonstrate employability skills – the student will be able to:			
26.01 Demonstrate knowledge of how to make job changes appropriately.			
26.02 Demonstrate acceptable personal hygiene and a professional appearance.			
26.03 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.			
26.04 Describe the importance of a drug-free workplace and the industry policies regarding alcohol and drug use.			
26.05 Demonstrate appropriate responses to performance evaluation from employer, supervisor, or other persons in the workplace.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Machinery Operations 4  
**Course Number:** 8103210  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of recordkeeping; soil conservation; operation, service and maintenance of machinery and equipment; business management skills; and customer relations.

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
18.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Machinery Operations.	
18.01	Key Ideas and Details	
18.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
18.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
18.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
18.02	Craft and Structure	
18.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
18.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	

Florida Standards		Correlation to CTE Program Standard #
18.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
18.03 Integration of Knowledge and Ideas		
18.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
18.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
18.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
18.04 Range of Reading and Level of Text Complexity		
18.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
18.04.2		
19.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Machinery Operations.	
19.01 Text Types and Purposes		
19.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
19.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
19.02 Production and Distribution of Writing		
19.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
19.02.2	Develop and strengthen writing as needed by planning, revising, editing,	



Florida Standards		Correlation to CTE Program Standard #
	rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
19.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
<b>19.03 Research to Build and Present Knowledge</b>		
19.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
19.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
19.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
<b>19.04 Range of Writing</b>		
19.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
<b>20.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Operations.</b>		
20.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
20.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
20.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
20.04	Model with mathematics. MAFS.K12.MP.4.1	
20.05	Use appropriate tools strategically.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.5.1
20.06 Attend to precision.	MAFS.K12.MP.6.1
20.07 Look for and make use of structure.	MAFS.K12.MP.7.1
20.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
27.0 Keep records – the student will be able to:			
27.01 Explain the purpose and importance of keeping records.			
27.02 Demonstrate procedures for keeping records of equipment maintenance and services.			
27.03 Keep records on each job or project assignment.			
28.0 Practice soil conservation – the student will be able to:			
28.01 Determine soil conditions such as texture, moisture, and structure.			
28.02 Identify the proper conditions of soil for machine operations.			
28.03 Practice soil conservation according to a farm plan.			
29.0 Operate, service, test, and maintain agricultural machinery and equipment – the student will be able to:			
29.01 Operate and adjust agricultural machinery and equipment that are used in the local area, according to the operator's manuals, such as the following: <ul style="list-style-type: none"> <li>• agricultural wheel-type tractors</li> <li>• planting equipment</li> <li>• primary and secondary tillage equipment</li> <li>• pesticide-application equipment</li> <li>• harvesting equipment</li> <li>• fertilization equipment</li> </ul>			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
29.02 Service machinery, using service manuals.			
29.03 Follow safety precautions when operating, servicing, and maintaining machines and equipment.			
30.0 Apply business-management skills and identify appropriate legal documents – the student will be able to:			
31.01 Identify personal/business liability and the use of liability insurance.			
31.02 Identify applicable insurance requirements.			
31.03 Identify and complete basic business-tax liability forms.			
31.04 Identify the requirements of eligibility for greenbelt, bluebelt, and homestead tax exemptions.			
31.05 Interpret enterprise budgets and amortization tables.			
31.06 Identify characteristics of legal documents (such as contracts, deeds, and leases).			
31.07 Identify applicable land-use and zoning regulations, including a comprehensive plan.			
31.0 Demonstrate positive customer-relations skills – the student will be able to:			
31.01 Exercise self-control.			
31.02 Identify and demonstrate appropriate responses to criticism.			
31.03 Explain the effects of positive human-relations skills on success in the business.			
31.04 Demonstrate respect for people and property.			

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **Extended Student Supervision**

Because of the production and marketing cycle of the agricultural industries, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

#### **Career and Technical Student Organization (CTSO)**

FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

#### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Diversified Agricultural Mechanics  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

**Secondary – Career Preparatory**

Program Number	8103300
CIP Number	0101020510
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	AGRICULTUR 1 @2 AGRI MECH #7
CTSO	FFA
SOC Codes (all applicable)	49-3041 - Farm Equipment Mechanics and Service Technicians 45-2091 - Agricultural Equipment Operators
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agriculture mechanics industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

## Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations 1	1 credit	45-2091	3	EQ
	8103120	Agricultural Mechanics 2	1 credit		2	VO
	8103130	Agricultural Mechanics 3	1 credit		2	VO
B	8103310	Diversified Agricultural Mechanics 4	1 credit	45-3041	2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

## Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

**This program is daggered and will not be aligned to academic courses.**

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth- Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Ag. Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

## Florida Standards for Technical Subjects

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.



## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Diversified Agricultural Mechanics.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Diversified Agricultural Mechanics.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Diversified Agricultural Mechanics.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Practice personal, equipment, and shop safety.
- 14.0 Select and use hand and power tools.
- 15.0 Install simple electrical circuits.
- 16.0 Demonstrate employability skills.
- 17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 18.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Diversified Agricultural Mechanics.
- 19.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Diversified Agricultural Mechanics.
- 20.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Diversified Agricultural Mechanics.
- 21.0 Demonstrate electric and gas welding.
- 22.0 Service and maintain small gasoline engines.
- 23.0 Perform preventive maintenance, checks, and services for tractors.
- 24.0 Perform minor repairs on an irrigation system.
- 25.0 Apply basic financial-management skills.
- 26.0 Demonstrate employability skills.
- 27.0 Operate and maintain agricultural tools and equipment.
- 28.0 Plan, draw, and construct a project.
- 29.0 Prepare and finish surfaces.
- 30.0 Replace simple electric motors, controls, and sensing devices.

- 31.0 Plan, repair, and maintain a basic irrigation system.
- 32.0 Perform basic plumbing procedures.
- 33.0 Mix and pour concrete and use masonry materials.
- 34.0 Weld, braze, and cut, using appropriate equipment.
- 35.0 Construct and maintain agricultural structures.
- 36.0 Apply business-management skills and identify appropriate legal documents.
- 37.0 Demonstrate positive customer-relations skills.

Daggered for Deletion

Florida Department of Education  
Student Performance Standards

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Diversified Agricultural Mechanics.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text,	

Florida Standards		Correlation to CTE Program Standard #
	including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Diversified Agricultural Mechanics.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	

Florida Standards		Correlation to CTE Program Standard #
		LAFS.910.WHST.2.4
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	LAFS.910.WHST.2.5
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	LAFS.910.WHST.2.6
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	LAFS.910.WHST.3.7
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	LAFS.910.WHST.3.8
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research.	LAFS.910.WHST.3.9
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	LAFS.910.WHST.4.10
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Diversified Agricultural Mechanics.	
03.01	Make sense of problems and persevere in solving them.	MAFS.K12.MP.1.1
03.02	Reason abstractly and quantitatively.	MAFS.K12.MP.2.1
03.03	Construct viable arguments and critique the reasoning of others.	MAFS.K12.MP.3.1
03.04	Model with mathematics.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.4.1
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy – the student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.			CS.10.02.01
04.02 Analyze the impact of agriculture on the local, state, national and global economy.			
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.			
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.			
05.0 Practice agriscience safety skills and procedures – the student will be able to:	MAFS.912.S-IC.2;	SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.01 Identify the common causes and prevention of accidents in agriscience operations.			
05.02 Demonstrate proper safety precautions and use of personal protective equipment.			CS.06.03.01.a CS.07.04.01.c.
05.03 Evaluate the food safety responsibilities that occur along the food supply chain.			FPP.01.02.01.a FPP.02.01.01.a FPP.02.02.02.a FPP.02.03
05.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.			CS.07.04.01
05.05 Identify proper disposal of hazardous waste materials and biohazards.			ESS.04.02.02.b ESS.04.05.01
05.06 Describe emergency procedures.			CS.07.03.01.c
06.0 Apply scientific and technological principles to agriscience issues – the student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	
06.01 Employ scientific measurement skills.			BS.02.02.01 CS.10.01.01.a
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 ESS.01.01.02.b
06.03 Identify the parts and functions of plant and animal cells.			PS.01.02.01.c AS.02.02.02.b
06.04 Describe the phases of cell reproduction.			PS.01.02.01.b. AS.02.02.03.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.			CS.11.01.01 CS.11.02.01
06.06 Interpret, analyze, and report data.			
06.07 Investigate DNA and genetics applications in agriscience including			BS.02.05.03.a.



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
the theory of probability.			
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).			BS.01.01.03.a.
07.0 Apply environmental principles to the agricultural industry – the student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	
07.01 Research how different climactic and geological activity influences agriculture.			NRS.02.06.09 CS.05.03.02
07.02 Describe various ecosystems as they relate to the agriculture industry.			NRS.01.01.02.
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.			PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.04 Identify regulatory agencies that impact agricultural practices.			
07.05 Apply Best Management Practices that enhance the natural environment.			PS.03.04.01.b AS.08.01.01.c
07.06 Identify conservation practices related to natural resources.			PS.03.04.01.a
08.0 Investigate and utilize basic scientific skills and principles in plant science – the student will be able to:	MAFS.912.S-IC.2	SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L.15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	
08.01 Identify and describe the specializations within the plant science industry.			
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.			PS.01.01.01.c.
08.03 Examine the processes of plant growth including photosynthesis and respiration.			PS.01.03.01 PS.01.03.02
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.			PS.02.03.01

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
08.05 Analyze information from a fertilizer label.			PS.02.03.04
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.03.01.03 PS.03.01.02
08.07 Investigate the impacts of various pests and propose solutions for their control.			PS.03.03.02 PS.03.03.03 PS.03.03.04
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.			FPP01.01.01.a
08.09 Explore career opportunities in plant science.			
09.0 Investigate and utilize basic scientific skills and principles in animal science – the student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.			AS.02.01.02.c
09.02 Categorize animals according to use, type, breed, and scientific classification.			AS.02.01.01.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.			AS.02.01.02.a AS.05.02.01.a
09.04 Compare basic internal and external anatomy of animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.			AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c As.03.02.01.a AS.06.01.01.b
09.06 Compare and contrast animal welfare issues.			AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
09.07 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.06.02.01.a FPP01.01.01.a
09.08 Explore career opportunities in animal science.			AS.01.01.02.b.
10.0 Demonstrate the use of agriscience tools, equipment, and instruments – the student will be able to:	MAFS.912.S-IC.2	SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	
10.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.			CS.08.01.01.b PST.02.02.02.b.
10.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			PST.03.04.01.b PST.03.03.02.a.
10.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.			PST.04.04.03.a PST.04.04.06.a
10.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.			CS.08.03.01.c PST.03.02.03.c. PST.01.03.01.a.
11.0 Demonstrate agribusiness, employability and human relation skills – the student will be able to:			
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).			
11.02 Utilize a record keeping system to collect, interpret, and analyze data.			CS.09.02.01.b CS.10.01.01.a.
11.03 Enhance oral communications through telephone, interview and presentation skills.			CS.03.01.03.b.
11.04 Enhance written communication by developing resumes and business letters.			CS.03.01.01 CS.03.01.02
11.05 Demonstrate interpersonal (nonverbal) communication skills.			CS.03.01.01 CS.03.01.02
11.06 Demonstrate good listening skills.			CS.01.02.02
12.0 Apply leadership and citizenship skills – the student will be able to:			
12.01 Identify and describe leadership characteristics.			CS.01.06.01.a.
12.02 Identify opportunities to apply acquired leadership skills.			CS.02.02.02.b.
12.03 Identify and demonstrate ways to be an active citizen.			CS.01.05.02.c.
12.04 Participate in community based learning activities.			CS.01.05.01.c.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
12.05 Demonstrate the ability to work cooperatively.			CS.01.02.02.b.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.			
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.			

Daggered for Deletion

Florida Department of Education  
Student Performance Standards

Course Title: Agricultural Mechanics 2  
Course Number: 8103120  
Course Credit: 1

Course Description:

This course is designed to develop competencies in the areas of safety; selection and use of tools; electrical circuits; and employability skills.  
**NOTE: This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.**

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Diversified Agricultural Mechanics.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	

Florida Standards		Correlation to CTE Program Standard #
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
01.04.2		
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Diversified Agricultural Mechanics.	
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most	

Florida Standards		Correlation to CTE Program Standard #
	significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Diversified Agricultural Mechanics.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	

Florida Standards	Correlation to CTE Program Standard #
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
13.0 Practice personal, equipment, and shop safety – the student will be able to:			
13.01 Identify and eliminate hazards in agricultural mechanics settings.			
13.02 Observe color-coded warnings in work areas and on equipment and machinery.			
13.03 Describe appropriate actions in case of fire, accident, or other emergencies.			
13.04 Describe personal protective equipment (PPE) and appropriate clothing.			
13.05 Demonstrate safety procedures and workplace "housekeeping" practices.			
13.06 Safely handle and store flammable and non-restricted chemicals.			
13.07 Operate machinery and equipment according to the safety recommendations of the manufacturers.			
13.08 Comply with the Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) rules and regulations.			
13.09 Describe the Florida "Right-to-Know" law (as recorded in Florida Statutes, Chapter 442).			
14.0 Select and use hand and power tools – the student will be able to:			
14.01 Identify the capabilities and limitations of hand and power tools.			
14.02 Select and safely use hand and power tools.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
14.03 Select and use proper PPE for hand and power tools.			
14.04 Identify worn, damaged, or abused tools.			
14.05 Select and demonstrate the appropriate procedures for sharpening tools.			
15.0 Install simple electrical circuits – the student will be able to:			
15.01 Demonstrate the principles of AC and DC circuitry.			
15.02 Demonstrate series and parallel circuitry.			
15.03 Explain the scientific principles of electrical systems.			
15.04 Plan and install a simple wiring system.			
15.05 Test electrical circuits.			
16.0 Demonstrate employability skills – the student will be able to:			
16.01 Conduct group meetings, using parliamentary procedures and public-speaking skills.			
16.02 Identify the documents that are required for a job application.			
16.03 Complete a job application form.			
16.04 Demonstrate competencies in job-interview techniques.			
17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance – the students will be able to:			
17.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.			
17.02 Explain emergency procedures to follow in response to workplace accidents.			
17.03 Create a disaster and/or emergency response plan.			

Florida Department of Education  
Student Performance Standards

Course Title: Agricultural Mechanics 3  
Course Number: 8106510  
Course Credit: 1

Course Description:

This course is designed to develop competencies in the areas of welding; small gasoline engine service and repair; preventative maintenance procedures; irrigation system repair; financial management skills and employability skills.

**NOTE: This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.**

Florida Standards		Correlation to CTE Program Standard #
18.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Diversified Agriculture Mechanics.	
18.01	Key Ideas and Details	
18.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
18.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
18.02	Craft and Structure	
18.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
18.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
18.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
18.03 Integration of Knowledge and Ideas		
18.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
18.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
18.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
18.04 Range of Reading and Level of Text Complexity		
18.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
18.04.2		
19.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Diversified Agricultural Mechanics.		
19.01 Text Types and Purposes		
19.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
19.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
19.02 Production and Distribution of Writing		
19.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
19.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
19.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
19.03	Research to Build and Present Knowledge	
19.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
19.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
19.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
19.04	Range of Writing	
19.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
20.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Diversified Agricultural Mechanics.	
20.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
20.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
20.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
20.04	Model with mathematics. MAFS.K12.MP.4.1	
20.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
20.06	Attend to precision. MAFS.K12.MP.6.1	
20.07	Look for and make use of structure.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.7.1
20.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
21.0 Demonstrate electric and gas welding – the student will be able to:			
21.01 Select and use gas-welding equipment.			
21.02 Select and use electric arc-welding equipment and materials.			
22.0 Service and maintain small gasoline engines – the student will be able to:			
22.01 Explain the scientific principles of small engines.			
22.02 Identify major parts and describe the general operation of small gasoline engines (2- and 4-stroke cycle).			
22.03 Practice appropriate safety precautions.			
22.04 Troubleshoot and perform minor repairs on small gasoline engines.			
23.0 Perform preventive maintenance, checks, and services for tractors – the student will be able to:			
23.01 Explain the scientific principles of hydraulic and transmission systems.			
23.02 Perform daily operator maintenance checks for tractors.			
23.03 Determine the preventive-maintenance procedures, using the tractor operator's manual.			
23.04 Perform scheduled preventive-maintenance procedures.			
23.05 Interpret and perform operator's trouble-shooting procedures as described in the manual.			
23.06 Keep records of tractor maintenance and services.			
24.0 Perform minor repair on an irrigation system – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
24.01 Identify the basic components of irrigation systems.			
24.02 Differentiate various types of irrigation systems.			
24.03 Identify state and local regulatory agencies for water management.			
24.04 Perform minor repair on an irrigation system.			
25.0 Apply basic financial-management skills – the student will be able to:			
25.01 Complete basic financial records.			
25.02 Demonstrate the use of banking procedures.			
25.03 Calculate interest on loans.			
25.04 Complete selected income-tax-return forms.			
26.0 Demonstrate employability skills – the student will be able to:			
26.01 Demonstrate knowledge of how to make job changes appropriately.			
26.02 Demonstrate acceptable personal hygiene and a professional appearance.			
26.03 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.			
26.04 Describe the importance of a drug-free workplace and the industry policies regarding alcohol and drug use.			
26.05 Demonstrate appropriate responses to performance evaluation from employer, supervisor, or other persons in the workplace.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diversified Agricultural Mechanics 4  
**Course Number:** 8103310  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competency in the areas of operation and maintenance of tools and equipment; project construction; electric motors replacement; irrigation systems repair and maintenance; plumbing procedures; masonry; and welding.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
18.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Diversified Agriculture Mechanics.	
18.01	Key Ideas and Details	
18.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.  LAFS.1112.RST.1.1	
18.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.1112.RST.1.2	
18.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.1112.RST.1.3	
18.02	Craft and Structure	
18.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.  LAFS.1112.RST.2.4	
18.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.  LAFS.1112.RST.2.5	
18.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.1112.RST.2.6	
18.03	Integration of Knowledge and Ideas	
18.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
18.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
18.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
18.04	Range of Reading and Level of Text Complexity	
18.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
18.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
19.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Diversified Agricultural Mechanics.	
19.01	Text Types and Purposes	
19.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
19.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
19.02	Production and Distribution of Writing	
19.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
19.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	



Florida Standards		Correlation to CTE Program Standard #
19.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
19.03	Research to Build and Present Knowledge	
19.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
19.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
19.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
19.04	Range of Writing	
19.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
20.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Diversified Agricultural Mechanics.	
20.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
20.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
20.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
20.04	Model with mathematics. MAFS.K12.MP.4.1	
20.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
20.06	Attend to precision. MAFS.K12.MP.6.1	

Florida Standards	Correlation to CTE Program Standard #
20.07 Look for and make use of structure.	MAFS.K12.MP.7.1
20.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
27.0 Operate and maintain agricultural tools and equipment – the student will be able to:			
27.01 Set up, adjust, and operate selected agricultural equipment according to the operator's manual.			
27.02 Maintain and repair selected agricultural tools and equipment, using repair manuals.			
27.03 Prepare equipment for storage.			
27.04 Keep records of equipment maintenance and services using computers to process information.			
28.0 Plan, draw, and construct a project – the student will be able to:			
28.01 Plan and sketch a project.			
28.02 Design and draw a project using drawing instruments and/or computer-assisted design (CAD) software.			
28.03 Calculate a bill of materials.			
28.04 Construct a project.			
29.0 Prepare and finish surfaces – the student will be able to:			
29.01 Identify and select appropriate finishes (such as paint, varnish, and stain).			
29.02 Repair worn or damaged surfaces using fillers, caulking, and sealers.			
29.03 Prepare surfaces and apply finishes.			
30.0 Replace simple electric motors, controls, and sensing devices – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
30.01 Identify different types of electric motors.			
30.02 Differentiate various types of controls.			
30.03 Replace electric motors, controls, and sensing devices.			
31.0 Plan, repair, and maintain a basic irrigation system – the student will be able to:			
31.01 Determine irrigation requirements.			
31.02 Plan and lay out an irrigation system, using computer applications.			
31.03 Repair and maintain an irrigation system.			
32.0 Perform basic plumbing procedures – the student will be able to:			
32.01 Identify and select plumbing materials and tools.			
32.02 Plan and construct a simple water-delivery system.			
32.03 Troubleshoot and perform minor plumbing repairs.			
32.04 Locate the state and local codes and standards and describe the importance of complying with them.			
33.0 Mix and pour concrete and use masonry materials – the student will be able to:			
33.01 Calculate concrete and other materials for a masonry project.			
33.02 Prepare forms; mix and pour concrete.			
33.03 Lay concrete blocks and/or bricks.			
34.0 Weld, braze, and cut, using appropriate equipment – the student will be able to:			
34.01 Set up, adjust, operate, and maintain MIG (middle inert gas) and TIG (tungsten inert gas) welding equipment.			
34.02 Set up, adjust, and operate plasma cutting equipment.			
34.03 Select recommended operational procedures and supplies for specific jobs.			
34.04 Practice all recommended safety precautions.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
34.05 Demonstrate the different welding positions.			
34.06 Cut and pierce metals, using oxyacetylene and plasma.			
34.07 Braze metals.			
34.08 Apply hard-surface alloys.			
34.09 Store welding equipment and supplies according to the recommended storage procedures.			
34.10 Locate the state and local codes and standards and describe the importance of complying with them.			
35.0 Construct and maintain agricultural structures – the student will be able to:			
35.01 Read and interpret basic construction plans.			
35.02 Lay out an agricultural structure for construction with the use of a transit.			
35.03 Demonstrate basic carpentry construction and procedures.			
35.04 Construct a fence.			
35.05 Maintain and repair agricultural structures.			
36.0 Apply business-management skills and identify appropriate legal documents – the student will be able to:			
36.01 Identify personal/business liability and the use of liability insurance.			
36.02 Identify applicable insurance requirements.			
36.03 Identify and complete basic business-tax-liability forms.			
36.04 Identify requirements of eligibility for greenbelt, bluebelt, and homestead tax exemptions.			
36.05 Interpret enterprise budgets and amortization tables.			
36.06 Identify characteristics of legal documents (such as contracts, deeds, legal land descriptions, and leases).			
36.07 Identify applicable land-use and zoning regulations, including a comprehensive plan.			
37.0 Demonstrate positive customer-relations skills – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
37.01 Exercise self-control.			
37.02 Identify and demonstrate appropriate responses to criticism.			
37.03 Explain the effects of positive human-relations skills on success in the business.			
37.04 Demonstrate respect for people and property.			

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## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

### **Extended Student Supervision**

Because of the production and marketing cycle of the agricultural industries, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Agricultural Machinery Mechanics  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

**Secondary – Career Preparatory**

Program Number	8103400
CIP Number	0101020410
Grade Level	9-12, 30, 31
Standard Length	6 credits
Teacher Certification	AGRICULTUR 1 @2 AGRI MECH #7
CTSO	FFA
SOC Codes (all applicable)	49-3041 - Farm Equipment Mechanics and Service Technicians 45-2091 - Agricultural Equipment Operators
Facility Code	204 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agricultural Mechanics industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.



## Program Structure

This program is a planned sequence of instruction consisting of an agricultural mechanics core with three occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations 1	1 credit	45-2091	3	EQ
	8103120	Agricultural Mechanics 2	1 credit		2	VO
	8103130	Agricultural Mechanics 3	1 credit		2	VO
B	8103410	Agricultural Machinery Mechanics 4	1 credit	45-2091	2	VO
C	8103420	Agricultural Machinery Mechanics 5	1 credit	49-3041	2	VO
	8103430	Agricultural Machinery Mechanics 6	1 credit		2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

## Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

**This program is daggered and will not be aligned to academic courses.**

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Ag. Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

## **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

## **Florida Standards for Mathematics & Language Arts (FS-M/LA)**

Some or all of the courses in this program have been aligned to the Florida Standards for Mathematics and Language Arts used in core academic classes. Data shown in the framework table (column ‘FS-M/LA’) contains the results of these alignment efforts.

## **Next Generation Sunshine State Standards (NGSSS) - Science**

Some or all of the courses in this program have been aligned to the Next Generation Sunshine State Standards (NGSSS) for Science. These standards are listed next to the content standards.

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Machinery Mechanics.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Machinery Mechanics.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Mechanics.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Practice personal, equipment, and shop safety.
- 14.0 Select and use hand and power tools.
- 15.0 Install simple electrical circuits.
- 16.0 Demonstrate employability skills.
- 17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 18.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Machinery Mechanics.
- 19.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Machinery Mechanics.
- 20.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Mechanics.
- 21.0 Demonstrate electric and gas welding.
- 22.0 Service and maintain small gasoline engines.
- 23.0 Perform preventive maintenance, checks, and services for tractors.
- 24.0 Perform minor repairs on an irrigation system.
- 25.0 Apply basic financial-management skills.
- 26.0 Demonstrate employability skills.
- 27.0 Keep records.
- 28.0 Weld, braze, and cut, using appropriate equipment.
- 29.0 Operate, service, test, and maintain agricultural machinery and equipment.
- 30.0 Demonstrate positive customer-relations skills.

- 31.0 Diagnose, service, and repair the lubrication system.
- 32.0 Test, repair and/or replace, and maintain the cooling system.
- 33.0 Test, repair and/or replace the intake, exhaust, and turbo-charged systems.
- 34.0 Test, repair and/or replace the fuel-delivery system.
- 35.0 Test, repair and/or replace, and maintain the brake system.
- 36.0 Test, repair and/or replace internal-combustion engines.
- 37.0 Test, repair and/or replace the electrical system, using service manuals.
- 38.0 Diagnose, service, and repair transmission systems.
- 39.0 Service and repair transfer case.
- 40.0 Diagnose, service, repair, and maintain the hydraulic system.
- 41.0 Diagnose, service, and repair the final drive systems.
- 42.0 Apply business-management skills and identify appropriate legal documents.

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Florida Department of Education  
Student Performance Standards

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Machinery Mechanics.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction	

Florida Standards		Correlation to CTE Program Standard #
	force, energy).	LAFS.910.RST.2.5
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	LAFS.910.RST.2.6
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	LAFS.910.RST.3.7
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	LAFS.910.RST.3.8
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	LAFS.910.RST.3.9
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently.	LAFS.910.RST.4.10
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Machinery Mechanics.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content.	LAFS.910.WHST.1.1
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	LAFS.910.WHST.1.2
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	LAFS.910.WHST.2.4

Florida Standards		Correlation to CTE Program Standard #
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
<b>03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Mechanics.</b>		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	



Florida Standards	Correlation to CTE Program Standard #
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy – the student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.			CS.10.02.01
04.02 Analyze the impact of agriculture on the local, state, national and global economy.			
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.			
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.			
05.0 Practice agriscience safety skills and procedures – the student will be able to:	MAFS.912.S-IC.2;	SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.01 Identify the common causes and prevention of accidents in agriscience operations.			
05.02 Demonstrate proper safety precautions and use of personal protective equipment.			CS.06.03.01.a CS.07.04.01.c.
05.03 Evaluate the food safety responsibilities that occur along the food supply chain.			FPP.01.02.01.a FPP.02.01.01.a FPP.02.02.02.a FPP.02.03
05.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.			CS.07.04.01
05.05 Identify proper disposal of hazardous waste materials and biohazards.			ESS.04.02.02.b ESS.04.05.01
05.06 Describe emergency procedures.			CS.07.03.01.c
06.0 Apply scientific and technological principles to agriscience issues – the student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	
06.01 Employ scientific measurement skills.			BS.02.02.01 CS.10.01.01.a
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 ESS.01.01.02.b
06.03 Identify the parts and functions of plant and animal cells.			PS.01.02.01.c AS.02.02.02.b
06.04 Describe the phases of cell reproduction.			PS.01.02.01.b. AS.02.02.03.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.			CS.11.01.01 CS.11.02.01
06.06 Interpret, analyze, and report data.			
06.07 Investigate DNA and genetics applications in agriscience including			BS.02.05.03.a.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
the theory of probability.			
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).			BS.01.01.03.a.
07.0 Apply environmental principles to the agricultural industry – the student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	
07.01 Research how different climactic and geological activity influences agriculture.			NRS.02.06.09 CS.05.03.02
07.02 Describe various ecosystems as they relate to the agriculture industry.			NRS.01.01.02.
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.			PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.04 Identify regulatory agencies that impact agricultural practices.			
07.05 Apply Best Management Practices that enhance the natural environment.			PS.03.04.01.b AS.08.01.01.c
07.06 Identify conservation practices related to natural resources.			PS.03.04.01.a
08.0 Investigate and utilize basic scientific skills and principles in plant science – the student will be able to:	MAFS.912.S-IC.2	SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L.15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	
08.01 Identify and describe the specializations within the plant science industry.			
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.			PS.01.01.01.c.
08.03 Examine the processes of plant growth including photosynthesis and respiration.			PS.01.03.01 PS.01.03.02
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.			PS.02.03.01

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
08.05 Analyze information from a fertilizer label.			PS.02.03.04
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.03.01.03 PS.03.01.02
08.07 Investigate the impacts of various pests and propose solutions for their control.			PS.03.03.02 PS.03.03.03 PS.03.03.04
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.			FPP01.01.01.a
08.09 Explore career opportunities in plant science.			
09.0 Investigate and utilize basic scientific skills and principles in animal science – the student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.			AS.02.01.02.c
09.02 Categorize animals according to use, type, breed, and scientific classification.			AS.02.01.01.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.			AS.02.01.02.a AS.05.02.01.a
09.04 Compare basic internal and external anatomy of animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.			AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c As.03.02.01.a AS.06.01.01.b
09.06 Compare and contrast animal welfare issues.			AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
09.07 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.06.02.01.a FPP01.01.01.a
09.08 Explore career opportunities in animal science.			AS.01.01.02.b.
10.0 Demonstrate the use of agriscience tools, equipment, and instruments – the student will be able to	MAFS.912.S-IC.2	SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	
10.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.			CS.08.01.01.b PST.02.02.02.b.
10.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			PST.03.04.01.b PST.03.03.02.a.
10.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.			PST.04.04.03.a PST.04.04.06.a
10.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.			CS.08.03.01.c PST.03.02.03.c. PST.01.03.01.a.
11.0 Demonstrate agribusiness, employability and human relation skills – the student will be able to:			
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).			
11.02 Utilize a record keeping system to collect, interpret, and analyze data.			CS.09.02.01.b CS.10.01.01.a.
11.03 Enhance oral communications through telephone, interview and presentation skills.			CS.03.01.03.b.
11.04 Enhance written communication by developing resumes and business letters.			CS.03.01.01 CS.03.01.02
11.05 Demonstrate interpersonal (nonverbal) communication skills.			CS.03.01.01 CS.03.01.02
11.06 Demonstrate good listening skills.			CS.01.02.02
12.0 Apply leadership and citizenship skills – the student will be able to:			
12.01 Identify and describe leadership characteristics.			CS.01.06.01.a.
12.02 Identify opportunities to apply acquired leadership skills.			CS.02.02.02.b.
12.03 Identify and demonstrate ways to be an active citizen.			CS.01.05.02.c.
12.04 Participate in community based learning activities.			CS.01.05.01.c.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
12.05 Demonstrate the ability to work cooperatively.			CS.01.02.02.b.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.			
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.			

Daggered for Deletion

Florida Department of Education  
Student Performance Standards

Course Title: Agricultural Mechanics 2  
Course Number: 8103120  
Course Credit: 1

Course Description:

This course is designed to develop competencies in the areas of safety; selection and use of tools; electrical circuits; and employability skills.  
**NOTE: This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion**

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Machinery Mechanics.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a	

Florida Standards		Correlation to CTE Program Standard #
	procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Machinery Mechanics.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	



Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	
	LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
	LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	
	LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research.	
	LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	
	LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Mechanics.	
03.01	Make sense of problems and persevere in solving them.	
	MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively.	
	MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others.	
	MAFS.K12.MP.3.1	
03.04	Model with mathematics.	
	MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically.	
	MAFS.K12.MP.5.1	
03.06	Attend to precision.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
13.0 Practice personal, equipment, and shop safety – the student will be able to:			
13.01 Identify and eliminate hazards in agricultural mechanics settings.			
13.02 Observe color-coded warnings in work areas and on equipment and machinery.			
13.03 Describe appropriate actions in case of fire, accident, or other emergencies.			
13.04 Describe personal protective equipment (PPE) and appropriate clothing.			
13.05 Demonstrate safety procedures and workplace "housekeeping" practices.			
13.06 Safely handle and store flammable and non-restricted chemicals.			
13.07 Operate machinery and equipment according to the safety recommendations of the manufacturers.			
13.08 Comply with the Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) rules and regulations.			
13.09 Describe the Florida "Right-to-Know" law (as recorded in Florida Statutes, Chapter 442).			
14.0 Select and use hand and power tools – the student will be able to:			
14.01 Identify the capabilities and limitations of hand and power tools.			
14.02 Select and safely use hand and power tools.			
14.03 Select and use proper PPE for hand and power tools.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
14.04 Identify worn, damaged, or abused tools.			
14.05 Select and demonstrate the appropriate procedures for sharpening tools.			
15.0 Install simple electrical circuits – the student will be able to:			
15.01 Demonstrate the principles of AC and DC circuitry.			
15.02 Demonstrate series and parallel circuitry.			
15.03 Explain the scientific principles of electrical systems.			
15.04 Plan and install a simple wiring system.			
15.05 Test electrical circuits.			
16.0 Demonstrate employability skills – the student will be able to:			
16.01 Conduct group meetings, using parliamentary procedures and public-speaking skills.			
16.02 Identify the documents that are required for a job application.			
16.03 Complete a job application form.			
16.04 Demonstrate competencies in job-interview techniques.			
17.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance – the students will be able to:			
17.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.			
17.02 Explain emergency procedures to follow in response to workplace accidents.			
17.03 Create a disaster and/or emergency response plan.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Machinery Mechanics 3  
**Course Number:** 8106510  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of welding; small gasoline engine service and repair; preventative maintenance procedures; irrigation system repair; financial management skills and employability skills.

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
18.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Machinery Mechanics.	
18.01	Key Ideas and Details	
18.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.  LAFS.1112.RST.1.1	
18.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.1112.RST.1.2	
18.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.1112.RST.1.3	
18.02	Craft and Structure	
18.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.  LAFS.1112.RST.2.4	
18.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.  LAFS.1112.RST.2.5	
18.02.3	Analyze the author’s purpose in providing an explanation, describing a	

Florida Standards		Correlation to CTE Program Standard #
	procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
<b>18.03 Integration of Knowledge and Ideas</b>		
18.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
18.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
18.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
<b>18.04 Range of Reading and Level of Text Complexity</b>		
18.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
18.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
<b>19.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Machinery Mechanics.</b>		
<b>19.01 Text Types and Purposes</b>		
19.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
19.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
<b>19.02 Production and Distribution of Writing</b>		
19.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
19.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most	

Florida Standards		Correlation to CTE Program Standard #
	significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
19.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
19.03	Research to Build and Present Knowledge	
19.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
19.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
19.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
19.04	Range of Writing	
19.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
20.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Mechanics.	
20.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
20.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
20.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
20.04	Model with mathematics. MAFS.K12.MP.4.1	
20.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	

Florida Standards	Correlation to CTE Program Standard #
20.06 Attend to precision.	MAFS.K12.MP.6.1
20.07 Look for and make use of structure.	MAFS.K12.MP.7.1
20.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
21.0 Demonstrate electric and gas welding – the student will be able to:			
21.01 Select and use gas-welding equipment.			
21.02 Select and use electric arc-welding equipment and materials.			
22.0 Service and maintain small gasoline engines – the student will be able to:			
22.01 Explain the scientific principles of small engines.			
22.02 Identify major parts and describe the general operation of small gasoline engines (2- and 4-stroke cycle).			
22.03 Practice appropriate safety precautions.			
22.04 Troubleshoot and perform minor repairs on small gasoline engines.			
23.0 Perform preventive maintenance, checks, and services for tractors – the student will be able to:			
23.01 Explain the scientific principles of hydraulic and transmission systems.			
23.02 Perform daily operator maintenance checks for tractors.			
23.03 Determine the preventive-maintenance procedures, using the tractor operator's manual.			
23.04 Perform scheduled preventive-maintenance procedures.			
23.05 Interpret and perform operator's trouble-shooting procedures as described in the manual.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
23.06 Keep records of tractor maintenance and services.			
24.0 Perform minor repair on an irrigation system – the student will be able to:			
24.01 Identify the basic components of irrigation systems.			
24.02 Differentiate various types of irrigation systems.			
24.03 Identify state and local regulatory agencies for water management.			
24.04 Perform minor repair on an irrigation system.			
25.0 Apply basic financial-management skills – the student will be able to:			
25.01 Complete basic financial records.			
25.02 Demonstrate the use of banking procedures.			
25.03 Calculate interest on loans.			
25.04 Complete selected income-tax-return forms.			
26.0 Demonstrate employability skills – the student will be able to:			
26.01 Demonstrate knowledge of how to make job changes appropriately.			
26.02 Demonstrate acceptable personal hygiene and a professional appearance.			
26.03 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.			
26.04 Describe the importance of a drug-free workplace and the industry policies regarding alcohol and drug use.			
26.05 Demonstrate appropriate responses to performance evaluation from employer, supervisor, or other persons in the workplace.			



Florida Department of Education  
Student Performance Standards

**Course Title:** Agricultural Machinery Mechanics 4  
**Course Number:** 8103410  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of recordkeeping; welding; equipment operation, service, testing and maintenance; and customer-relations skills.

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion

Florida Standards		Correlation to CTE Program Standard #
18.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Machinery Mechanics.	
18.01	Key Ideas and Details	
18.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
18.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
18.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
18.02	Craft and Structure	
18.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
18.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
18.02.3	Analyze the author's purpose in providing an explanation, describing a	

Florida Standards		Correlation to CTE Program Standard #
	procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
<b>18.03 Integration of Knowledge and Ideas</b>		
18.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
18.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
18.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
<b>18.04 Range of Reading and Level of Text Complexity</b>		
18.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
18.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
<b>19.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Machinery Mechanics.</b>		
<b>19.01 Text Types and Purposes</b>		
19.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
19.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
<b>19.02 Production and Distribution of Writing</b>		
19.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
19.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most	

Florida Standards		Correlation to CTE Program Standard #
	significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
19.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
19.03	Research to Build and Present Knowledge	
19.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
19.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
19.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
19.04	Range of Writing	
19.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
20.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Machinery Mechanics.	
20.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
20.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
20.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
20.04	Model with mathematics. MAFS.K12.MP.4.1	
20.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	

Florida Standards	Correlation to CTE Program Standard #
20.06 Attend to precision.	MAFS.K12.MP.6.1
20.07 Look for and make use of structure.	MAFS.K12.MP.7.1
20.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
27.0 Keep records – the student will be able to:			
27.01 Explain the purpose and importance of keeping records.			
27.02 Demonstrate procedures for keeping records of equipment maintenance and services.			
27.03 Keep records on each job or project assignment.			
27.04 Complete work orders, service invoices, and requisitions.			
27.05 Prepare a written cost estimate of repair work.			
28.0 Weld, braze, and cut, using appropriate equipment – the student will be able to:			
28.01 Set up, adjust, operate, and maintain MIG (middle inert gas) and TIG (tungsten inert gas) welding equipment.			
28.02 Set up, adjust, and operate plasma cutting equipment.			
28.03 Select recommended operational procedures and supplies for specific jobs.			
28.04 Practice all recommended safety precautions.			
28.05 Demonstrate the different welding positions.			
28.06 Cut and pierce metals, using oxyacetylene and plasma.			
28.07 Braze metals.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
28.08 Apply hard-surface alloys.			
28.09 Store welding equipment and supplies according to the recommended storage procedures.			
29.0 Operate, service, test, and maintain agricultural machinery and equipment – the student will be able to:			
29.01 Operate and adjust agricultural machinery and equipment that are used in the local area, according to the operator's manuals, such as the following: <ul style="list-style-type: none"> <li>• agricultural wheel-type tractors</li> <li>• planting equipment</li> <li>• primary and secondary tillage equipment</li> <li>• pesticide-application equipment</li> <li>• harvesting equipment</li> <li>• fertilization equipment</li> </ul>			
29.02 Remove, clean, test, repair, and reinstall parts of machinery and equipment, using repair manuals.			
29.03 Service machinery, using service manuals.			
29.04 Follow safety precautions when operating, servicing, and maintaining machines and equipment.			
30.0 Demonstrate positive customer-relations skills – the student will be able to:			
30.01 Exercise self-control.			
30.02 Identify and demonstrate appropriate responses to criticism.			
30.03 Explain the effects of positive human-relations skills on success in the business.			
30.04 Demonstrate respect for people and property.			

Florida Department of Education  
Student Performance Standards

**Course Title:** Agricultural Machinery Mechanics 5  
**Course Number:** 8103420  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of service, repair and maintenance of the following: the lubrication system; the cooling system; the intake, exhaust, and turbo-charged systems; the fuel-delivery system; and the brake system.

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
31.0 Diagnose, service, and repair the lubrication system – the student will be able to:			
31.01 Change oil filters.			
31.02 Check and change oils and other lubricants in engines.			
31.03 Diagnose and replace damaged or worn components of the system.			
32.0 Test, repair and/or replace, and maintain the cooling system – the student will be able to:			
32.01 Test coolant.			
32.02 Flush and clean the system.			
32.03 Test, repair and/or replace parts of the system.			
32.04 Adjust parts of the system for proper operation.			
33.0 Test, repair and/or replace the intake, exhaust, and turbo-charged systems – the student will be able to:			
33.01 Troubleshoot the intake, exhaust, and turbo-charged systems, using recommended diagnostic equipment.			
33.02 Repair and replace parts of the systems.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
33.03 Service and adjust the systems for proper operation.			
34.0 Test, repair and/or replace the fuel-delivery system, using service manuals – the student will be able to:			
34.01 Remove, clean, rebuild, and reinstall carburetors.			
34.02 Bleed the diesel-fuel system.			
34.03 Remove and reinstall a diesel-fuel-injection pump, according to the manufacturer's specifications.			
34.04 Replace components of the fuel system.			
34.05 Service and adjust parts of the fuel system for proper operation.			
35.0 Test, repair and/or replace, and maintain the brake system – the student will be able to:			
35.01 Drain, refill, and adjust the brake system.			
35.02 Test brake-system components, using recommended diagnostic equipment.			
35.03 Repair and replace parts of the system.			
35.04 Service and adjust the system for proper operation.			

Florida Department of Education  
Student Performance Standards

**Course Title:** Agricultural Machinery Mechanics 6  
**Course Number:** 8103430  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of service, repair and maintenance of the following: internal-combustion engines; electrical system; transmission system; hydraulic system; and final-drive system; and business management skills.

**NOTE:** This program has been daggered for deletion with 2012-2013 being the last cohort of students permitted to enroll in the program. After 2012-2013, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
36.0 Test, repair and/or replace internal-combustion engines – the student will be able to:			
36.01 Troubleshoot components of the engine, using recommended diagnostic equipment.			
36.02 Repair and replace components of the basic engine, using repair manuals.			
36.03 Service and adjust all parts of the engine for proper operation.			
37.0 Test, repair and/or replace the electrical system, using service manuals – the student will be able to:			
37.01 Troubleshoot the electrical system, using recommended diagnostic equipment.			
37.02 Repair and replace components of the electrical system.			
37.03 Service and adjust all parts of the system for proper operation.			
38.0 Diagnose, service, and repair transmission systems – the student will be able to:			
38.01 Troubleshoot transmission components, using recommended diagnostic equipment.			
38.02 Repair and replace parts of transmission systems.			
38.03 Service and adjust parts of different transmission systems for proper operation.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
39.0 Service and repair transfer case – the student will be able to:			
39.01 Troubleshoot transfer case components.			
39.02 Service and adjust system components.			
39.03 Repair and replace system components.			
39.04 Change filters and drain, flush, and refill the transfer case system.			
40.0 Diagnose, service, repair, and maintain the hydraulic system – the student will be able to:			
40.01 Change filters and drain, flush, and refill the hydraulic system.			
40.02 Troubleshoot hydraulic-system components, using recommended diagnostic equipment.			
40.03 Repair and replace parts of the system.			
40.04 Service and adjust the system for proper operation.			
41.0 Diagnose, service, and repair the final-drive systems – the student will be able to:			
41.01 Diagnose the final-drive systems, using recommended diagnostic equipment.			
41.02 Repair and replace parts of the systems.			
41.03 Service and adjust the systems for proper operation.			
42.0 Apply business-management skills and identify appropriate legal documents – the student will be able to:			
42.01 Identify personal/business liability and the use of liability insurance.			
42.02 Identify applicable insurance requirements.			
42.03 Identify and complete basic business-tax-liability forms.			
42.04 Identify the requirements of greenbelt, bluebelt, and homestead tax exemptions.			
42.05 Interpret enterprise budgets and amortization tables.			
42.06 Identify characteristics of legal documents (such as contracts, deeds, and leases).			

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
42.07 Identify applicable land-use and zoning regulations, including a comprehensive plan.			

Daggered for Deletion

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

### **Extended Student Supervision**

Because of the production and marketing cycle of the agricultural industries, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly

indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Animal Biotechnology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**NOTE:** This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

**Secondary – Career Preparatory**

Program Number	8106100
CIP Number	0101090100
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	19-4021 - Biological Technicians
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agricultural biotechnology industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of three courses with one occupational completion point. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations 1	1 credit	19-4021	3	EQ
	8106850	Agricultural Biotechnology 2	1 credit		3	VO
	8106120	Animal Biotechnology 3	1 credit		3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Tables

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

**This program is daggered and will not be aligned to academic courses.**

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Ag. Foundations	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%
Agricultural Biotechnology 2	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%
Animal Biotechnology 3	0/87 0%	0/80 0%	0/83 0%	0/69 0%	0/67 0%	0/70 0%	0/69 0%	0/82 0%	0/66 0%	0/74 0%	0/72 0%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
Agricultural Biotechnology 2	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%

Animal Biotechnology 3	0/67 0%	0/75 0%	0/54 0%	0/46 0%	0/45 0%	0/45 0%	0/45 0%
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\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.



## Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Animal Biotechnology.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Animal Biotechnology.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Animal Biotechnology.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Identify the historical, social, cultural and potential applications of biotechnology.
- 14.0 Conduct scientific investigation and apply results.
- 15.0 Practice agricultural laboratory safety.
- 16.0 Demonstrate laboratory skills as applied to biotechnology.
- 17.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR).
- 18.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Animal Biotechnology.
- 19.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Animal Biotechnology.
- 20.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Animal Biotechnology.
- 21.0 Apply genetic principles to animal science.
- 22.0 Interpret the relationship between total digestible nutrients (TDN) in feeds and its utilization.
- 23.0 Examine the developmental processes that determine animal growth.
- 24.0 Investigate the reproduction system of animals.
- 25.0 Describe animal science and the role of animals in society.

Florida Department of Education  
Student Performance Standards

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Animal Biotechnology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text,	

Florida Standards		Correlation to CTE Program Standard #
	including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Animal Biotechnology.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	

Florida Standards		Correlation to CTE Program Standard #
		LAFS.910.WHST.2.4
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	LAFS.910.WHST.2.5
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	LAFS.910.WHST.2.6
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	LAFS.910.WHST.3.7
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	LAFS.910.WHST.3.8
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research.	LAFS.910.WHST.3.9
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	LAFS.910.WHST.4.10
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Animal Biotechnology.	
03.01	Make sense of problems and persevere in solving them.	MAFS.K12.MP.1.1
03.02	Reason abstractly and quantitatively.	MAFS.K12.MP.2.1
03.03	Construct viable arguments and critique the reasoning of others.	MAFS.K12.MP.3.1
03.04	Model with mathematics.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.4.1
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy – the student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.			CS.10.02.01
04.02 Analyze the impact of agriculture on the local, state, national and global economy.			
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.			
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.			
05.0 Practice agriscience safety skills and procedures – the student will be able to:	MAFS.912.S-IC.2;	SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.01 Identify the common causes and prevention of accidents in agriscience operations.			
05.02 Demonstrate proper safety precautions and use of personal protective equipment.			CS.06.03.01.a CS.07.04.01.c.
05.03 Evaluate the food safety responsibilities that occur along the food supply chain.			FPP.01.02.01.a FPP.02.01.01.a FPP.02.02.02.a FPP.02.03
05.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.			CS.07.04.01
05.05 Identify proper disposal of hazardous waste materials and biohazards.			ESS.04.02.02.b ESS.04.05.01
05.06 Describe emergency procedures.			CS.07.03.01.c
06.0 Apply scientific and technological principles to agriscience issues – the student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	
06.01 Employ scientific measurement skills.			BS.02.02.01 CS.10.01.01.a
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 ESS.01.01.02.b
06.03 Identify the parts and functions of plant and animal cells.			PS.01.02.01.c AS.02.02.02.b
06.04 Describe the phases of cell reproduction.			PS.01.02.01.b. AS.02.02.03.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.			CS.11.01.01 CS.11.02.01
06.06 Interpret, analyze, and report data.			
06.07 Investigate DNA and genetics applications in agriscience including			BS.02.05.03.a.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
the theory of probability.			
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).			BS.01.01.03.a.
07.0 Apply environmental principles to the agricultural industry – the student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	
07.01 Research how different climactic and geological activity influences agriculture.			NRS.02.06.09 CS.05.03.02
07.02 Describe various ecosystems as they relate to the agriculture industry.			NRS.01.01.02.
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.			PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.04 Identify regulatory agencies that impact agricultural practices.			
07.05 Apply Best Management Practices that enhance the natural environment.			PS.03.04.01.b AS.08.01.01.c
07.06 Identify conservation practices related to natural resources.			PS.03.04.01.a
08.0 Investigate and utilize basic scientific skills and principles in plant science – the student will be able to:	MAFS.912.S-IC.2	SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L.15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	
08.01 Identify and describe the specializations within the plant science industry.			
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.			PS.01.01.01.c.
08.03 Examine the processes of plant growth including photosynthesis and respiration.			PS.01.03.01 PS.01.03.02
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.			PS.02.03.01

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
08.05 Analyze information from a fertilizer label.			PS.02.03.04
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.03.01.03 PS.03.01.02
08.07 Investigate the impacts of various pests and propose solutions for their control.			PS.03.03.02 PS.03.03.03 PS.03.03.04
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.			FPP01.01.01.a
08.09 Explore career opportunities in plant science.			
09.0 Investigate and utilize basic scientific skills and principles in animal science – the student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.			AS.02.01.02.c
09.02 Categorize animals according to use, type, breed, and scientific classification.			AS.02.01.01.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.			AS.02.01.02.a AS.05.02.01.a
09.04 Compare basic internal and external anatomy of animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.			AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
09.06 Compare and contrast animal welfare issues.			AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
09.07 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.06.02.01.a FPP01.01.01.a
09.08 Explore career opportunities in animal science.			AS.01.01.02.b.
10.0 Demonstrate the use of agriscience tools, equipment, and instruments – the student will be able to:	MAFS.912.S-IC.2	SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	
10.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.			CS.08.01.01.b PST.02.02.02.b.
10.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			PST.03.04.01.b PST.03.03.02.a.
10.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.			PST.04.04.03.a PST.04.04.06.a
10.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.			CS.08.03.01.c PST.03.02.03.c. PST.01.03.01.a.
11.0 Demonstrate agribusiness, employability and human relation skills – the student will be able to:			
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).			
11.02 Utilize a record keeping system to collect, interpret, and analyze data.			CS.09.02.01.b CS.10.01.01.a.
11.03 Enhance oral communications through telephone, interview and presentation skills.			CS.03.01.03.b.
11.04 Enhance written communication by developing resumes and business letters.			CS.03.01.01 CS.03.01.02
11.05 Demonstrate interpersonal (nonverbal) communication skills.			CS.03.01.01 CS.03.01.02
11.06 Demonstrate good listening skills.			CS.01.02.02
12.0 Apply leadership and citizenship skills – the student will be able to:			
12.01 Identify and describe leadership characteristics.			CS.01.06.01.a.
12.02 Identify opportunities to apply acquired leadership skills.			CS.02.02.02.b.
12.03 Identify and demonstrate ways to be an active citizen.			CS.01.05.02.c.
12.04 Participate in community based learning activities.			CS.01.05.01.c.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
12.05 Demonstrate the ability to work cooperatively.			CS.01.02.02.b.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.			
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.			

Daggered for Deletion

Florida Department of Education  
Student Performance Standards

Course Title: Agricultural Biotechnology 2  
Course Number: 8106850  
Course Credit: 1

Course Description:

This course was developed as a core and is designed to develop competencies in the areas of agricultural biotechnology in agriculture, scientific investigation, laboratory safety, scientific and technological concepts; and the fundamentals of biotechnology.

**NOTE: This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.**

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Animal Biotechnology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	

Florida Standards		Correlation to CTE Program Standard #
		LAFS.910.RST.2.5
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	
		LAFS.910.RST.2.6
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	
		LAFS.910.RST.3.7
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	
		LAFS.910.RST.3.8
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	
		LAFS.910.RST.3.9
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently.	
		LAFS.910.RST.4.10
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Animal Biotechnology.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content.	
		LAFS.910.WHST.1.1
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
		LAFS.910.WHST.1.2
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
		LAFS.910.WHST.2.4
02.02.2	Develop and strengthen writing as needed by planning, revising, editing,	

Florida Standards		Correlation to CTE Program Standard #
	rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Animal Biotechnology.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
13.0 Identify the historical, social, cultural and potential applications of biotechnology – the student will be able to:			
13.01 Define biotechnology and explore the historical impact on agriculture.			
13.02 Explain the developmental progression of biotechnology.			
13.03 Investigate current applications of biotechnology in agriculture.			
13.04 Investigate current research in agricultural biotechnology.			
13.05 Examine potential applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture.			
13.06 Research emerging problems and issues associated with agricultural biotechnology.			
13.07 Describe the role of agencies that regulate biotechnology.			
13.08 Interpret the major regulatory issues related to biotechnology.			
13.09 Explore ethical, legal and social biotechnology issues.			
13.10 Evaluate the benefits and risks associated with biotechnology.			
13.11 Investigate the emergence and evolution of biological organisms and their use in biotechnology.			
13.12 Examine intellectual properties associated with biotechnology by defining their components.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
13.13 Examine an ethical dilemma associated with biotechnology by identifying its components.			
14.0 Conduct scientific investigation and apply results – the student will be able to:			
14.01 Discuss the differences between scientific laws and scientific theories.			
14.02 Explain the process of scientific inquiry.			
14.03 Analyze research being conducted in agricultural biotechnology.			
14.04 Design an agricultural experiment using appropriate control measures.			
14.05 Devise a system for recording data.			
14.06 Collect and record data using SI units.			
14.07 Summarize data and draw defensible conclusions.			
14.08 Prepare a report on the experiment conducted.			
14.09 Plan and conduct follow-up experiments using the scientific method.			
15.0 Practice agricultural laboratory safety – the student will be able to:			
15.01 Identify first aid supplies, personnel and emergency protection areas.			
15.02 Monitor, use, store and dispose of hazardous materials properly.			
15.03 Document safety training and practices using Material Safety Data Sheets (MSDS) and Occupational Safety and Health Administration (OSHA) standards.			
15.04 Demonstrate and utilize safety equipment.			
15.05 Identify safety symbols and signs.			
15.06 Demonstrate appropriate safety procedures and guidelines, and discuss implications of safety violations.			
16.0 Demonstrate laboratory skills as applied to biotechnology – the student will be able to:			
16.01 Maintain and interpret biotechnology laboratory records.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
16.02 Operate laboratory equipment and measurement devices.			
16.03 Demonstrate aseptic techniques in the biotechnology laboratory.			
16.04 Select an appropriate standard operating procedure for working with biological materials.			
16.05 Prepare buffers, reagents, solutions and media.			
16.06 Inventory biological and chemical materials, and maintain accurate records of supplies and expiration dates.			
16.07 Isolate, maintain, quantify and store cell cultures.			
16.08 Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.			
16.09 Extract and purify DNA.			
16.10 Perform protein separation techniques and interpret the results.			
16.11 Describe how antibodies are formed and how they can be used in biotechnology applications.			
16.12 Research and describe the use of biotechnology to detect microbes.			
17.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR) – the student will be able to:			
17.01 Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes.			
17.02 Differentiate the roles of carbohydrates, fats, and proteins in biotechnology applications.			
17.03 Diagram the processes used to produce transgenic eukaryotes.			
17.04 Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.			
17.05 Describe processes by which enzymes are produced through biotechnology.			
17.06 Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.			
17.07 Diagram the process by which organisms are genetically engineered for waste treatment.			
17.08 Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
agricultural products.			
17.09 Investigate and report on genetic engineering procedures used in the production of agricultural products.			
17.10 Explain the functions of hormones in animals.			
17.11 Describe the processes used to produce animal hormones from transgenic organisms.			
17.12 Identify foods produced through fermentation.			
17.13 Compare and contrast bioengineering and conventional pathways used in food processing.			
17.14 Explain biomass and sources of biomass.			
17.15 Assess the characteristics of biomass that make it useful for biofuels production.			
17.16 Describe the process used in producing alcohol from biomass.			
17.17 Diagram the process used in producing biodiesel from biomass.			
17.18 Illustrate the process used in producing methane from biomass.			
17.19 Describe the selective plant breeding process.			
17.20 Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.			
17.21 Describe the use of biotechnology in bioremediation.			
17.22 Describe the processes involved in biotreatment of biological and chemical wastes.			
17.23 Explain the global importance of biodiversity.			
17.24 Explain the positive and negative impacts of agricultural practices on wild populations.			
17.25 Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.			
17.26 Describe the processes used in the production of molecules for use in industrial applications.			

Florida Department of Education  
Student Performance Standards

Course Title: Animal Biotechnology 3  
Course Number: 8106120  
Course Credit: 1

Course Description:

This course is designed to develop competencies in the areas of biotechnology in animal science, animal growth and reproduction, and the role of animals in society.

**NOTE: This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.**

Florida Standards		Correlation to CTE Program Standard #
18.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Animal Biotechnology.	
18.01	Key Ideas and Details	
18.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
18.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
18.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
18.02	Craft and Structure	
18.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
18.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	

Florida Standards		Correlation to CTE Program Standard #
18.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
18.03 Integration of Knowledge and Ideas		
18.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
18.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
18.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
18.04 Range of Reading and Level of Text Complexity		
18.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
18.04.2		
19.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Animal Biotechnology.	
19.01 Text Types and Purposes		
19.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
19.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
19.02 Production and Distribution of Writing		
19.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
19.02.2	Develop and strengthen writing as needed by planning, revising, editing,	

Florida Standards		Correlation to CTE Program Standard #
	rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
19.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
19.03	Research to Build and Present Knowledge	
19.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
19.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
19.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
19.04	Range of Writing	
19.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
20.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Animal Biotechnology.	
20.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
20.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
20.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
20.04	Model with mathematics. MAFS.K12.MP.4.1	
20.05	Use appropriate tools strategically.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.5.1
20.06 Attend to precision.	MAFS.K12.MP.6.1
20.07 Look for and make use of structure.	MAFS.K12.MP.7.1
20.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
21.0 Apply genetic principles to animal science – the student will be able to:			
21.01 Describe how the concept of heritability is used in the selection of livestock.			
21.02 Chart the difference between phenotypic and genotypic characteristics and determine probabilities.			
21.03 Analyze performance data used in the selection process of livestock.			
21.04 Use computer data to assist in the selection process of livestock.			
21.05 Differentiate between dominant and recessive traits.			
21.06 Describe the chemical and physical properties of DNA.			
21.07 Extract a visible mass of DNA from animal or plant tissue.			
21.08 Develop a hypothetical species using genetic engineering.			
21.09 Debate the safeguards used in research in genetic engineering.			
22.0 Interpret the relationship between total digestible nutrients (TDN) in feeds and its utilization – the student will be able to:			
22.01 Determine nutritional requirements of selected animals.			
22.02 Select appropriate feed samples for analysis of nutritional values and develop a balanced ration.			
22.03 Conduct experiments comparing growth rates using selected rations.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
22.04 Obtain information from a feed label and determine which nutrients are derived from which component.			
22.05 Demonstrate the effects digestive agents have in the digestive process.			
22.06 Compare how the body's cells metabolize fats, carbohydrates and proteins.			
22.07 Analyze the effect of diseases on nutritional utilization.			
23.0 Examine the developmental processes that determine animal growth – the student will be able to:			
23.01 Develop a growth curve using selected animal species.			
23.02 Differentiate between muscle, fat, and bone development.			
23.03 Evaluate the effects of hormones in animal production.			
23.04 Compare morphology of developing embryos.			
23.05 Analyze the diseases that affect development growth.			
24.0 Investigate the reproduction system of animals – the student will be able to:			
24.01 Analyze the quality of semen of selected animals.			
24.02 Compare and contrast sperm anatomy of selected animal species.			
24.03 Analyze the factors that affect sperm mobility and development.			
24.04 Compare and contrast the reproductive cycles of selected animal species.			
24.05 Compare and contrast the breeding time and conception rates of selected animal species.			
24.06 Describe the functions of hormones that control reproduction.			
24.07 Discuss the use of hormone therapy to manipulate ovarian activity.			
24.08 Describe and compare the different pathogens that cause animal diseases.			
24.09 Analyze the mating process of selected animal species.			
25.0 Describe animal science and the role of animals in society – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
25.01 Differentiate between animal welfare and animal rights.			
25.02 Debate current events concerning animal welfare and animal rights.			
25.03 Demonstrate safe procedures when working with animal related equipment in laboratory settings.			
25.04 Practice safety precautions around animals.			
25.05 Analyze the mating process of selected animal species.			
25.06 Develop a research project related to biotechnology and animal science.			
25.07 Discuss the benefits of biotechnology in producing and marketing animals and animal products.			
25.08 Research how biotechnology affects the consumer.			

Daggered for Deletion

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

### **Extended Student Supervision**

Because of the production and marketing cycle of the agricultural industries, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.



Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Animal Science and Services  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Program Number	8106200
CIP Number	0101030210
Grade Level	9-12, 30, 31
Standard Length	6 credits
Teacher Certification	AGRICUTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	45-2093 - Farmworkers, Farm, Ranch, and Aquacultural Animals 45-1011 - First-Line Supervisors of Farming, Fishing, and Forestry Workers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, health, safety and environmental issues, and the use and care of animal health-care instruments, animal grooming equipment, animal restraining equipment, and laboratory equipment.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of three occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations 1	1 credit	45-2093	3	EQ
	8106210	Animal Science and Services 2	1 credit		2	VO
	8106220	Animal Science and Services 3	1 credit		2	VO
B	8106230	Animal Science and Services 4	1 credit	45-1011	2	VO
	8106240	Animal Science and Services 5	1 credit		2	VO
C	8106250	Animal Science and Services 6	1 credit	45-1011	2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Ag. Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%
Animal Science and Services 2	13/87 15%	9/80 11%	27/83 33%	7/69 10%	21/67 31%	9/70 13%	6/69 9%	23/82 28%	11/66 17%	22/74 30%	6/72 8%
Animal Science and Services 3	25/87 29%	23/80 29%	8/83 10%	22/69 32%	2/67 3%	22/70 31%	26/69 38%	4/82 5%	24/66 36%	3/74 4%	22/72 31%
Animal Science and Services 4	21/87 24%	21/80 26%	8/83 10%	21/69 30%	1/67 1%	25/70 36%	25/69 36%	1/82 1%	19/66 29%	2/74 3%	19/72 26%
Animal Science and Services 5	2/87 2%	2/80 3%	3/83 4%	1/69 1%	1/67 1%	3/70 7%	2/69 3%	0/82 0%	2/66 3%	2/74 3%	1/72 1%

Animal Science and Services 6	13/87 15%	9/80 11%	27/83 33%	7/69 10%	21/67 31%	9/70 13%	6/69 9%	23/82 28%	11/66 17%	22/74 30%	6/72 8%
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\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Ag. Foundations	14/67 21%	4/75 5%	8/54 15%	**	**	**	**
Animal Science and Services 2	5/67 7%	4/75 5%	#	**	**	**	**
Animal Science and Services 3	6/67 9%	5/75 7%	#	**	**	**	**
Animal Science and Services 4	#	1/75 1%	#	**	**	**	**
Animal Science and Services 5	7/67 10%	1/75 1%	#	**	**	**	**
Animal Science and Services 6	5/67 7%	7/75 9%	#	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

*Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

### **National Standards (NS)**

Some or all of the courses in this program have been aligned with Industry or National Standards. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link:

[https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn\\_000.pdf](https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf)

### **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Animal Science and Services.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Animal Science and Services.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student Animal Science and Services.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Describe animal science and the role of animals in society.
- 14.0 Classify animals according to hierarchical taxonomy and agricultural use.
- 15.0 Identify careers in the animal industry.
- 16.0 Describe animal and human first aid and laboratory safety.
- 17.0 Recognize normal and abnormal animal behaviors.
- 18.0 Apply principles of comparative anatomy and physiology to uses within various animal systems.
- 19.0 Evaluate the male and female reproductive systems.
- 20.0 Demonstrate safe animal handling and management techniques.
- 21.0 Analyze the communities responsibility in options for caring for unwanted /neglected livestock.
- 22.0 Evaluate the importance of the food and fiber system to understand the impact on global economy.
- 23.0 Examine the scope of career opportunities in and the importance of agriculture to the economy.
- 24.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Animal Science and Services.
- 25.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Animal Science and Services.
- 26.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Animal Science and Services.
- 27.0 Apply principles of animal nutrition to ensure the proper growth, development, and reproduction and economic production of animals.
- 28.0 Evaluate animals for breeding readiness and soundness.
- 29.0 Explain the reproductive system and breeding of selected animals.
- 30.0 Prescribe and implement a prevention and treatment program for animal diseases, parasites and other disorders.
- 31.0 Demonstrate knowledge of preventive medicine and disease control.

- 32.0 Select animals for specific purposes and maximum performance based on anatomy and physiology.
- 33.0 Prepare, groom, exhibit, and market animals
- 34.0 Maintain and analyze records.
- 35.0 Provide for the biosecurity of agricultural animals and production facilities.
- 36.0 Explain the components of the American business system.
- 37.0 Investigate agricultural cooperatives structure and function.
- 38.0 Apply animal health practices.
- 39.0 Maintain equipment and facilities.
- 40.0 Operate, maintain, and repair machinery and equipment.
- 41.0 Investigate emerging technologies in Animal Science.
- 42.0 Apply scientific principles in the selection and breeding of animals.
- 43.0 Manage pasture and forage crops.
- 44.0 Discuss animal marketing techniques.
- 45.0 Apply advanced animal health practices.
- 46.0 Perform emergency first aid on animals.
- 47.0 Implement procedures to ensure that animal products are safe.
- 48.0 Identify, select, and breed food-producing animals.
- 49.0 Analyze county, state and federal agencies that support the animal industry.
- 50.0 Apply principles of comparative anatomy and physiology to uses within various animal systems.
- 51.0 Plan routine management of food-producing animals and facilities.
- 52.0 Maintain and analyze records.
- 53.0 Design animal housing, equipment and handling facilities for animal production.
- 54.0 Comply with government regulations and safety standards for facilities used in animal production.
- 55.0 Identify and interpret rules, policy, and regulations affecting the livestock industry.
- 56.0 Understand the relationship of animal production and the environment.
- 57.0 Evaluate the effects of environmental conditions on animals.
- 58.0 Identify and interpret environmental issues and regulations pertaining to animal industry.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agritechnology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical	



Florida Standards		Correlation to CTE Program Standard #
	context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
01.04.2		
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agritechnology.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	

Florida Standards		Correlation to CTE Program Standard #
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agritechnology.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	

Florida Standards		Correlation to CTE Program Standard #
03.03	Construct viable arguments and critique the reasoning of others.	MAFS.K12.MP.3.1
03.04	Model with mathematics.	MAFS.K12.MP.4.1
03.05	Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06	Attend to precision.	MAFS.K12.MP.6.1
03.07	Look for and make use of structure.	MAFS.K12.MP.7.1
03.08	Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy-- The student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	CS.10.02.01
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
04.02 Analyze the impact of agriculture on the local, state, national and global economy.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
05.0 Practice agriscience safety skills and procedures--The student will be able to:		SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.01 Identify the common causes and prevention of accidents in agriscience operations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.06.03.01.a CS.07.04.01.c.
05.02 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		FPP.01.02.01. a FPP.02.01.01. a FPP.02.02.02. a FPP.02.03
05.03 Identify proper disposal of hazardous waste materials and biohazards.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.07.04.01
05.04 Describe emergency procedures for: basic first aid, CPR, chemical spills, fire extinguisher use	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ESS.04.02.02. b ESS.04.05.01
06.0 Apply scientific and technological principles to agriscience issues--The student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	CS.07.03.01.c
06.01 Employ scientific measurement skills.			
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 CS.10.01.01.a
06.03 Identify the parts and functions of plant and animal cells.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		BS.02.02.01 ESS.01.01.02. b
06.04 Describe the phases of cell reproduction.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.01.02.01.c AS.02.02.02.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8		PS.01.02.01.b. AS.02.02.03.b
06.06 Interpret, analyze, and report data.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.11.01.01 CS.11.02.01

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).	LAFS.910.W.3.7 LAFS.1112.W.3.7		BS.02.05.03.a.
07.0 Apply environmental principles to the agricultural industry--The student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	BS.01.01.03.a.
07.01 Research how different climactic and geological activity influences agriculture.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
07.02 Describe various ecosystems as they relate to the agriculture industry.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.02.06.09 CS.05.03.02
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.01.01.02.
07.04 Identify regulatory agencies that impact agricultural practices.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.L.3.6 LAFS.1112.L.3.6		PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.05 Apply Best Management Practices that enhance the natural environment.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
07.06 Identify conservation practices related to natural resources.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.03.04.01.b AS.08.01.01.c
08.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:		SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	PS.03.04.01.a
08.01 Identify and describe the specializations within the plant science industry.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.03 Examine the processes of plant growth including photosynthesis,	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.01.01.01.c.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
respiration, transpiration, absorption, transfer, storage, reproduction, etc....	LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.03.01 PS.01.03.02
08.05 Analyze information from a fertilizer label.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		PS.02.03.01
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.02.03.04
08.07 Investigate the impacts of various pests and propose solutions for their control.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.01.03 PS.03.01.02
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.03.02 PS.03.03.03 PS.03.03.04
08.09 Explore career opportunities in plant science.	LAFS.910.W.3.7 LAFS.1112.W.3.7		FPP01.01.01.a
09.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
09.02 Analyze commercially important livestock breeds in Florida.	LAFS.910.W.2.4 LAFS.1112.W.2.4		AS.02.01.02.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.	LAFS.910.L.3.6 LAFS.1112.L.3.6		AS.02.01.01.c
09.04 Compare and contrast animal welfare issues.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.01.02.a AS.05.02.01.a
09.05 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.02.02.01.c AS.02.02.05.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
			AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.06 Explore career opportunities in animal science.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
10.0 Demonstrate the use of agriscience tools, equipment, and instruments-- The student will be able to		SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c
10.01 Select and demonstrate proper use of hand tools in agriculture.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		AS.06.02.01.a FPP01.01.01.a
10.02 Operate service and maintain agriscience equipment, and instruments.			AS.01.01.02.b.
10.03 Manage facilities and supplies.			
11.0 Demonstrate agribusiness, employability and human relation skills--The student will be able to:			CS.08.01.01.b PST.02.02.02. b.
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		PST.03.04.01. b PST.03.03.02. a.
11.02 Utilize a record keeping system to collect, interpret, and analyze data.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		PST.04.04.03. a PST.04.04.06. a
11.03 Enhance oral communications through telephone, interview and presentation skills.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.08.03.01.c PST.03.02.03.c . PST.01.03.01. a.
11.04 Enhance written communication by developing resumes and	LAFS.910.W.2.4 LAFS.1112.W.2.4		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
business letters.	LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.L.1.2 LAFS.1112.L.1.2		
11.05 Demonstrate interpersonal (nonverbal) communication skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
11.06 Demonstrate good listening skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.09.02.01.b CS.10.01.01.a.
12.0 Apply leadership and citizenship skills--The student will be able to:			CS.03.01.03.b.
12.01 Identify and describe leadership characteristics.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.02 Identify opportunities to apply acquired leadership skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.03 Identify and demonstrate ways to be an active citizen.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.02.02
12.04 Participate in community based learning activities.			
12.05 Demonstrate the ability to work cooperatively.			CS.01.06.01.a.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		CS.02.02.02.b.
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.02.c.
12.08 Develop both a leadership and a career development plan utilizing SMART goals that include 5, 10, and 20 year benchmarks.			
13.0 Discuss components of food safety and handling practices in agriculture - The student will be able to:			
13.01 Demonstrate proper safety precautions and use of personal protective equipment.			
13.02 Evaluate the food safety responsibilities that occur along the food supply chain.			
13.03 Explain techniques and procedures for the safe handling of food products.			
13.04 Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).			



<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
13.05 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Animal Science and Services 2  
**Course Number:** 8106210  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of safety; animal behavior; animal welfare; animal control; and employability skills.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Animal Science and Services	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Animal Science and Services	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's	

Florida Standards		Correlation to CTE Program Standard #
	capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
<b>03.0</b>	<b>Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Animal Science and Services</b>	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06	Attend to precision. MAFS.K12.MP.6.1	
03.07	Look for and make use of structure. MAFS.K12.MP.7.1	

Florida Standards	Correlation to CTE Program Standard #
03.08 Look for and express regularity in repeated reasoning.  MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
13.0 Describe animal science and the role of animals in society – the student will be able to:			
13.01 Describe animal science and the role of animals in society.			
13.02 Analyze perceptions of public opinion of animal related issues.	MAFS.912.SIC.2.3		
13.03 Identify the origin, significance, distribution and domestication of animal species.	MAFS.912.SIC.1.1 MAFS.912.SIC.1.2		AS.01.01.01.a
13.04 Evaluate and describe characteristics of animals that developed in response to the animals’ environment and led to their domestication.			AS.01.01.01.b
13.05 Predict adaptations of animals to production practices and environments.			AS.01.01.01.c
13.06 Define major components of the animal industry.			AS.01.01.02.a
13.07 Outline the development of the animal industry and the resulting products, services and careers.			AS.01.01.02.b
13.08 Predict trends and implications of future development of the animal systems industry.	MAFS.912.S-IC.2.6 MAFS.912.S-IC.2.3		AS.01.01.02.c
14.0 Classify animals according to hierarchical taxonomy and agricultural use – the student will be able to:			
14.01 Explain the importance of the binomial system of nomenclature.		SC.912.L.15.6	AS.02.01.01.a
14.02 Explain how animals are classified using Linnaeus’s taxonomical classification system.		SC.912.L.15.6	AS.02.01.01.b
14.03 Classify animals according to the taxonomical classification system.		SC.912.L.15.6	AS.02.01.01.c
14.04 Identify major animal species by common and scientific names.		SC.912.L.15.4	AS.02.01.02.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
14.05 Compare and contrast the hierarchical classification of the major agricultural animal species.		SC.912.L.15.4	AS.02.01.02.b
14.06 Appraise and evaluate the economic value of animals for various applications in the agriculture industry.	MAFS.912.S-ID.1.2, 3, 4 MAFS.912.S-ID.2.5, 6 MAFS.912.S-ID.3.7, 8, 9	SC.912.N.4.2	AS.02.01.02.c
15.0 Identify careers in the animal industry – the student will be able to:			
15.01 Locate and obtain information on animal-industry careers and career opportunities.			
15.02 Compare and contrast various careers in the animal industry including training requirements for entry and advancement in animal-industry careers.			
15.03 Examine professional organizations and commodity groups in the animal industry and supporting organizations.			
16.0 Describe animal and human first aid and laboratory safety – the student will be able to:			
16.01 Practice safe procedures when working with animal-related equipment and in laboratory settings.			
16.02 Understand animal behaviors as they relate to practicing safety precautions around animal restraint.			
16.03 Discuss the impact of unsafe procedures.			
16.04 Define zoonosis and investigate selected zoonotic diseases.		SC.912.L.14.6	
16.05 Discuss OSHA as it relates to the animal industry.			
16.06 Explain how to use a first aid kit and its key components.			
16.07 Recognize allergic reactions.		SC.912.L.14.52	
16.08 Describe proper use of eye wash solution.			
16.09 Understand how to control minor hemorrhage and/or trauma.		SC.912.L.14.36	
16.10 Explain emergency procedures.			
17.0 Recognize normal and abnormal animal behaviors – the student will be able to:			
17.01 Distinguish between instinctive and learned behaviors.			
17.02 Recognize normal and abnormal behavioral characteristics of animals through observations.		SC.912.N.1.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
17.03 Identify behavioral problems.			
18.0 Apply principles of comparative anatomy and physiology to uses within various animal systems – the student will be able to:			
18.01 Identify basic characteristics of animal cells, tissues, organs and body systems.			AS.02.02.01.a
18.02 Compare and contrast animal cells, tissues, organs and body systems.			AS.02.02.01.b
18.03 Explain how the components and systems of animal anatomy and physiology relate to the production and use of animals.			AS.02.02.01.c
18.04 Diagram a typical animal cell and identify the organelles.		SC.912.L.14.2	AS.02.02.02.a
18.05 Describe the functions of animal cell structures.		SC.912.L.14.2	AS.02.02.02.b
18.06 Describe the properties, locations, functions and types of animal organs.			AS.02.02.02.c
18.07 Compare and contrast body systems and system adaptations between animal species.		SC.912.L.14.19, 21, 31, 32, 33, 36, 46, 48	AS.02.02.06.b
19.0 Evaluate the male and female reproductive systems – the student will be able to:			
19.01 Explain the male and female reproductive organs of the major animal species.			AS.05.01.01.a
19.02 Describe the functions of major organs in the male and female reproductive systems.			AS.05.01.01.b
20.0 Demonstrate safe animal handling and management techniques – the student will be able to:			
20.01 Discuss the dangers involved in working with animals.		SC.912.N.4.2	AS.06.01.01.a
20.02 Outline safety procedures for working with animals by species.			AS.06.01.01.b
20.03 Interpret animal behaviors and execute protocols for safe handling of animals.			AS.06.01.01.c
20.04 Explain the implications of animal welfare and animal rights for animal agriculture.			AS.06.01.02.a
20.05 Design programs that assure the proper care and use of animals and prevent abuse or mistreatment.		SC.912.N.4.1	AS.06.01.02.b
20.06 Implement quality-assurance programs and procedures for animal production.			AS.06.01.02.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
21.0 Analyze the communities responsibility in options for caring for unwanted/neglected livestock – the student will be able to:			
21.01 Differentiate between animal control agencies and humane societies.			
21.02 Explain the laws governing animal care and use.		SC.912.L.17.13 SC.912.N.4.2	
21.03 Identify and locate local animal control agencies and humane societies.			
22.0 Evaluate the importance of the food and fiber system to understand the impact on global economy – the student will be able to:			
22.01 Assess the agricultural impact upon the US gross national product and the total global economy.	MAFS.912.S-IC.1.1, 2 MAFS.912.S-IC.2.6		
22.02 Investigate local, state, and national regulatory laws, industry regulations, and legislation for agricultural businesses.		SC.912.L.17.12, 13	
22.03 Identify and describe the primary government agencies involved with agriculture.		SC.912.L.17.13	
22.04 Research new and emerging technologies and their impact on the economy.	MAFS.912.S-IC.2.6		
22.05 Recognize the value of the food and agribusiness industry.	MAFS.912.S-ID.3.9	SC.912.L.17.18	
23.0 Examine the scope of career opportunities in and the importance of agriculture to the economy – the student will be able to:			
23.01 Define and explore agriculture and agribusinesses and their role in the economy.			
23.02 Evaluate and explore the agribusiness career opportunities in agriculture.			
23.03 Compare how key organizational structures and processes affect organizational performance and the quality of products and services.			
23.04 Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.			



**Florida Department of Education  
Student Performance Standards**

**Course Title:** Animal Science and Services 3  
**Course Number:** 8106220  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of animal digestive systems; animal breeding; preventive medicine and disease control; control of parasites; animal marketing; and analyzing records

Florida Standards	Correlation to CTE Program Standard #
24.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Animal Science and Services.	
24.01 Key Ideas and Details	
24.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.  LAFS.1112.RST.1.1	
24.01.2 Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.1112.RST.1.2	
24.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.1112.RST.1.3	
24.02 Craft and Structure	
24.02.1 Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.  LAFS.1112.RST.2.4	
24.02.2 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.  LAFS.1112.RST.2.5	
24.02.3 Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.  LAFS.1112.RST.2.6	

Florida Standards	Correlation to CTE Program Standard #
24.03 Integration of Knowledge and Ideas	
24.03.1 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. <div style="text-align: right;">LAFS.1112.RST.3.7</div>	
24.03.2 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. <div style="text-align: right;">LAFS.1112.RST.3.8</div>	
24.03.3 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. <div style="text-align: right;">LAFS.1112.RST.3.9</div>	
24.04 Range of Reading and Level of Text Complexity	
24.04.1 By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. 24.04.2 By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. <div style="text-align: right;">LAFS.1112.RST.4.10</div>	
25.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Animal Science and Services.	
25.01 Text Types and Purposes	
25.01.1 Write arguments focused on discipline-specific content. <div style="text-align: right;">LAFS.1112.WHST.1.1</div>	
25.01.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. <div style="text-align: right;">LAFS.1112.WHST.1.2</div>	
25.02 Production and Distribution of Writing	
25.02.1 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. <div style="text-align: right;">LAFS.1112.WHST.2.4</div>	
25.02.2 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. <div style="text-align: right;">LAFS.1112.WHST.2.5</div>	
25.02.3 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including	

Florida Standards	Correlation to CTE Program Standard #
<p style="text-align: right;">new arguments or information.</p> <p style="text-align: right;">LAFS.1112.WHST.2.6</p>	
<p>25.03 Research to Build and Present Knowledge</p>	
<p>25.03.1 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.</p> <p style="text-align: right;">LAFS.1112.WHST.3.7</p>	
<p>25.03.2 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p> <p style="text-align: right;">LAFS.1112.WHST.3.8</p>	
<p>25.03.3 Draw evidence from informational texts to support analysis, reflection, and research.</p> <p style="text-align: right;">LAFS.1112.WHST.3.9</p>	
<p>25.04 Range of Writing</p>	
<p>25.04.1 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.</p> <p style="text-align: right;">LAFS.1112.WHST.4.10</p>	
<p>26.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Animal Science and Services.</p>	
<p>26.01 Make sense of problems and persevere in solving them.</p> <p style="text-align: right;">MAFS.K12.MP.1.1</p>	
<p>26.02 Reason abstractly and quantitatively.</p> <p style="text-align: right;">MAFS.K12.MP.2.1</p>	
<p>26.03 Construct viable arguments and critique the reasoning of others.</p> <p style="text-align: right;">MAFS.K12.MP.3.1</p>	
<p>26.04 Model with mathematics.</p> <p style="text-align: right;">MAFS.K12.MP.4.1</p>	
<p>26.05 Use appropriate tools strategically.</p> <p style="text-align: right;">MAFS.K12.MP.5.1</p>	
<p>26.06 Attend to precision.</p> <p style="text-align: right;">MAFS.K12.MP.6.1</p>	
<p>26.07 Look for and make use of structure.</p> <p style="text-align: right;">MAFS.K12.MP.7.1</p>	
<p>26.08 Look for and express regularity in repeated reasoning.</p>	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
27.0 Apply principles of animal nutrition to ensure the proper growth, development, and reproduction and economic production of animals – the student will be able to:			
27.01 Compare and contrast common types of feedstuffs and the roles they play in the diets of animals.		SC.912.L.18.1	AS.04.01.01.a
27.02 Determine the relative nutritional value of feedstuffs by evaluating their general quality and condition.			AS.04.01.01.b
27.03 Select appropriate feedstuffs for animals based on factors such as economics, digestive system and nutritional needs.			AS.04.01.01.c
27.04 Explain the importance of a balanced ration for animals.			AS.04.01.02.a
27.05 Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements and performance.	MAFS.912.F-IF.2.4 MAFS.912.N-Q.1.3 MAFS912.A-CED.1.3		AS.04.01.02.b
27.06 Formulate animal feeds based on nutritional requirements, using feed ingredients for maximum nutrition and optimal economic production.	MAFS.912.F-LE.2.5 MAFS.912.AREI.3.6 MAFS.912.N-Q.1.1, 3	SC.912.L.18.1	AS.04.01.02.c
27.07 Explain the purpose and benefits of feed additives and growth promotants in animal production.		SC.912.L.18.1	AS.04.02.01.a
27.08 Discuss how feed additives and growth promotants are administered and the precautions that should be taken.		SC.912.L.18.1	AS.04.02.01.b
27.09 Prescribe and administer feed additives and growth promotants.	MAFS.912.N-Q.1.1, 3		AS.04.02.01.c
27.10 Analyze different feed labels and apply feed label regulations.	MAFS.912.N-Q.1.3		
28.0 Evaluate animals for breeding readiness and soundness – the student will be able to:			
28.01 Explain how age, size, life cycle, maturity level and health status affect the reproductive efficiency of male and female animals.			AS.05.02.01.a
28.02 Summarize factors that lead to reproductive maturity.			AS.05.02.01.b

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
28.03 Evaluate and select animals for reproductive readiness.			AS.05.02.01.c
28.04 Discuss the importance of efficient and economic reproduction in animals.		SC.912.N.4.2	AS.05.02.02.a
28.05 Evaluate reproductive problems that occur in animals.			AS.05.02.02.b
28.06 Treat or cull animals with reproductive problems.			AS.05.02.02.c
28.07 Select breeding animals based on characteristics of the reproductive organs.		SC.912.L.15.4	AS.05.03.01.c
29.0 Explain the reproductive system and breeding of selected animals – the student will be able to:			
29.01 Describe estrous cycle.		SC.912.L.14.31, 33	
29.02 Describe breeding techniques.		SC.912.L.15.9, 14, 15	
29.03 Describe the proper care for breeding stock.			
29.04 Describe the proper care for newborn.		SC.912.L.14.41	
29.05 Compare and contrast between reproduction in animal species.		SC.912.L.14.33	
30.0 Prescribe and implement a prevention and treatment program for animal diseases, parasites and other disorders – the student will be able to:			
30.01 Explain methods of determining animal health and disorders.			AS.03.01.01.a
30.02 Perform simple health-check evaluations on animals.			AS.03.01.01.b
30.03 Describe diagnostic tests to detect health problems in animals.			AS.03.01.01.c
30.04 Identify common diseases, parasites and physiological disorders that affect animals.			AS.03.01.02.a
30.05 Assess illnesses and disorders of animals based on symptoms and problems caused by diseases, parasites and physiological disorders.		SC.912.L.17.6	AS.03.01.02.c
30.06 Identify common diseases, parasites and physiological disorders of animals.			
30.07 Explain characteristics of causative agents and vectors of diseases and disorders in animals.		SC.912.L.14.6	AS.03.01.03.a
30.08 Evaluate preventive measures for controlling and limiting the spread of diseases, parasites and disorders among animals.		SC.912.L.17.17	AS.03.01.03.b

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
30.09 Design and implement a health maintenance and disease and disorder prevention plan for animals in their natural and/or confined environments.			AS.03.01.03.c
30.10 Explain the clinical significance of common considerations in veterinary treatments, such as aseptic techniques.			AS.03.01.04.a
30.11 Prepare animals, facilities and equipment for surgical and nonsurgical treatments and procedures.			AS.03.01.04.b
30.12 Describe surgical and nonsurgical treatments and procedures in animal health care.			AS.03.01.04.c
30.13 Identify and describe zoonotic diseases.			AS.03.01.05.a
30.14 Explain the health risk of zoonotic diseases to humans and their historical significance and future implications.		SC.912.L.14.6	AS.03.01.05.b
30.15 Implement zoonotic disease prevention methods and procedures for the safe handling and treatment of animals.			AS.03.01.05.c
31.0 Demonstrate knowledge of preventive medicine and disease control – the student will be able to:			
31.01 Describe procedures for prescribed oral medications.			
31.02 Describe the process for administering medications by injection.			
31.03 Describe the procedure for safe disposal of biologicals.			
31.04 Discuss the term immunology and active and passive immunity.		SC.912.L.14.6, 52	
31.05 Describe the process for fecal sample collection, slide preparation, and examination.			
32.0 Select animals for specific purposes and maximum performance based on anatomy and physiology – the student will be able to:			
32.01 Identify ways an animal's health can be affected by anatomical and physiological disorders.			AS.02.03.01.a
32.02 Compare and contrast desirable anatomical and physiological characteristics of animals within and between species.			AS.02.03.01.b
32.03 Evaluate and select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth and reproduction.		SC.912.L.15.15	AS.02.03.01.c
32.04 Create a program to develop an animal to its highest potential performance.			AS.02.03.02.a
32.05 Assess an animal to determine if it has reached its optimal performance level based on anatomical and physiological			AS.02.03.02.b

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
characteristics.			
32.06 Develop efficient procedures to produce consistently high quality animals, well suited for their intended purposes.			AS.02.03.02.c
33.0 Prepare, groom, exhibit, and market animals – the student will be able to:			
33.01 Groom selected animals for exhibition.			
33.02 Train animals for show and/or exhibition.			
33.03 Demonstrate proper techniques for exhibiting and animals.			
33.04 Demonstrate knowledge required to train selected animals to halter.			
33.05 Measure animal growth using a scale.			
33.06 Identify market outlets.			
33.07 Describe methods of restraining, loading, handling, and transporting animals safely.			
33.08 Determine market grades of animals and animal products.			
33.09 Identify components of shipping and health certificates.			
34.0 Maintain and analyze records – the student will be able to:			
34.01 Maintain and analyze animal records.	MAFS.912.N-Q.1.1		
34.02 Discuss the legal requirements of maintaining animal health records, and maintain and analyze animal health records.	MAFS.912.N-Q.1.1		
34.03 Maintain and analyze basic business records (inventory, depreciation, receipts, and expenses) using computer applications.	MAFS.912.N-Q.1.1 MAFS912.A-CED.1.3 MAFS.912.F-IF.3.8b		
34.04 Prepare and maintain Supervised Agricultural Experience (SAE) records.	MAFS.912.N-Q.1.1 MAFS912.A-CED.1.1		
35.0 Provide for the biosecurity of agricultural animals and production facilities – the student will be able to:			
35.01 Explain the importance of biosecurity to the animal industry.		SC.912.L.14.6	AS.03.02.01.a
35.02 Discuss procedures at the local, state and national levels to ensure biosecurity of the animal industry.			AS.03.02.01.b
35.03 Implement a biosecurity plan for an animal production operation.			AS.03.02.01.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
36.0 Explain the components of the American business system – the student will be able to:			
36.01 Describe the five basic ways American business is organized.			
36.02 Distinguish and identify between the characteristics of each method of doing business.			
36.03 Evaluate the advantages and disadvantages provided by each business method.			
36.04 Evaluate how cooperative principles and practices differentiate cooperatives from other businesses.			
37.0 Investigate agricultural cooperatives structure and function – the student will be able to:			
37.01 Explain the definition of a cooperative.			
37.02 Understand the history of cooperative principles and practices.			
37.03 Describe the five areas that classify cooperative structure.			
37.04 Distinguish and identify between the five types of cooperative structure and their functions.			



**Florida Department of Education  
Student Performance Standards**

**Course Title:**        **Animal Science and Services 4**  
**Course Number:**   **8106230**  
**Course Credit:**     **1**

**Course Description:**

This course is designed to develop competencies in the areas of nutrition; grooming, exhibiting and marketing animals; operation, maintenance and repair of equipment.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
23.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Animal Science and Services	
23.01	Key Ideas and Details	
23.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
23.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
23.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
23.02	Craft and Structure	
23.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
23.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
23.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
23.03	Integration of Knowledge and Ideas	
23.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
23.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
23.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
23.04	Range of Reading and Level of Text Complexity	
23.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
23.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
24.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Animal Science and Services	
24.01	Text Types and Purposes	
24.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
24.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
24.02	Production and Distribution of Writing	
24.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
24.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	

Florida Standards		Correlation to CTE Program Standard #
24.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
<b>24.03 Research to Build and Present Knowledge</b>		
24.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
24.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
24.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
<b>24.04 Range of Writing</b>		
24.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
<b>25.0</b>	<b>Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Animal Science and Services</b>	
25.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
25.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
25.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
25.04	Model with mathematics. MAFS.K12.MP.4.1	
25.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
25.06	Attend to precision. MAFS.K12.MP.6.1	

Florida Standards	Correlation to CTE Program Standard #
25.07 Look for and make use of structure.	MAFS.K12.MP.7.1
25.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
38.0 Apply animal health practices – the student will be able to:			
38.01 Administer prescribed oral medications.			
38.02 Locate injection points of selected animals.			
38.03 Sterilize instruments and supplies.			
38.04 Interpret and follow directions on medications and animal health aids, including withdrawal periods.			
38.05 Dip, spray, or dust animals for external parasites (under supervision).			
38.06 Dispose of empty chemical and medical containers as prescribed.			
38.07 Store medications and chemicals safely and securely.			
38.08 Dispose of biomedical waste and by products (needles, scalpel blades, medicines, etc.)			
39.0 Maintain equipment and facilities – the student will be able to:			
39.01 Clean and disinfect pens, cages, feeders, waterers, trailers and other equipment according to Best Management Practices.		SC.912.L.14.6	
39.02 Dispose of animal residue and waste according to Best Management Practices.		SC.912.L.17.14	
39.03 Prepare and maintain equipment and instruments.			
39.04 Repair and maintain pens, cages and other facilities and structures.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
39.05 Perform maintenance and minor repair of electrical and plumbing fixtures and equipment.			
39.06 Create a clean, sanitary and healthy environment for animals.			
40.0 Operate, maintain, and repair machinery and equipment – the student will be able to:			
40.01 Use equipment-operator and repair manuals.			
40.02 Operate, service, and maintain equipment.			
40.03 Maintain records of equipment maintenance and repair.			
40.04 Prepare equipment for storage.			
40.05 Demonstrate safety practices in operating machinery and equipment.			
41.0 Investigate emerging technologies in Animal Science – the student will be able to:			
41.01 Investigate genetic advancements and their effect on animal industry.		SC.912.L.15.14	
41.02 Identify new technologies in animal science.			
41.03 Research emerging technologies and determine their impact on animal industry and society.		SC.912.L.16.10 SC.912.L.17.17	
42.0 Apply scientific principles in the selection and breeding of animals – the student will be able to:			
42.01 Explain genetic inheritance in agricultural animals.		SC.912.L.16.3 SC.912.L.16.2	AS.05.03.01.a
42.02 Explain the advantages of using genetically superior animals in the production of animals and animal products.			AS.05.03.01.b
42.03 Select a breeding system based on the principles of genetics.		SC.912.L.16.4	AS.05.03.01.c
42.04 Define natural and artificial breeding methods.			AS.05.03.02.a
42.05 Explain the processes of natural and artificial breeding methods.			AS.05.03.02.b
42.06 Select animal breeding methods based on reproductive and economic efficiency.			AS.05.03.02.c
42.07 Explain the use of quantitative breeding values (e.g., EPDs) in the selection of genetically superior breeding stock.	MAFS.912.S-IC.2.6		AS.05.03.03.a
42.08 Compare and contrast quantitative breeding value differences	MAFS.912.S-IC.2.6		AS.05.03.03.b

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
between genetically superior animals and animals of average genetic value.			
42.09 Select animals based on quantitative breeding values for specific characteristics.			AS.05.03.03.c
42.10 Explain the advantages of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer.			AS.05.03.04.a
42.11 Explain the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer.			AS.05.03.04.b
42.12 Perform procedures for estrous synchronization, superovulation, flushing, embryo transfer and other reproductive management practices.			AS.05.03.04.c
42.13 Discuss the uses and advantages and disadvantages of natural breeding and artificial insemination.			AS.05.03.05.a
42.14 Explain the materials, methods and processes of artificial insemination.			AS.05.03.05.b
42.15 Demonstrate artificial insemination techniques.			AS.05.03.05.c
43.0 Manage pasture and forage crops – the student will be able to:			
43.01 Compare pasture, forage and feed crop production and harvesting systems.			
43.02 Assist in determining pasture and forage needs.			
43.03 Take a soil sample and interpret results.	MAFS.912.S-IC.2.6	SC.912.P.8.11 SC.912.N.1.4	
43.04 Take a forage sample and interpret results.	MAFS.912.S-IC.2.6	SC.912.N.1.4	
43.05 Describe soil and water conservation practices.		SC.912.L.17.15, 17	
43.06 Determine range and pasture quality.			
43.07 Prepare soil for planting feed, pasture and forage crops.			
43.08 Plant and grow feed, pasture and forage crops.			
43.09 Fertilize pasture, forage, and feed crops.			
43.10 Control weeds and pests in crops.			

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
43.11 Harvest forage and feed crops.			
43.12 Store harvested feed and forage crops.			
43.13 Assist in the development of a plan for the rotation of fields, pens and pastures.		SC.912.L.17.20	

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Animal Science and Services 5  
**Course Number:** 8106240  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of nutrition; grooming, exhibiting and marketing animals; operation, maintenance and repair of equipment.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
44.0 Discuss animal marketing techniques – the student will be able to:			
44.01 Collect and interpret market reports and identify market outlets for companion and food-producing animals.	MAFS.912.S-ID.1.2, 3, 4 MAFS.912.S-ID.2.5, 6 MAFS.912.S-ID.3.7, 8, 9		
44.02 Determine market grades of animal and animal products.			
44.03 Examine the impacts of industry promotion campaigns.	MAFS.912.S-IC.2.6		
45.0 Apply advanced animal health practices – the student will be able to:			
45.01 Administer prescribed injections (under supervision).			
45.02 Discuss proper disposal of deceased animals.		SC.912.L.17.14	
45.03 Determine when euthanasia is appropriate.		SC.912.N.4.1, 2	
45.04 Discuss AVMA approved methods of euthanasia.		SC.912.N.4.1, 2	



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
45.05 Discuss BMPs (Best Management Practices) associated with castration, dehorning, docking, and debeaking.		SC.912.N.4.2 SC.912.N.4.1	
46.0 Perform emergency first aid on animals – the student will be able to:			
46.01 Evaluate the health status of the animals.			
46.02 Isolate injured animals.			
46.03 Demonstrate how to properly cleanse wounds and apply antiseptic.			
46.04 Immobilize fractured limbs.			
46.05 Identify and stop external bleeding.		SC.912.L.14.36	
46.06 Know when to seek additional medical attention for animals.			
47.0 Implement procedures to ensure that animal products are safe – the student will be able to:			
47.01 Identify animal production practices that could pose health risks or are considered to pose risks by some.			AS.06.02.01.a
47.02 Discuss consumer concerns with animal production practices relative to human health.			AS.06.02.01.b
47.03 Implement a program to assure the safety of animal products.			AS.06.02.01.c
47.04 Describe how animal identification systems can track an animal's location, nutrition requirements, production progress and changes in health.			AS.06.02.02.a
47.05 Explain why animal trace-back capability, using individual animal and farm identification systems, is important to producers and consumers.		SC.912.N.4.2	AS.06.02.02.b
47.06 Implement an animal and/or premises identification program.			AS.06.02.02.c
48.0 Identify, select, and breed food-producing animals – the student will be able to:			
48.01 Appraise animal conformation and desirable characteristics and breeds.			
48.02 Describe estrous cycle of food-producing animals.		SC.912.L.14.31, 33	
48.03 Describe breeding techniques, including artificial insemination.		SC.912.L.14.31, 33 SC.912.L.15.14 SC.912.L.16.2	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
48.04 Justify offspring that should be culled.			
48.05 Identify signs of parturition.			
48.06 Identify common disorders of parturition.			
48.07 Prepare animals and facilities for parturition.			
48.08 Assist in the delivery of newborn animals.			
49.0 Analyze county, state and federal agencies that support the animal industry – the student will be able to:			
49.01 Identify the agencies that support the animal industry.		SC.912.L.17.12	
49.02 Research the technical assistance, disaster relief, grants and other programs available.			
49.03 Inquire about career opportunities within these agencies.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Animal Science and Services 6  
**Course Number:** 8106250  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of nutrition; grooming, exhibiting and marketing animals; operation, maintenance and repair of equipment.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
50.0 Apply principles of comparative anatomy and physiology to uses within various animal systems – the student will be able to:			AS.02.02.06.b
50.01 Compare and contrast body systems and system adaptations between animal species.		SC.912.L.14.19, 21, 31, 32, 33, 36, 46, 48	AS.02.02.06.c
50.02 Explain the impact of animal body systems on performance, health, growth, and reproduction.		SC.912.L.14.19, 21, 31, 32, 33, 36, 46, 48	
51.0 Plan routine management of food-producing animals and facilities – the student will be able to:			
51.01 Schedule feeding and care of animals.			
51.02 Order supplies and animal feeds.			
51.03 Develop training and exercise schedule for animal.			
51.04 Develop a plan for routine maintenance of equipment and facilities.			
51.05 Assist in the planning of a routine animal health and preventative medication program.			
51.06 Implement and maintain sanitary conditions for animals, including young.		SC.912.L.14.6	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
51.07 Separate non-compatible animals.			
51.08 Observe animals on a regular basis for problems or stress.			
51.09 Develop a calendar of operations for a selected animal operation.			
52.0 Maintain and analyze records – the student will be able to:			
52.01 Analyze and utilize production, performance and breeding records, using computer applications.			
52.02 Identify major sources of credit.			
52.03 Evaluate leasing and renting agreements.			
52.04 Evaluate need for liability and other insurance.			
52.05 Analyze records to determine efficiency of operation.	MAFS.912.F-IF.3.8b MAFS.912.S-ID.3.7 MAFS.912.S-ID.1.2 MAFS.912.S-IC.2.6		
52.06 Maintain machinery, equipment and facilities inventory records.			
52.07 Maintain breeding records.			
52.08 Prepare an annual budget.			
52.09 Maintain and analyze basic business records (inventory, depreciation, receipts, and expenses) using computer applications.	MAFS.912.N-Q.1.1 MAFS912.A-CED.1.3 MAFS.912.F-IF.3.8b MAFS912.F-LE.1.1(bc)		
52.10 Plan a work schedule.			
52.11 Maintain personnel and labor records.			
52.12 Maintain supervised agricultural experience records.	MAFS.912.N-Q.1.1 MAFS.912.A-CED.1.1		
52.13 Discuss the legal requirements of maintaining animal health records, and maintain and analyze health records.	MAFS.912.N-Q.1.1 MAFS.912.S-IC.2.6		
52.14 Maintain chemical-use and water-use records, etc.			
53.0 Design animal housing, equipment and handling facilities for animal production – the student will be able to:			
53.01 Identify facilities needed to house and produce each animal		SC.912.N.4.1	AS.07.01.01.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
species safely and efficiently.			
53.02 Critique designs for an animal facility and prescribe alternative layouts and adjustments for the safe and efficient use of the facility.		SC.912.N.4.1	AS.07.01.01.b
53.03 Design an animal facility, focusing on animal requirements, efficiency, safety and ease of handling.		SC.912.N.4.1	AS.07.01.01.c
53.04 Identify equipment and handling facilities used in modern animal production.			AS.07.01.02.a
53.05 Explain how modern equipment and handling facilities enhance the safe and economic production of animals.			AS.07.01.02.b
53.06 Select equipment and implement animal handling procedures and improvements to enhance production efficiency.			AS.07.01.02.c
54.0 Comply with government regulations and safety standards for facilities used in animal production – the student will be able to:			
54.01 List the general standards (e.g., environmental, zoning, construction) that must be met in facilities for animal production.			AS.07.02.01.a
54.02 Evaluate an animal facility to determine if standards have been met.			AS.07.02.01.b
54.03 Design a facility that meets standards for the legal, safe, ethical and efficient production of animals.			AS.07.02.01.c
55.0 Identify and interpret rules, policy, and regulations affecting the animal industry – the student will be able to:			
55.01 Maintain a file of current animal rules and regulations.			
55.02 Secure professional services and information.			
55.03 Observe EPA pesticide use regulations.		SC.912.L.17.13	
55.04 Identify the procedures and requirements for obtaining a restricted use pesticide applicator's license.			
55.05 Observe regulations regarding the use of medications and growth stimulants.			
55.06 Observe state and federal regulations regarding disease testing/eradication programs and other programs.			
55.07 Identify applicable land-use and zoning regulations.		SC.912.L.17.12	
55.08 Identify agencies affecting natural resource utilization (e.g., DNR, DEP, EPA).			
55.09 Identify agencies regulating employee/employer relations (e.g., OSHA).			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
55.10 Investigate opportunities to impact policy making at the local, state, and national level.			
56.0 Understand the relationship of animal production and the environment – the student will be able to:			
56.01 Evaluate the relationship between animal agriculture on the environment.		SC.912.L.17.17	AS.08.01.01.a
56.02 Outline methods of balancing the effects of animal agriculture on the environment.		SC.912.L.17.17	AS.08.01.01.b
56.03 Implement BMPs (Best Management Practices) to balance the impact of animal agriculture on the environment.		SC.912.L.17.17	AS.08.01.01.c
56.04 Determine positive effects of animal agriculture on the environment.		SC.912.L.17.17	
57.0 Evaluate the effects of environmental conditions on animals – the student will be able to:			
57.01 Identify optimal environmental conditions for animals.			AS.08.02.01.a
57.02 Describe the effects of environmental conditions on animal populations and performance.			AS.08.02.01.b
57.03 Establish and maintain favorable environmental conditions for animal growth and performance.			AS.08.02.01.c
58.0 Identify and interpret environmental issues and regulations pertaining to animal industry – the student will be able to :			
58.01 Determine environmental issues pertinent to your area.			
58.02 Calculate the economic impact of environmental regulations on the industry.			
58.03 Discuss emerging technologies and determine their effectiveness as related to environmental quality.		SC.912.L.17.15	
58.04 Evaluate an animal facility to determine if standards have been met.			
58.05 Design a facility that meets standards for the legal, safe, ethical and efficient production of animals.			

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the animal industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>



Florida Department of Education  
Curriculum Framework

**Program Title:** Plant Biotechnology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**NOTE:** This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Secondary – Career Preparatory	
Program Number	8106500
CIP Number	0101110100
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	19-4021 - Biological Technicians
CTE Program Resources	<a href="http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agricultural biotechnology industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of three courses with one occupational completion point. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations 1	1 credit	19-4021	3	EQ
	8106850	Agricultural Biotechnology 2	1 credit		3	VO
	8106510	Plant Biotechnology 3	1 credit		3	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

**This program is daggered and will not be aligned to academic courses.**

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Ag. Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and

*language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Daggered for Deletion

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Plant Biotechnology.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Plant Biotechnology.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Plant Biotechnology.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Identify the historical, social, cultural and potential applications of biotechnology.
- 14.0 Conduct scientific investigation and apply results.
- 15.0 Practice agricultural laboratory safety.
- 16.0 Demonstrate laboratory skills as applied to biotechnology.
- 17.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR).
- 18.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Plant Biotechnology.
- 19.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Plant Biotechnology.
- 20.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Plant Biotechnology.
- 21.0 Describe plant classifications and the economic impact to your region.
- 22.0 Apply genetic principles to plant production.
- 23.0 Perform propagation.
- 24.0 Use plants to show nutrient absorption and the translocation process in plants.
- 25.0 Demonstrate alternate methods of plant production.
- 26.0 Identify the historical, social, cultural and potential applications of plant biotechnology.
- 27.0 Demonstrate the application of plant biotechnology to Agriculture, Food and Natural Resources (AFNR).

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

Florida Standards	Correlation to CTE Program Standard #
01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Plant Biotechnology.	
01.01 Key Ideas and Details	
01.01.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. LAFS.910.RST.1.1	
01.01.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.910.RST.1.2	
01.01.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.910.RST.1.3	
01.02 Craft and Structure	
01.02.1 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2 Analyze the structure of the relationships among concepts in a text,	

Florida Standards		Correlation to CTE Program Standard #
	including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
01.04.2		
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Plant Biotechnology.		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	

Florida Standards		Correlation to CTE Program Standard #
		LAFS.910.WHST.2.4
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	LAFS.910.WHST.2.5
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	LAFS.910.WHST.2.6
02.03 Research to Build and Present Knowledge		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	LAFS.910.WHST.3.7
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	LAFS.910.WHST.3.8
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research.	LAFS.910.WHST.3.9
02.04 Range of Writing		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	LAFS.910.WHST.4.10
03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Plant Biotechnology.		
03.01	Make sense of problems and persevere in solving them.	MAFS.K12.MP.1.1
03.02	Reason abstractly and quantitatively.	MAFS.K12.MP.2.1
03.03	Construct viable arguments and critique the reasoning of others.	MAFS.K12.MP.3.1
03.04	Model with mathematics.	



Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.4.1
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy – the student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.			CS.10.02.01
04.02 Analyze the impact of agriculture on the local, state, national and global economy.			
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.			
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.			
05.0 Practice agriscience safety skills and procedures – the student will be able to:	MAFS.912.S-IC.2;	SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.01 Identify the common causes and prevention of accidents in agriscience operations.			
05.02 Demonstrate proper safety precautions and use of personal protective equipment.			CS.06.03.01.a CS.07.04.01.c.
05.03 Evaluate the food safety responsibilities that occur along the food supply chain.			FPP.01.02.01.a FPP.02.01.01.a FPP.02.02.02.a FPP.02.03
05.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.			CS.07.04.01
05.05 Identify proper disposal of hazardous waste materials and biohazards.			ESS.04.02.02.b ESS.04.05.01
05.06 Describe emergency procedures.			CS.07.03.01.c
06.0 Apply scientific and technological principles to agriscience issues – the student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	
06.01 Employ scientific measurement skills.			BS.02.02.01 CS.10.01.01.a
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 ESS.01.01.02.b
06.03 Identify the parts and functions of plant and animal cells.			PS.01.02.01.c AS.02.02.02.b
06.04 Describe the phases of cell reproduction.			PS.01.02.01.b. AS.02.02.03.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.			CS.11.01.01 CS.11.02.01
06.06 Interpret, analyze, and report data.			
06.07 Investigate DNA and genetics applications in agriscience including			BS.02.05.03.a.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
the theory of probability.			
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).			BS.01.01.03.a.
07.0 Apply environmental principles to the agricultural industry – the student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	
07.01 Research how different climactic and geological activity influences agriculture.			NRS.02.06.09 CS.05.03.02
07.02 Describe various ecosystems as they relate to the agriculture industry.			NRS.01.01.02.
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.			PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.04 Identify regulatory agencies that impact agricultural practices.			
07.05 Apply Best Management Practices that enhance the natural environment.			PS.03.04.01.b AS.08.01.01.c
07.06 Identify conservation practices related to natural resources.			PS.03.04.01.a
08.0 Investigate and utilize basic scientific skills and principles in plant science – the student will be able to:	MAFS.912.S-IC.2	SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L.15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	
08.01 Identify and describe the specializations within the plant science industry.			
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.			PS.01.01.01.c.
08.03 Examine the processes of plant growth including photosynthesis and respiration.			PS.01.03.01 PS.01.03.02
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.			PS.02.03.01

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
08.05 Analyze information from a fertilizer label.			PS.02.03.04
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.03.01.03 PS.03.01.02
08.07 Investigate the impacts of various pests and propose solutions for their control.			PS.03.03.02 PS.03.03.03 PS.03.03.04
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.			FPP01.01.01.a
08.09 Explore career opportunities in plant science.			
09.0 Investigate and utilize basic scientific skills and principles in animal science – the student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.			AS.02.01.02.c
09.02 Categorize animals according to use, type, breed, and scientific classification.			AS.02.01.01.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.			AS.02.01.02.a AS.05.02.01.a
09.04 Compare basic internal and external anatomy of animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.			AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
09.06 Compare and contrast animal welfare issues.			AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
09.07 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.06.02.01.a FPP01.01.01.a
09.08 Explore career opportunities in animal science.			AS.01.01.02.b.
10.0 Demonstrate the use of agriscience tools, equipment, and instruments – the student will be able to	MAFS.912.S-IC.2	SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	
10.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.			CS.08.01.01.b PST.02.02.02.b.
10.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			PST.03.04.01.b PST.03.03.02.a.
10.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.			PST.04.04.03.a PST.04.04.06.a
10.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.			CS.08.03.01.c PST.03.02.03.c. PST.01.03.01.a.
11.0 Demonstrate agribusiness, employability and human relation skills – the student will be able to:			
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).			
11.02 Utilize a record keeping system to collect, interpret, and analyze data.			CS.09.02.01.b CS.10.01.01.a.
11.03 Enhance oral communications through telephone, interview and presentation skills.			CS.03.01.03.b.
11.04 Enhance written communication by developing resumes and business letters.			CS.03.01.01 CS.03.01.02
11.05 Demonstrate interpersonal (nonverbal) communication skills.			CS.03.01.01 CS.03.01.02
11.06 Demonstrate good listening skills.			CS.01.02.02
12.0 Apply leadership and citizenship skills – the student will be able to:			
12.01 Identify and describe leadership characteristics.			CS.01.06.01.a.
12.02 Identify opportunities to apply acquired leadership skills.			CS.02.02.02.b.
12.03 Identify and demonstrate ways to be an active citizen.			CS.01.05.02.c.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
12.04 Participate in community based learning activities.			CS.01.05.01.c.
12.05 Demonstrate the ability to work cooperatively.			CS.01.02.02.b.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.			
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.			

Daggered for Deletion

Florida Department of Education  
Student Performance Standards

**Course Title:** Agricultural Biotechnology 2  
**Course Number:** 8106850  
**Course Credit:** 1

**Course Description:**

This course was developed as a core and is designed to develop competencies in the areas of agricultural biotechnology in agriculture, scientific investigation, laboratory safety, scientific and technological concepts; and the fundamentals of biotechnology.

**NOTE:** This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Plant Biotechnology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	

Florida Standards		Correlation to CTE Program Standard #
		LAFS.910.RST.2.5
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	
		LAFS.910.RST.2.6
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	
		LAFS.910.RST.3.7
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	
		LAFS.910.RST.3.8
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	
		LAFS.910.RST.3.9
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently.	
		LAFS.910.RST.4.10
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Plant Biotechnology.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content.	
		LAFS.910.WHST.1.1
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
		LAFS.910.WHST.1.2
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
		LAFS.910.WHST.2.4
02.02.2	Develop and strengthen writing as needed by planning, revising, editing,	



Florida Standards		Correlation to CTE Program Standard #
	rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Plant Biotechnology.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
13.0 Identify the historical, social, cultural and potential applications of biotechnology – the student will be able to:			
13.01 Define biotechnology and explore the historical impact on agriculture.			
13.02 Explain the developmental progression of biotechnology.			
13.03 Investigate current applications of biotechnology in agriculture.			
13.04 Investigate current research in agricultural biotechnology.			
13.05 Examine potential applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture.			
13.06 Research emerging problems and issues associated with agricultural biotechnology.			
13.07 Describe the role of agencies that regulate biotechnology.			
13.08 Interpret the major regulatory issues related to biotechnology.			
13.09 Explore ethical, legal and social biotechnology issues.			
13.10 Evaluate the benefits and risks associated with biotechnology.			
13.11 Investigate the emergence and evolution of biological organisms and their use in biotechnology.			
13.12 Examine intellectual properties associated with biotechnology by			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
defining their components.			
13.13 Examine an ethical dilemma associated with biotechnology by identifying its components.			
14.0 Conduct scientific investigation and apply results – the student will be able to:			
14.01 Discuss the differences between scientific laws and scientific theories.			
14.02 Explain the process of scientific inquiry.			
14.03 Analyze research being conducted in agricultural biotechnology.			
14.04 Design an agricultural experiment using appropriate control measures.			
14.05 Devise a system for recording data.			
14.06 Collect and record data using SI units.			
14.07 Summarize data and draw defensible conclusions.			
14.08 Prepare a report on the experiment conducted.			
14.09 Plan and conduct follow-up experiments using the scientific method.			
15.0 Practice agricultural laboratory safety – the student will be able to:			
15.01 Identify first aid supplies, personnel and emergency protection areas.			
15.02 Monitor, use, store and dispose of hazardous materials properly.			
15.03 Document safety training and practices using Material Safety Data Sheets (MSDS) and Occupational Safety and Health Administration (OSHA) standards.			
15.04 Demonstrate and utilize safety equipment.			
15.05 Identify safety symbols and signs.			
15.06 Demonstrate appropriate safety procedures and guidelines, and discuss implications of safety violations.			
16.0 Demonstrate laboratory skills as applied to biotechnology – the student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
16.01 Maintain and interpret biotechnology laboratory records.			
16.02 Operate laboratory equipment and measurement devices.			
16.03 Demonstrate aseptic techniques in the biotechnology laboratory.			
16.04 Select an appropriate standard operating procedure for working with biological materials.			
16.05 Prepare buffers, reagents, solutions and media.			
16.06 Inventory biological and chemical materials, and maintain accurate records of supplies and expiration dates.			
16.07 Isolate, maintain, quantify and store cell cultures.			
16.08 Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.			
16.09 Extract and purify DNA.			
16.10 Perform protein separation techniques and interpret the results.			
16.11 Describe how antibodies are formed and how they can be used in biotechnology applications.			
16.12 Research and describe the use of biotechnology to detect microbes.			
17.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR) – the student will be able to:			
17.01 Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes.			
17.02 Differentiate the roles of carbohydrates, fats, and proteins in biotechnology applications.			
17.03 Diagram the processes used to produce transgenic eukaryotes.			
17.04 Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.			
17.05 Describe processes by which enzymes are produced through biotechnology.			
17.06 Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.			
17.07 Diagram the process by which organisms are genetically engineered for waste treatment.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
17.08 Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of agricultural products.			
17.09 Investigate and report on genetic engineering procedures used in the production of agricultural products.			
17.10 Explain the functions of hormones in animals.			
17.11 Describe the processes used to produce animal hormones from transgenic organisms.			
17.12 Identify foods produced through fermentation.			
17.13 Compare and contrast bioengineering and conventional pathways used in food processing.			
17.14 Explain biomass and sources of biomass.			
17.15 Assess the characteristics of biomass that make it useful for biofuels production.			
17.16 Describe the process used in producing alcohol from biomass.			
17.17 Diagram the process used in producing biodiesel from biomass.			
17.18 Illustrate the process used in producing methane from biomass.			
17.19 Describe the selective plant breeding process.			
17.20 Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.			
17.21 Describe the use of biotechnology in bioremediation.			
17.22 Describe the processes involved in biotreatment of biological and chemical wastes.			
17.23 Explain the global importance of biodiversity.			
17.24 Explain the positive and negative impacts of agricultural practices on wild populations.			
17.25 Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.			
17.26 Describe the processes used in the production of molecules for use in industrial applications.			

Florida Department of Education  
Student Performance Standards

**Course Title:** Plant Biotechnology 3  
**Course Number:** 8106510  
**Course Credit:** 1

**Course Description:**

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

**NOTE:** This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
18.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Plant Biotechnology.	
18.01	Key Ideas and Details	
18.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
18.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
18.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
18.02	Craft and Structure	
18.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
18.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	

Florida Standards		Correlation to CTE Program Standard #
18.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
18.03 Integration of Knowledge and Ideas		
18.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
18.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
18.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
18.04 Range of Reading and Level of Text Complexity		
18.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
18.04.2		
19.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Plant Biotechnology.	
19.01 Text Types and Purposes		
19.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
19.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
19.02 Production and Distribution of Writing		
19.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
19.02.2	Develop and strengthen writing as needed by planning, revising, editing,	

Florida Standards		Correlation to CTE Program Standard #
	rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
19.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
19.03	<b>Research to Build and Present Knowledge</b>	
19.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
19.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
19.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
19.04	<b>Range of Writing</b>	
19.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
20.0	<b>Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Plant Biotechnology.</b>	
20.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
20.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
20.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
20.04	Model with mathematics. MAFS.K12.MP.4.1	
20.05	Use appropriate tools strategically.	



Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.5.1
20.06 Attend to precision.	MAFS.K12.MP.6.1
20.07 Look for and make use of structure.	MAFS.K12.MP.7.1
20.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
21.0 Describe plant classifications and the economic impact to your region – the student will be able to:			
21.01 Classify plants based upon their regional use and importance.			
21.02 Describe the economic impact of regionally produced products.			
21.03 Describe the regional growing conditions that impact the feasibility of producing particular plant products.			
21.04 Identify economically significant plant families.			
21.05 Identify at least thirty plants by common and scientific names.			
22.0 Apply genetic principles to plant improvement – the student will be able to:			
22.01 Describe the relationship between reproduction and plant improvement.			
22.02 Demonstrate the reproductive cycle in seed plants.			
22.03 Describe how genetic processes and structures control inheritance in plants.			
22.04 Explain polyploidy in both natural settings and in commercial plant production.			
22.05 Differentiate phenotypic versus genotypic expression in plant crosses.			
22.06 Describe the processes used for mutation induction.			
23.0 Demonstrate methods of micropropagating plants – the student will be			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
able to:			
23.01 Evaluate the advantages and disadvantages of using micropropagation techniques.			
23.02 Describe the factors (light, temperature, plant growth regulators) affecting growth in plant tissue culture.			
23.03 Prepare a lab for use as a plant tissue culture facility.			
23.04 Demonstrate aseptic/sterile technique.			
23.05 Produce a crop using tissue culture methods and prepare a written report of results.			
24.0 Demonstrate methods of plant production – the student will be able to:			
24.01 Evaluate the advantages and disadvantages of non-traditional crop production techniques (hydroponic/substrate, greenhouse, tunnel/hoop, etc.).			
24.02 Demonstrate different means of hydroponics production.			
24.03 Determine the cultural needs in hydroponics production.			
24.04 Describe crops grown commercially by non-traditional techniques in your region.			
25.0 Use plants to demonstrate growth disorders (nutrients, pathogens, pests – the student will be able to:			
25.01 Identify plant nutrient-related disorders.			
25.02 Identify pathogen-related disorders in plants.			
25.03 Identify pest-related disorders in plants.			
25.04 Discuss how IPM and biotechnology are used to solve plant disorders.			
25.05 Prepare plant tissue samples for submission to determine nutrient levels.			
25.06 Demonstrate factors that affect the nutrient levels in plant tissue.			
26.0 Identify the historical, social, cultural and potential applications of plant biotechnology – the student will be able to:			
26.01 Research and report on the major innovators and milestones in the development of biotechnology.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
26.02 Analyze the scope and impact of plant biotechnology in today's global society.			
26.03 Assess the future impact plant biotechnology could have on world populations.			
26.04 Research, evaluate, and articulate a major regulatory issue pertaining to plant biotechnology.			
26.05 Research, evaluate, and articulate the implications of an ethical, legal, social, or cultural biotechnology issue in plant production.			
26.06 Research and debate an ethical issue associated with plant biotechnology.			
26.07 Analyze an intellectual/genetic property issue associated with bioethics in plant production.			
27.0 Demonstrate the application of plant biotechnology to Agriculture, Food and Natural Resources (AFNR) – the student will be able to:			
27.01 Utilize external reviews and compare them to research conducted in plant production.			
27.02 Develop a standard operating procedure for a biological process in plant production.			
27.03 Verify the physical properties of buffers, reagents, solutions and media.			
27.04 Simulate ordering, stocking, and maintaining supplies of biological and chemical materials.			
27.05 Devise a management plan to reduce laboratory waste.			
27.06 Analyze factors that influence gene expression.			
27.07 Perform DNA manipulations, such as cloning/subcloning, blotting, sequencing and amplification.			
27.08 Characterize the biochemical properties of proteins.			
27.09 Use antibodies to detect and quantify antigens.			
27.10 Conduct an Enzyme-Linked Immunosorbent Assay (ELISA).			
27.11 Produce alcohol and co-products from biomass.			
27.12 Produce biodiesel and co-products from biomass.			
27.13 Produce methane and co-products from biomass.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
27.14 Evaluate the technologies used to create biofuels from biomass.			
27.15 Design and conduct an experiment using biotechnology tools to evaluate selectively bred plants.			

Daggered for Deletion

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

### **Extended Student Supervision**

Because of the production and marketing cycle of the agricultural industries, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Agricultural Biotechnology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**NOTE:** This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

**Secondary – Career Preparatory**

Program Number	8106600
CIP Number	0126120100
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	19-4021 - Biological Technicians
CTE Program Resources	<a href="http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agricultural biotechnology industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of three courses with one occupational completion point. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations 1	1 credit	19-4021	3	EQ
	8106850	Agricultural Biotechnology 2	1 credit		3	VO
	8106860	Agricultural Biotechnology 3	1 credit		3	EQ

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Ag. Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and



*language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Daggered for Deletion

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Biotechnology.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Biotechnology.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Identify the historical, social, cultural and potential applications of biotechnology.
- 14.0 Conduct scientific investigation and apply results.
- 15.0 Practice agricultural laboratory safety.
- 16.0 Demonstrate laboratory skills as applied to biotechnology.
- 17.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR).
- 18.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Biotechnology.
- 19.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Biotechnology.
- 20.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology.
- 21.0 Identify the historical, social, cultural and potential applications of agricultural biotechnology.
- 22.0 Apply genetic principles to agricultural production.
- 23.0 Demonstrate proper tissue/cell culture techniques.
- 24.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR).

Florida Department of Education  
Student Performance Standards

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

**NOTE:** This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Biotechnology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction	

Florida Standards		Correlation to CTE Program Standard #
	force, energy).	
		LAFS.910.RST.2.5
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	
		LAFS.910.RST.2.6
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	
		LAFS.910.RST.3.7
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	
		LAFS.910.RST.3.8
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	
		LAFS.910.RST.3.9
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently.	
		LAFS.910.RST.4.10
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Biotechnology.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content.	
		LAFS.910.WHST.1.1
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
		LAFS.910.WHST.1.2
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
		LAFS.910.WHST.2.4

Florida Standards		Correlation to CTE Program Standard #
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
<b>02.03 Research to Build and Present Knowledge</b>		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
<b>02.04 Range of Writing</b>		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
<b>03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology.</b>		
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	

Florida Standards	Correlation to CTE Program Standard #
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy – the student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.			CS.10.02.01
04.02 Analyze the impact of agriculture on the local, state, national and global economy.			
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.			
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.			
05.0 Practice agriscience safety skills and procedures – the student will be able to:	MAFS.912.S-IC.2;	SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.01 Identify the common causes and prevention of accidents in agriscience operations.			
05.02 Demonstrate proper safety precautions and use of personal protective equipment.			CS.06.03.01.a CS.07.04.01.c.
05.03 Evaluate the food safety responsibilities that occur along the food supply chain.			FPP.01.02.01.a FPP.02.01.01.a FPP.02.02.02.a FPP.02.03
05.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.			CS.07.04.01
05.05 Identify proper disposal of hazardous waste materials and biohazards.			ESS.04.02.02.b ESS.04.05.01
05.06 Describe emergency procedures.			CS.07.03.01.c
06.0 Apply scientific and technological principles to agriscience issues – the student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	
06.01 Employ scientific measurement skills.			BS.02.02.01 CS.10.01.01.a
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 ESS.01.01.02.b
06.03 Identify the parts and functions of plant and animal cells.			PS.01.02.01.c AS.02.02.02.b
06.04 Describe the phases of cell reproduction.			PS.01.02.01.b. AS.02.02.03.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.			CS.11.01.01 CS.11.02.01
06.06 Interpret, analyze, and report data.			
06.07 Investigate DNA and genetics applications in agriscience including			BS.02.05.03.a.



CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
the theory of probability.			
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).			BS.01.01.03.a.
07.0 Apply environmental principles to the agricultural industry – the student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	
07.01 Research how different climactic and geological activity influences agriculture.			NRS.02.06.09 CS.05.03.02
07.02 Describe various ecosystems as they relate to the agriculture industry.			NRS.01.01.02.
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.			PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.04 Identify regulatory agencies that impact agricultural practices.			
07.05 Apply Best Management Practices that enhance the natural environment.			PS.03.04.01.b AS.08.01.01.c
07.06 Identify conservation practices related to natural resources.			PS.03.04.01.a
08.0 Investigate and utilize basic scientific skills and principles in plant science – the student will be able to:	MAFS.912.S-IC.2	SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L.15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	
08.01 Identify and describe the specializations within the plant science industry.			
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.			PS.01.01.01.c.
08.03 Examine the processes of plant growth including photosynthesis and respiration.			PS.01.03.01 PS.01.03.02
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.			PS.02.03.01

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
08.05 Analyze information from a fertilizer label.			PS.02.03.04
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.03.01.03 PS.03.01.02
08.07 Investigate the impacts of various pests and propose solutions for their control.			PS.03.03.02 PS.03.03.03 PS.03.03.04
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.			FPP01.01.01.a
08.09 Explore career opportunities in plant science.			
09.0 Investigate and utilize basic scientific skills and principles in animal science – the student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.			AS.02.01.02.c
09.02 Categorize animals according to use, type, breed, and scientific classification.			AS.02.01.01.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.			AS.02.01.02.a AS.05.02.01.a
09.04 Compare basic internal and external anatomy of animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.			AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c As.03.02.01.a AS.06.01.01.b
09.06 Compare and contrast animal welfare issues.			AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
09.07 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.06.02.01.a FPP01.01.01.a
09.08 Explore career opportunities in animal science.			AS.01.01.02.b.
10.0 Demonstrate the use of agriscience tools, equipment, and instruments – the student will be able to	MAFS.912.S-IC.2	SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	
10.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.			CS.08.01.01.b PST.02.02.02.b.
10.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			PST.03.04.01.b PST.03.03.02.a.
10.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.			PST.04.04.03.a PST.04.04.06.a
10.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.			CS.08.03.01.c PST.03.02.03.c. PST.01.03.01.a.
11.0 Demonstrate agribusiness, employability and human relation skills – the student will be able to:			
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).			
11.02 Utilize a record keeping system to collect, interpret, and analyze data.			CS.09.02.01.b CS.10.01.01.a.
11.03 Enhance oral communications through telephone, interview and presentation skills.			CS.03.01.03.b.
11.04 Enhance written communication by developing resumes and business letters.			CS.03.01.01 CS.03.01.02
11.05 Demonstrate interpersonal (nonverbal) communication skills.			CS.03.01.01 CS.03.01.02
11.06 Demonstrate good listening skills.			CS.01.02.02
12.0 Apply leadership and citizenship skills – the student will be able to:			
12.01 Identify and describe leadership characteristics.			CS.01.06.01.a.
12.02 Identify opportunities to apply acquired leadership skills.			CS.02.02.02.b.
12.03 Identify and demonstrate ways to be an active citizen.			CS.01.05.02.c.
12.04 Participate in community based learning activities.			CS.01.05.01.c.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
12.05 Demonstrate the ability to work cooperatively.			CS.01.02.02.b.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.			
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.			

Daggered for Deletion

Florida Department of Education  
Student Performance Standards

**Course Title:** Agricultural Biotechnology 2  
**Course Number:** 8106850  
**Course Credit:** 1

**Course Description:**

This course was developed as a core and is designed to develop competencies in the areas of agricultural biotechnology in agriculture, scientific investigation, laboratory safety, scientific and technological concepts; and the fundamentals of biotechnology.

**NOTE:** This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agricultural Biotechnology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	

Florida Standards		Correlation to CTE Program Standard #
		LAFS.910.RST.2.5
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	
		LAFS.910.RST.2.6
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	
		LAFS.910.RST.3.7
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	
		LAFS.910.RST.3.8
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	
		LAFS.910.RST.3.9
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently.	
		LAFS.910.RST.4.10
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agricultural Biotechnology.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content.	
		LAFS.910.WHST.1.1
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
		LAFS.910.WHST.1.2
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
		LAFS.910.WHST.2.4
02.02.2	Develop and strengthen writing as needed by planning, revising, editing,	

Florida Standards		Correlation to CTE Program Standard #
	rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
13.0 Identify the historical, social, cultural and potential applications of biotechnology – the student will be able to:			
13.01 Define biotechnology and explore the historical impact on agriculture.			
13.02 Explain the developmental progression of biotechnology.			
13.03 Investigate current applications of biotechnology in agriculture.			
13.04 Investigate current research in agricultural biotechnology.			
13.05 Examine potential applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture.			
13.06 Research emerging problems and issues associated with agricultural biotechnology.			
13.07 Describe the role of agencies that regulate biotechnology.			
13.08 Interpret the major regulatory issues related to biotechnology.			
13.09 Explore ethical, legal and social biotechnology issues.			
13.10 Evaluate the benefits and risks associated with biotechnology.			
13.11 Investigate the emergence and evolution of biological organisms and their use in biotechnology.			
13.12 Examine intellectual properties associated with biotechnology by defining their components.			



CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
13.13 Examine an ethical dilemma associated with biotechnology by identifying its components.			
14.0 Conduct scientific investigation and apply results – the student will be able to:			
14.01 Discuss the differences between scientific laws and scientific theories.			
14.02 Explain the process of scientific inquiry.			
14.03 Analyze research being conducted in agricultural biotechnology.			
14.04 Design an agricultural experiment using appropriate control measures.			
14.05 Devise a system for recording data.			
14.06 Collect and record data using SI units.			
14.07 Summarize data and draw defensible conclusions.			
14.08 Prepare a report on the experiment conducted.			
14.09 Plan and conduct follow-up experiments using the scientific method.			
15.0 Practice agricultural laboratory safety – the student will be able to:			
15.01 Identify first aid supplies, personnel and emergency protection areas.			
15.02 Monitor, use, store and dispose of hazardous materials properly.			
15.03 Document safety training and practices using Material Safety Data Sheets (MSDS) and Occupational Safety and Health Administration (OSHA) standards.			
15.04 Demonstrate and utilize safety equipment.			
15.05 Identify safety symbols and signs.			
15.06 Demonstrate appropriate safety procedures and guidelines, and discuss implications of safety violations.			
16.0 Demonstrate laboratory skills as applied to biotechnology – the student will be able to:			
16.01 Maintain and interpret biotechnology laboratory records.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
16.02 Operate laboratory equipment and measurement devices.			
16.03 Demonstrate aseptic techniques in the biotechnology laboratory.			
16.04 Select an appropriate standard operating procedure for working with biological materials.			
16.05 Prepare buffers, reagents, solutions and media.			
16.06 Inventory biological and chemical materials, and maintain accurate records of supplies and expiration dates.			
16.07 Isolate, maintain, quantify and store cell cultures.			
16.08 Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.			
16.09 Extract and purify DNA.			
16.10 Perform protein separation techniques and interpret the results.			
16.11 Describe how antibodies are formed and how they can be used in biotechnology applications.			
16.12 Research and describe the use of biotechnology to detect microbes.			
17.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR) – the student will be able to:			
17.01 Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes.			
17.02 Differentiate the roles of carbohydrates, fats, and proteins in biotechnology applications.			
17.03 Diagram the processes used to produce transgenic eukaryotes.			
17.04 Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.			
17.05 Describe processes by which enzymes are produced through biotechnology.			
17.06 Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.			
17.07 Diagram the process by which organisms are genetically engineered for waste treatment.			
17.08 Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
agricultural products.			
17.09 Investigate and report on genetic engineering procedures used in the production of agricultural products.			
17.10 Explain the functions of hormones in animals.			
17.11 Describe the processes used to produce animal hormones from transgenic organisms.			
17.12 Identify foods produced through fermentation.			
17.13 Compare and contrast bioengineering and conventional pathways used in food processing.			
17.14 Explain biomass and sources of biomass.			
17.15 Assess the characteristics of biomass that make it useful for biofuels production.			
17.16 Describe the process used in producing alcohol from biomass.			
17.17 Diagram the process used in producing biodiesel from biomass.			
17.18 Illustrate the process used in producing methane from biomass.			
17.19 Describe the selective plant breeding process.			
17.20 Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.			
17.21 Describe the use of biotechnology in bioremediation.			
17.22 Describe the processes involved in biotreatment of biological and chemical wastes.			
17.23 Explain the global importance of biodiversity.			
17.24 Explain the positive and negative impacts of agricultural practices on wild populations.			
17.25 Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.			
17.26 Describe the processes used in the production of molecules for use in industrial applications.			

Florida Department of Education  
Student Performance Standards

Course Title: Agricultural Biotechnology 3  
Course Number: 8106860  
Course Credit: 1

Course Description:

This course is designed to enhance competencies in the areas of current agricultural biotechnology applications, genetic principles, tissue/cell culture, and the potential for biotechnology in the area of agriculture.

**NOTE: This program has been daggered for deletion with 2013-2014 being the last cohort of students permitted to enroll in the program. After 2013-2014, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.**

Florida Standards		Correlation to CTE Program Standard #
18.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agricultural Biotechnology.	
18.01	Key Ideas and Details	
18.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
18.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
18.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
18.02	Craft and Structure	
18.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
18.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
18.02.3	Analyze the author's purpose in providing an explanation, describing a	

Florida Standards		Correlation to CTE Program Standard #
	procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	
<b>18.03 Integration of Knowledge and Ideas</b>		
18.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
18.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
18.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
<b>18.04 Range of Reading and Level of Text Complexity</b>		
18.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
18.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
<b>19.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agricultural Biotechnology.</b>		
<b>19.01 Text Types and Purposes</b>		
19.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
19.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
<b>19.02 Production and Distribution of Writing</b>		
19.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
19.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most	

Florida Standards		Correlation to CTE Program Standard #
	significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
19.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
19.03	Research to Build and Present Knowledge	
19.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
19.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
19.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
19.04	Range of Writing	
19.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
20.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agricultural Biotechnology.	
20.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
20.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
20.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
20.04	Model with mathematics. MAFS.K12.MP.4.1	
20.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	

Florida Standards	Correlation to CTE Program Standard #
20.06 Attend to precision.	MAFS.K12.MP.6.1
20.07 Look for and make use of structure.	MAFS.K12.MP.7.1
20.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
21.0 Identify the historical, social, cultural and potential applications of agricultural biotechnology – the student will be able to:			
21.01 Research and report on the major innovators and milestones in the development of biotechnology.			
21.02 Identify animal, plant, and environmental applications of biotechnology and the economic impact.			
21.03 Assess the future impact biotechnology could have on world populations.			
21.04 Research, evaluate and articulate a major regulatory issue pertaining to biotechnology.			
21.05 Research, evaluate and articulate the implications of an ethical, legal, social or cultural biotechnology issue in agricultural production.			
21.06 Debate an ethical issue associated with biotechnology.			
21.07 Analyze an intellectual property issue associated with bioethics in agricultural production.			
21.08 Identify and discuss emerging technologies in agriculture production (transgenics, biologics, biosecurity, food safety, sustainability, etc.).			
22.0 Apply genetic principles to agricultural production – the student will be able to:			
22.01 Describe the relationship between reproduction and genetic improvement.			
22.02 Demonstrate how traits are inherited.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
22.03 Describe how genetic processes and structures control inheritance.			
22.04 Predict probable results of single or multiple trait crosses.			
22.05 Differentiate between dominant and recessive traits.			
22.06 Describe the chemical and physical properties of DNA.			
22.07 Develop a hypothetical species using genetic engineering.			
22.08 Debate the safeguards used in research in genetic engineering.			
22.09 Describe the process of genetic marker assisted selection.			
22.10 Analyze factors that influence gene expression.			
23.0 Demonstrate proper tissue/cell culture techniques – the student will be able to:			
23.01 Prepare a lab for use as a tissue culture facility.			
23.02 Describe the effects of growth hormones on tissue/cell culture.			
23.03 Demonstrate the use of sterile instruments and materials.			
23.04 Produce plants using tissue culture methods and prepare a written report of results.			
24.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR) – the student will be able to:			
24.01 Develop a standard operating procedure for a biological process in agriculture.			
24.02 Calibrate laboratory equipment and conduct instrument qualification tests.			
24.03 Verify the physical properties of buffers, reagents, solutions and media.			
24.04 Simulate the process needed to order, stock, and maintain supplies of biological and chemical materials.			
24.05 Devise a management plan to reduce laboratory waste.			
24.06 Perform DNA manipulations, such as cloning/subcloning, blotting, sequencing and amplification.			
24.07 Characterize the biochemical properties of proteins.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
24.08 Use antibodies to detect and quantify antigens			
24.09 Conduct an Enzyme-Linked Immunosorbent Assay (ELISA).			
24.10 Produce alcohol and co-products from biomass.			
24.11 Produce biodiesel and co-products from biomass.			
24.12 Produce methane and co-products from biomass.			
24.13 Evaluate the technologies used to create biofuels from biomass.			
24.14 Design and conduct an experiment using biotechnology tools to evaluate selectively bred organisms.			

Daggered for Deletion

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

### **Extended Student Supervision**

Because of the production and marketing cycle of the agricultural industries, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

Florida Department of Education  
Curriculum Framework

**Program Title:** Agritechnology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**Secondary – Career Preparatory**

Program Number	8106800
CIP Number	0101039901
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	19-4011 - Agricultural and Food Science Technicians
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in animal and plant production and processing; agriculture marketing; agricultural mechanics; employability skills; mathematics; basic science; biological sciences; communications; and human-relations skills.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of one occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirements
A	8106810	Agriscience Foundations 1	1 credit	19-4011	3	EQ
	8106820	Agritechnology 1	1 credit		2	VO
	8106830	Agritechnology 2	1 credit		2	VO

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### **Academic Alignment Table**

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth- Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Agriscience Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%
Agritechnology 1	9/87 10%	9/80 11%	37/83 45%	10/69 14%	27/67 40%	19/70 27%	10/69 14%	28/82 34%	20/66 30%	27/74 36%	10/72 14%
Agritechnology 2	27/87 31%	29/80 36%	18/83 22%	29/69 42%	12/67 18%	42/70 60%	26/69 38%	14/82 17%	36/66 56%	15/74 20%	29/72 40%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%
Agritechnology 1	**	**	**	**	**	**	**
Agritechnology 2	**	**	**	**	**	**	**

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### **Florida Standards for Technical Subjects**

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and

*language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

### **National Standards (NS)**

Some or all of the courses in this program have been aligned with Industry or National Standards. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link:

[https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn\\_000.pdf](https://www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf)

## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agritechnology.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agritechnology.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agritechnology.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Discuss components of food safety and handling practices in agriculture.
- 14.0 Explore the scope of the agriscience industry.
- 15.0 Determine proper animal health and nutrition.
- 16.0 Identify components of reproduction.
- 17.0 Identify procedures in animal production.
- 18.0 Develop procedures for exhibiting animals.
- 19.0 Compare, select, and use plant production systems.
- 20.0 Investigate proper methods to fertilize plants and crops.
- 21.0 Operate, maintain, and service facilities, tools, and equipment.
- 22.0 Apply principles of agribusiness finance.
- 23.0 Students evaluate the importance of the food and fiber system to understand the impact on global economy.
- 24.0 Examine the scope of career opportunities in and the importance of agriculture to the economy.
- 25.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agritechnology.
- 26.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agritechnology.
- 27.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agritechnology.
- 28.0 Analyze the scope of the Agriscience industry.
- 29.0 Recommend steps for proper animal health and nutrition.
- 30.0 Select, and use plant production systems.
- 31.0 Fertilize plants and crops.
- 32.0 Irrigate plants and crops.
- 33.0 Control plant pests.
- 34.0 Maintain, and service facilities, tools, and equipment.
- 35.0 Describe procedures for harvesting and marketing agricultural products.



- 36.0 Compare principles of agribusiness finance.
- 37.0 Explain the components of the American business system.
- 38.0 Investigate agricultural cooperatives structure and function.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

<b>Florida Standards</b>		<b>Correlation to CTE Program Standard #</b>
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agritechnology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical	

Florida Standards		Correlation to CTE Program Standard #
	context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
<b>01.03 Integration of Knowledge and Ideas</b>		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
<b>01.04 Range of Reading and Level of Text Complexity</b>		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
01.04.2		
<b>02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agritechnology.</b>		
<b>02.01 Text Types and Purposes</b>		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	

Florida Standards		Correlation to CTE Program Standard #
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agritechnology.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	

Florida Standards		Correlation to CTE Program Standard #
03.03 Construct viable arguments and critique the reasoning of others.	MAFS.K12.MP.3.1	
03.04 Model with mathematics.	MAFS.K12.MP.4.1	
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1	
03.06 Attend to precision.	MAFS.K12.MP.6.1	
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1	
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy-- The student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	CS.10.02.01
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
04.02 Analyze the impact of agriculture on the local, state, national and global economy.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
05.0 Practice agriscience safety skills and procedures--The student will be able to:		SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2;	

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
		SC.912.P.8.7;	
05.01 Identify the common causes and prevention of accidents in agriscience operations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.06.03.01.a CS.07.04.01.c.
05.02 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		FPP.01.02.01. a FPP.02.01.01. a FPP.02.02.02. a FPP.02.03
05.03 Identify proper disposal of hazardous waste materials and biohazards.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.07.04.01
05.04 Describe emergency procedures for: basic first aid, CPR, chemical spills, fire extinguisher use	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ESS.04.02.02. b ESS.04.05.01
06.0 Apply scientific and technological principles to agriscience issues--The student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	CS.07.03.01.c
06.01 Employ scientific measurement skills.			
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 CS.10.01.01.a
06.03 Identify the parts and functions of plant and animal cells.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		BS.02.02.01 ESS.01.01.02. b
06.04 Describe the phases of cell reproduction.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.01.02.01.c AS.02.02.02.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8		PS.01.02.01.b. AS.02.02.03.b

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
06.06 Interpret, analyze, and report data.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.11.01.01 CS.11.02.01
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).	LAFS.910.W.3.7 LAFS.1112.W.3.7		BS.02.05.03.a.
07.0 Apply environmental principles to the agricultural industry--The student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	BS.01.01.03.a.
07.01 Research how different climactic and geological activity influences agriculture.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
07.02 Describe various ecosystems as they relate to the agriculture industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.02.06.09 CS.05.03.02
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.01.01.02.
07.04 Identify regulatory agencies that impact agricultural practices.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS910.L.3.6 LAFS.1112.L.3.6		PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.05 Apply Best Management Practices that enhance the natural environment.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
07.06 Identify conservation practices related to natural resources.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		PS.03.04.01.b AS.08.01.01.c
08.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:		SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	PS.03.04.01.a
08.01 Identify and describe the specializations within the plant science industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.02 Categorize plants based on specific characteristics according to	LAFS.910.W.2.4 LAFS.1112.W.2.4		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
industry and scientific standards.			
08.03 Examine the processes of plant growth including photosynthesis, respiration, transpiration, absorption, transfer, storage, reproduction, etc....	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.01.01.c.
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.03.01 PS.01.03.02
08.05 Analyze information from a fertilizer label.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		PS.02.03.01
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.02.03.04
08.07 Investigate the impacts of various pests and propose solutions for their control.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.01.03 PS.03.01.02
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.03.02 PS.03.03.03 PS.03.03.04
08.09 Explore career opportunities in plant science.	LAFS.910.W.3.7 LAFS.1112.W.3.7		FPP01.01.01.a
09.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
09.02 Analyze commercially important livestock breeds in Florida.	LAFS.910.W.2.4 LAFS.1112.W.2.4		AS.02.01.02.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.	LAFS.910.L.3.6 LAFS.1112.L.3.6		AS.02.01.01.c
09.04 Compare and contrast animal welfare issues.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4		AS.02.01.02.a AS.05.02.01.a



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
	LAFS.1112.SL.2.4		
09.05 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.06 Explore career opportunities in animal science.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
10.0 Demonstrate the use of agriscience tools, equipment, and instruments-- The student will be able to		SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c
10.01 Select and demonstrate proper use of hand tools in agriculture.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		AS.06.02.01.a FPP01.01.01.a
10.02 Operate service and maintain agriscience equipment, and instruments.			AS.01.01.02.b.
10.03 Manage facilities and supplies.			
11.0 Demonstrate agribusiness, employability and human relation skills--The student will be able to:			CS.08.01.01.b PST.02.02.02. b.
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		PST.03.04.01. b PST.03.03.02. a.
11.02 Utilize a record keeping system to collect, interpret, and analyze data.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		PST.04.04.03. a PST.04.04.06. a
11.03 Enhance oral communications through telephone, interview and presentation skills.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.08.03.01.c PST.03.02.03.c .

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
			PST.01.03.01.a.
11.04 Enhance written communication by developing resumes and business letters.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.L.1.2 LAFS.1112.L.1.2		
11.05 Demonstrate interpersonal (nonverbal) communication skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
11.06 Demonstrate good listening skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.09.02.01.b CS.10.01.01.a.
12.0 Apply leadership and citizenship skills--The student will be able to:			CS.03.01.03.b.
12.01 Identify and describe leadership characteristics.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.02 Identify opportunities to apply acquired leadership skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.03 Identify and demonstrate ways to be an active citizen.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.02.02
12.04 Participate in community based learning activities.			
12.05 Demonstrate the ability to work cooperatively.			CS.01.06.01.a.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		CS.02.02.02.b.
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.02.c.
12.08 Develop both a leadership and a career development plan utilizing SMART goals that include 5, 10, and 20 year benchmarks.			
13.0 Discuss components of food safety and handling practices in agriculture - The student will be able to:			
13.01 Demonstrate proper safety precautions and use of personal protective equipment.			
13.02 Evaluate the food safety responsibilities that occur along the food supply chain.			
13.03 Explain techniques and procedures for the safe handling of food products.			

<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
13.04 Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).			
13.05 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agritechnology 1  
**Course Number:** 8106820  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agriscience industry careers; prevention and treatment of livestock diseases; livestock anatomy; wholesale cuts of meat; animal reproduction and identification; animal safety; animal-health certification; plant growth; plant fertilization; safe use of pesticides; maintenance of tools and equipment; record keeping; and employability skills.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agritechnology	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).  LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question	

Florida Standards		Correlation to CTE Program Standard #
	the author seeks to address. LAFS.910.RST.2.6	
01.03 Integration of Knowledge and Ideas		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
01.04 Range of Reading and Level of Text Complexity		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agritechnology		
02.01 Text Types and Purposes		
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	

Florida Standards		Correlation to CTE Program Standard #
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.  LAFS.910.WHST.2.6	
02.03 Research to Build and Present Knowledge		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.  LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.  LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research.  LAFS.910.WHST.3.9	
02.04 Range of Writing		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.  LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agritechnology	
03.01	Make sense of problems and persevere in solving them.  MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively.  MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others.  MAFS.K12.MP.3.1	
03.04	Model with mathematics.  MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically.  MAFS.K12.MP.5.1	
03.06	Attend to precision.  MAFS.K12.MP.6.1	

Florida Standards	Correlation to CTE Program Standard #
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
14.0 Explore the scope of the agriscience industry--The student will be able to:		SC.912.N.1.1, 4, 5 SC.912.N.4.1;	
14.01 Investigate career opportunities in agriscience industries.			
14.02 Describe training requirements for entry and advancement in agriscience careers.			
15.0 Determine proper animal health and nutrition--The student will be able to:		SC.912.L.14.6, 31, 52 SC.912.L.16.7 SC.912.L.17.1, 2, 6, 8, 11, 14, 15, 16, 17, 18, 20 SC.912.L.18.2, 3, 4 SC.912.N.1.1, 2, 4, 5, 6	
15.01 Demonstrate proper methods to clean and disinfect animal equipment and facilities.			
15.02 Explain proper disposal of animal waste with regards to sanitation, economics, and environmental implications			
15.03 Describe a livestock animals digestive system.			
15.04 Describe nutritional requirements of animals.			
16.0 Identify components of reproduction--The student will be able to:		SC.912.L.14.31, 32, 33 SC.912.L.15.2, 5, 6 SC.912.L.16.1, 2, 10, 13 SC.912.N.3.5	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
16.01 Examine livestock and poultry reproductive anatomy.			
16.02 Explain the reproductive cycles of commercially important animals.			
16.03 Compare and select appropriate breeding methods for different agricultural enterprises.			
16.04 Describe approved care for newborn animals.			
16.05 Identify components of reproduction--The student will be able to:			
17.0 Identify procedures in animal production			
17.01 Compare & contrast desirable characteristics of breeding and market animals.			
17.02 Evaluate wholesale cuts of beef, pork, lamb, and poultry.			
17.03 Describe methods of animal identification.			
17.04 Describe methods of restraining, loading, handling, and transporting animals safely.			
18.0 Develop procedures for exhibiting animals--The student will be able to:		SC.912.L.16.10	
18.01 Demonstrate the procedures for preparing, maintaining, and handling livestock.			
18.02 Compare and contrast appropriate livestock evaluation criteria. .			
18.03 Prepare appropriate registrations, shipping and health certificates required for exhibiting or marketing animals.			
18.04 Demonstrate appropriate grooming and showmanship skills.			
19.0 Compare, select, and use plant production systems--The student will be able to:	MAFS.912.S-IC.2	SC.912.L.14.7, 53 SC.912.L.15.5, 6 SC.912.L.16.17 SC.912.L.17.4 SC.912.L.18.7	
19.01 Compare different plant production systems. (Seed, cutting, air layer and tissue culture).			
19.02 Propagate, transplant and grow plants.			
19.03 Select and prepare a site and/or a seedbed for planting.			
19.04 Identify methods of pruning plants to achieve desired growth and to			



CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci	National Standards
	maintain health.			
20.0	Investigate proper methods to fertilize plants and crops--The student will be able to:	MAFS.912.N-Q.1.3	SC.912.L.17.10, 16 SC.912.P.8.8, 11	
20.01	Interpret information on a fertilizer label.			
20.02	Compare sources and forms of nutrients.			
20.03	Determine methods of applying fertilizer materials.			
20.04	Collect soil sample to determine nutrient levels.			
20.05	Test for pH and soluble salts.			
21.0	Operate, maintain, and service facilities, tools, and equipment--The student will be able to:		SC.912.P.10.3, 14, 15, 16, 18	
21.01	Use and maintain hand tools and power equipment (e.g., power saws, welders).			
21.02	Describe maintenance and service of small engines.			
21.03	Examine science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).			
22.0	Apply principles of agribusiness finance--The student will be able to:	MAFS.912.S-IC.2	SC.912.N.4.2	
22.01	Identify components of balance sheets and income statements.			
22.02	Identify major sources of credit for agribusiness.			
22.03	Complete a business loan application.			
22.04	Maintain and interpret agribusiness financial records including depreciation, inventory, and budgets.			
23.0	Evaluate the importance of the food and fiber system to understand the impact on global economy.—The student will be able to:			
23.01	Assess the agricultural impact upon the US gross national product and the total global economy.			
23.02	Investigate local, state, and national regulatory laws, industry regulations, and legislation for agricultural businesses.			
23.03	Identify and describe the primary government agencies involved with agriculture.			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
23.04 Research new and emerging technologies and their impact on the economy.			
23.05 Describe the value of the food and agribusiness industry.			
24.0 Examine the scope of career opportunities in and the importance of agriculture to the economy.			
24.01 Define and explore agriculture and agribusinesses and their role in the economy.			
24.02 Evaluate and explore the agribusiness career opportunities in agriculture.			
24.03 Compare how key organizational structures and processes affect organizational performance and the quality of products and services.			
24.04 Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.			

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agritechnology 2  
**Course Number:** 8106830  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of welding; small gasoline engine service and repair; preventative maintenance procedures; irrigation system repair; refrigeration; new and emerging technologies; financial management skills; and employability skills.

Florida Standards		Correlation to CTE Program Standard #
25.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Agritechnology	
25.01	Key Ideas and Details	
25.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
25.01.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
25.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
25.02	Craft and Structure	
25.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
25.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. LAFS.1112.RST.2.5	
25.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. LAFS.1112.RST.2.6	

Florida Standards		Correlation to CTE Program Standard #
25.03	Integration of Knowledge and Ideas	
25.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.RST.3.7	
25.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. LAFS.1112.RST.3.8	
25.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. LAFS.1112.RST.3.9	
25.04	Range of Reading and Level of Text Complexity	
25.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
25.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently. LAFS.1112.RST.4.10	
26.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Agritechnology	
26.01	Text Types and Purposes	
26.01.1	Write arguments focused on discipline-specific content. LAFS.1112.WHST.1.1	
26.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.1112.WHST.1.2	
26.02	Production and Distribution of Writing	
26.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.1112.WHST.2.4	
26.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
26.02.3	Use technology, including the Internet, to produce, publish, and update	

Florida Standards		Correlation to CTE Program Standard #
	individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
26.03 Research to Build and Present Knowledge		
26.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
26.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
26.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
26.04 Range of Writing		
26.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
27.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Agritechnology	
27.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
27.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
27.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
27.04	Model with mathematics. MAFS.K12.MP.4.1	
27.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
27.06	Attend to precision. MAFS.K12.MP.6.1	
27.07	Look for and make use of structure.	

Florida Standards	Correlation to CTE Program Standard #
	MAFS.K12.MP.7.1
27.08 Look for and express regularity in repeated reasoning.	
	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
28.0 Analyze the scope of the agriscience industry--The student will be able to:		SC.912.N.1.1, 4, 5 SC.912.N.4.1	
28.01 Identify and describe the importance of professional and trade organizations.			
28.02 Examine and interpret trade journals, and academic research in the agriscience industry.			
28.03 Complete a job application			
29.0 Recommend steps for proper animal health and nutrition--The student will be able to:	MAFS.912.N-Q.1.3	SC.912.L.14.6, 31, 52 SC.912.L.16.7; SC.912.L.17.1, 2, 6, 8, 11, 14, 15, 16, 17, 18, 20 SC.912.L.18.2, 3, 4 SC.912.N.1.1, 2, 4, 5, 6	
29.01 Recognize, describe and demonstrate prevention and treatment of common animal diseases, disorders, and pests.			
29.02 Read, interpret, and demonstrate correct uses of pesticides, medication, and other additives according to their labels.			
29.03 Formulate and compute least-cost feed rations.			
29.04 Select and apply growth stimulators and implants.			
29.05 Determine feeding rates and methods of feeding animals.			
30.0 Select, and use plant production systems--The student will be able to:	MAFS.912.S-IC.2	SC.912.L.14.7, 53 SC.912.L.15.5, 6 SC.912.L.16.17 SC.912.L.17.4 SC.912.L.18.7	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
30.01 List the leading local (community) varieties of commonly grown crops for commercial production.			
30.02 Recommend varieties of local commercial plants and field crops.			
30.03 Identify the recommended planting rate, spacing requirements and growth times for common garden crops.			
30.04 Describe the operation of and adjustment of plant production equipment			
31.0 Fertilize plants and crops--The student will be able to:	MAFS.912.S-IC.2 MAFS.912.N-Q.1.3	SC.912.L.17.10, 16 SC.912.P.8.8, 11	
31.01 Develop fertilization schedules and calculate fertilizer rates for plants.			
31.02 Identify common nutrient-deficiency symptoms in plants.			
31.03 Calibrate fertilization equipment and fertilize plants.			
32.0 Irrigate plants and crops--The student will be able to:	MAFS.912.N-Q.1.3	SC.912.E.7.5, 6, 7, 8, 9 SC.912.L.17.10;	
32.01 Recognize soil and plant conditions indicating irrigation needs and develop an irrigation schedule.			
32.02 Compare and select irrigation equipment and methods.			
32.03 Install, operate, maintain, and repair irrigation equipment.			
32.04 Develop Best Management Practices for water use.			
33.0 Control plant pests--The student will be able to:	MAFS.912.N-Q.1.3	SC.912.L.17.6, 8, 9, 13, 17	
33.01 Compare and contrast common plant pests and their damages.			
33.02 Diagram life cycles of insects, pests, and diseases.			
33.03 Interpret the procedures and requirements for obtaining a restricted-use-pesticide operator's license.			
33.04 Select, mix, and apply a no restricted chemical according to the label and local, state, federal and EPA regulations.			
33.05 Describe biological, chemical and cultural methods of controlling plant pests.			
33.06 Develop Best Management Practices for pest management.			
34.0 Maintain, and service facilities, tools, and equipment--The student will be able to:		SC.912.P.10.3,14,15, 16,18	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
34.01 Discuss basic facility maintenance, installation, or repair. (e.g., welding, electricity, plumbing, fencing, construction)			
34.02 Safely operate, maintain, service, and repair equipment.			
35.0 Describe procedures for harvesting and marketing agricultural products--The student will be able to	MAFS.912.S-IC.2	SC.912.P.8.10	
35.01 Determine maturity, condition, quality, and volume of products (produced by program) to be harvested.			
35.02 Describe procedures for harvesting products (produced by program).			
35.03 Collect and interpret market reports and identify market outlets for agricultural products (produced by program).			
35.04 Organize a marketing program for an agricultural product (produced by program or student).			
35.05 Assess kinds and types of storage facilities for agricultural products (produced by program).			
35.06 Grade, treat, pack, and/or store harvested products (produced by program).			
36.0 Compare principles of agribusiness finance--The student will be able to:		SC.912.N.4.2	
36.01 Explain the purposes and structures of contracts, leases, deeds, and insurance policies.			
36.02 Complete a State FFA Degree or Proficiency Applications.			
36.03 Identify tax structure of agricultural business. ( ex. Property tax, intangible taxes, income taxes)			
37.0 Explain the components of the American business system.—The student will be able to:			
37.01 Describe the five basic ways American business is organized.			
37.02 Distinguish and identify between the characteristics of each method of doing business.			
37.03 Evaluate the advantages and disadvantages provided by each business method.			
37.04 Evaluate how cooperative principles and practices differentiate cooperatives from other businesses.			
37.05 Describe the five basic ways American business is organized.			
38.0 Investigate agricultural cooperatives structure and function.—The student will be able to:			



<b>CTE Standards and Benchmarks</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>	<b>National Standards</b>
38.01 Explain the definition of a cooperative.			
38.02 Explain the history of cooperative principles and practices.			
38.03 Describe the five areas that classify cooperative structure.			
38.04 Distinguish and identify between the five types of cooperative structure and their functions.			

## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Extended Student Supervision**

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

### **Career and Technical Student Organization (CTSO)**

FFA is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agriscience Foundations.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	

Florida Standards		Correlation to CTE Program Standard #
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). LAFS.910.RST.2.5	
01.02.3	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. LAFS.910.RST.2.6	
<b>01.03 Integration of Knowledge and Ideas</b>		
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. LAFS.910.RST.3.7	
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem. LAFS.910.RST.3.8	
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. LAFS.910.RST.3.9	
<b>01.04 Range of Reading and Level of Text Complexity</b>		
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently. LAFS.910.RST.4.10	
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agriscience Foundations.	
02.01	Text Types and Purposes	

Florida Standards		Correlation to CTE Program Standard #
02.01.1	Write arguments focused on discipline-specific content. LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02 Production and Distribution of Writing		
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03 Research to Build and Present Knowledge		
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04 Range of Writing		
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a	

Florida Standards		Correlation to CTE Program Standard #
	range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agriscience Foundations.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	
03.05	Use appropriate tools strategically. MAFS.K12.MP.5.1	
03.06	Attend to precision. MAFS.K12.MP.6.1	
03.07	Look for and make use of structure. MAFS.K12.MP.7.1	
03.08	Look for and express regularity in repeated reasoning. MAFS.K12.MP.8.1	

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy-- The student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	CS.10.02.01
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
04.02 Analyze the impact of agriculture on the local, state, national and global economy.	LAFS.910.W.3.8 LAFS.1112.W.3.8		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci	National Standards
04.03	Identify significant career patterns/shifts in the history of the agricultural industry.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
04.04	Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
05.0	Practice agriscience safety skills and procedures--The student will be able to:		SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	
05.01	Identify the common causes and prevention of accidents in agriscience operations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.06.03.01.a CS.07.04.01.c.
05.02	Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		FPP.01.02.01. a FPP.02.01.01. a FPP.02.02.02. a FPP.02.03
05.03	Identify proper disposal of hazardous waste materials and biohazards.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.07.04.01
05.04	Describe emergency procedures for: basic first aid, CPR, chemical spills, fire extinguisher use	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ESS.04.02.02. b ESS.04.05.01
06.0	Apply scientific and technological principles to agriscience issues--The student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	CS.07.03.01.c
06.01	Employ scientific measurement skills.			



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 CS.10.01.01.a
06.03 Identify the parts and functions of plant and animal cells.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		BS.02.02.01 ESS.01.01.02. b
06.04 Describe the phases of cell reproduction.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		PS.01.02.01.c AS.02.02.02.b
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8		PS.01.02.01.b. AS.02.02.03.b
06.06 Interpret, analyze, and report data.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.11.01.01 CS.11.02.01
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).	LAFS.910.W.3.7 LAFS.1112.W.3.7		BS.02.05.03.a.
07.0 Apply environmental principles to the agricultural industry--The student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	BS.01.01.03.a.
07.01 Research how different climactic and geological activity influences agriculture.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
07.02 Describe various ecosystems as they relate to the agriculture industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.02.06.09 CS.05.03.02
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.01.01.02.
07.04 Identify regulatory agencies that impact agricultural practices.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS910.L.3.6 LAFS.1112.L.3.6		PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.05 Apply Best Management Practices that enhance the natural environment.	LAFS.910.W.2.4 LAFS.1112.W.2.4		

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
07.06 Identify conservation practices related to natural resources.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.03.04.01.b AS.08.01.01.c
08.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:		SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L.15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	PS.03.04.01.a
08.01 Identify and describe the specializations within the plant science industry.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.03 Examine the processes of plant growth including photosynthesis, respiration, transpiration, absorption, transfer, storage, reproduction, etc....	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.01.01.c.
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.03.01 PS.01.03.02
08.05 Analyze information from a fertilizer label.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		PS.02.03.01
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.02.03.04
08.07 Investigate the impacts of various pests and propose solutions for their control.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.01.03 PS.03.01.02
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.03.02 PS.03.03.03 PS.03.03.04
08.09 Explore career opportunities in plant science.	LAFS.910.W.3.7 LAFS.1112.W.3.7		FPP01.01.01.a
09.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46,	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
		47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
09.02 Analyze commercially important livestock breeds in Florida.	LAFS.910.W.2.4 LAFS.1112.W.2.4		AS.02.01.02.c
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.	LAFS.910.L.3.6 LAFS.1112.L.3.6		AS.02.01.01.c
09.04 Compare and contrast animal welfare issues.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.01.02.a AS.05.02.01.a
09.05 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.06 Explore career opportunities in animal science.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c As.03.02.01.a AS.06.01.01.b
10.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to		SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c
10.01 Select and demonstrate proper use of hand tools in agriculture.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		AS.06.02.01.a FPP01.01.01.a
10.02 Operate service and maintain agriscience equipment, and instruments.			AS.01.01.02.b.
10.03 Manage facilities and supplies.			
11.0 Demonstrate agribusiness, employability and human relation skills--The student will be able to:			CS.08.01.01.b PST.02.02.02.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
			b.
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		PST.03.04.01. b PST.03.03.02. a.
11.02 Utilize a record keeping system to collect, interpret, and analyze data.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		PST.04.04.03. a PST.04.04.06. a
11.03 Enhance oral communications through telephone, interview and presentation skills.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.08.03.01.c PST.03.02.03.c . PST.01.03.01. a.
11.04 Enhance written communication by developing resumes and business letters.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.L.1.2 LAFS.1112.L.1.2		
11.05 Demonstrate interpersonal (nonverbal) communication skills.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		
11.06 Demonstrate good listening skills.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.09.02.01.b CS.10.01.01.a.
12.0 Apply leadership and citizenship skills--The student will be able to:			CS.03.01.03.b.
12.01 Identify and describe leadership characteristics.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.02 Identify opportunities to apply acquired leadership skills.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.03 Identify and demonstrate ways to be an active citizen.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.01.02.02

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci	National Standards
12.04 Participate in community based learning activities.			
12.05 Demonstrate the ability to work cooperatively.			CS.01.06.01.a.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		CS.02.02.02.b.
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.02.c.
12.08 Develop both a leadership and a career development plan utilizing SMART goals that include 5, 10, and 20 year benchmarks.			
13.0 Discuss components of food safety and handling practices in agriculture - The student will be able to:			
13.01 Demonstrate proper safety precautions and use of personal protective equipment.			
13.02 Evaluate the food safety responsibilities that occur along the food supply chain.			
13.03 Explain techniques and procedures for the safe handling of food products.			
13.04 Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).			
13.05 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.			

Florida Department of Education  
Curriculum Framework

**Program Title:** Aquaculture  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

**NOTE:** This program has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

**Secondary – Career Preparatory**

Program Number	8112000
CIP Number	0101030300
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	45-2093 - Farmworkers, Farm, Ranch, and Aquacultural Animals
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>

**Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in the planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues in the aquaculture industry.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

**Program Structure**

This program is a planned sequence of instruction consisting of one occupational completion point. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level	Graduation Requirement
A	8106810	Agriscience Foundations	1 credit	45-2093	3	EQ
	8112010	Aquaculture 2	1 credit		3	EQ
	8112020	Aquaculture 3	1 credit		3	EQ

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics, VO= Career and Technical Education)

### Academic Alignment Table

Academic alignment is an ongoing, collaborative effort of professional educators specializing in the fields of science, mathematics, English/language arts, and Career and Technical Education (CTE). This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses. Career and Technical Education courses that have been aligned to the Next Generation Sunshine State Standards for Science and the Florida Standards for Mathematics and English/Language Arts will show the following data: the quantity of academic standards in the CTE course; the total number of standards contained in the academic course; and the percentage of alignment to the CTE course.

**This program is daggered and will not be aligned to academic courses.**

Courses	Anatomy/ Physiology Honors	Astronomy Solar/Galactic Honors	Biology 1	Chemistry 1	Earth-Space Science	Environmental Science	Genetics	Integrated Science	Marine Science 1 Honors	Physical Science	Physics 1
Ag. Foundations	29/87 33%	18/80 23%	55/83 66%	11/69 16%	36/67 54%	30/70 42%	20/69 29%	49/82 60%	25/66 38%	38/74 51%	12/72 16%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

Courses	Algebra 1	Algebra 2	Geometry	English 1	English 2	English 3	English 4
Agriscience Foundations 1	14/67 21%	4/75 5%	8/54 15%	11/46 24%	11/45 24%	11/45 24%	11/45 24%

\*\* Alignment pending review

# Alignment attempted, but no correlation to academic course

### Florida Standards for Technical Subjects

Florida Standards (FS) for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects are the critical reading and writing literacy standards designed for grade 6 and above. These standards are predicated on teachers of history/social studies, science, and technical subjects using their content area expertise to help students meet the particular challenges of reading, writing, speaking, listening, and

*language in their respective fields. It is important to note that the 6-12 literacy standards in history/social studies, science, and technical subjects are not meant to replace content standards in those areas but rather to supplement them.*

This curriculum framework incorporates the grades 9-10 reading and writing literacy standards in the first two courses of this CTE program and grade 11-12 reading and writing literacy standards in the third and fourth courses of this CTE program. The standards for Mathematical Practices describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. This curriculum framework incorporates the appropriate mathematical practices in the first four courses of this CTE program.

Daggered for Deletion



## **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

## Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Aquaculture.
- 02.0 Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Aquaculture.
- 03.0 Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Aquaculture.
- 04.0 Describe the history of agriculture and its influence on the global economy.
- 05.0 Practice agriscience safety skills and procedures.
- 06.0 Apply scientific and technological principles to agriscience issues.
- 07.0 Apply environmental principles to the agricultural industry.
- 08.0 Investigate and utilize basic scientific skills and principles in plant science.
- 09.0 Investigate and utilize basic scientific skills and principles in animal science.
- 10.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 11.0 Demonstrate agribusiness, employability and human relation skills.
- 12.0 Apply leadership and citizenship skills.
- 13.0 Describe the nature and origin of and career opportunities in aquaculture.
- 14.0 Demonstrate the management and environmentally sound use of water and land resources.
- 15.0 Apply biological principles to the reproduction, identification and growth of aquaculture species.
- 16.0 Safely operate, maintain and repair machinery, equipment and facilities used in aquaculture.
- 17.0 Assist in the propagation and culture of an aquaculture organism.
- 18.0 Describe procedures used in locating markets and marketing aquaculture products.
- 19.0 Apply business management skills in managing an aquaculture operation.
- 20.0 Identify applicable local, state, and federal rules and regulations and assistance programs.
- 21.0 Assist in producing aquaculture species in one or more of the following: ponds, cages, tanks, raceways, net pens.
- 22.0 Students evaluate the importance of the food and fiber system to understand the impact on global economy.
- 23.0 Students examine the scope of career opportunities in and the importance of agriculture to the economy.
- 24.0 Describe the nature and origin of and career opportunities in aquaculture.
- 25.0 Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Aquaculture.
- 26.0 Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Aquaculture.
- 27.0 Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Aquaculture.
- 28.0 Exhibit management and environmentally sound use of water and land resources.
- 29.0 Complete the propagation and culture of an aquaculture organism.
- 30.0 Demonstrate procedures used in locating markets and marketing aquaculture products.
- 31.0 Incorporate business management skills in managing an aquaculture operation.
- 32.0 Demonstrate leadership, employability, communication, and human relations skills.
- 33.0 Produce an aquaculture species in one or more of the following: pond, cage, tank, raceway, net pen.
- 34.0 Control disease, pest and water quality problems.
- 35.0 Assist in harvesting and processing aquaculture species.

- 36.0 Explain the components of the American business system.
- 37.0 Investigate agricultural cooperatives structure and function.

Daggered for Deletion

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations 1  
**Course Number:** 8106810  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

**NOTE:** This program has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Agritechnology.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	

Florida Standards		Correlation to CTE Program Standard #
		LAFS.910.RST.1.3
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.	LAFS.910.RST.2.4
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	LAFS.910.RST.2.5
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	LAFS.910.RST.2.6
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	LAFS.910.RST.3.7
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	LAFS.910.RST.3.8
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	LAFS.910.RST.3.9
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently.	LAFS.910.RST.4.10
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Agritechnology.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.910.WHST.1.1	
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. LAFS.910.WHST.1.2	
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. LAFS.910.WHST.2.4	
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Agritechology.	

Florida Standards	Correlation to CTE Program Standard #
03.01 Make sense of problems and persevere in solving them.	MAFS.K12.MP.1.1
03.02 Reason abstractly and quantitatively.	MAFS.K12.MP.2.1
03.03 Construct viable arguments and critique the reasoning of others.	MAFS.K12.MP.3.1
03.04 Model with mathematics.	MAFS.K12.MP.4.1
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
04.0 Describe the history of agriculture and its influence on the global economy-- The student will be able to:		SC.912.E.5.7; SC.912.L.14.1; SC.912.L.15.13; SC.912.L.17.1, 5, 13, 18, 20; SC.912.N.4.2;	CS.10.02.01
04.01 Investigate the origin and history of agriculture and its relationship to science and technology.	LAFS.910.W.3.7 LAFS.1112.W.3.7		
04.02 Analyze the impact of agriculture on the local, state, national and global economy.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
04.03 Identify significant career patterns/shifts in the history of the agricultural industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
04.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
05.0 Practice agriscience safety skills and procedures--The student will be able to:		SC.912.L.14.6; SC.912.L.15.4; SC.912.L.16.7, 10; SC.912.L.17.12, 14, 15, 16, 18; SC.912.N.1.1, 2, 3; SC.912.N.4.2; SC.912.P.8.7;	
05.01 Identify the common causes and prevention of accidents in agriscience operations.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.06.03.01.a CS.07.04.01.c.
05.02 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		FPP.01.02.01. a FPP.02.01.01. a FPP.02.02.02. a FPP.02.03
05.03 Identify proper disposal of hazardous waste materials and biohazards.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		CS.07.04.01
05.04 Describe emergency procedures for: basic first aid, CPR, chemical spills, fire extinguisher use	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		ESS.04.02.02. b ESS.04.05.01
06.0 Apply scientific and technological principles to agriscience issues--The student will be able to:		SC.912.E.7.8; SC.912.L.14.2, 3, 4, 5, 6, 8; SC.912.L.15.14, 15; SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17; SC.912.N.1.1, 2, 3, 4, 6, 7; SC.912.N.2.2, 5; SC.912.N.3.1; SC.912.N.4.1;	CS.07.03.01.c
06.01 Employ scientific measurement skills.			
06.02 Demonstrate safe and effective use of common laboratory equipment.			BS.02.02.01 CS.10.01.01.a
06.03 Identify the parts and functions of plant and animal cells.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		BS.02.02.01 ESS.01.01.02. b
06.04 Describe the phases of cell reproduction.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1		PS.01.02.01.c AS.02.02.02.b



CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
06.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.3.8 LAFS.1112.W.3.8		PS.01.02.01.b. AS.02.02.03.b
06.06 Interpret, analyze, and report data.	LAFS.910.W.2.4 LAFS.1112.W.2.4		CS.11.01.01 CS.11.02.01
06.07 Investigate DNA and genetics applications in agriscience including the theory of probability.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
06.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).	LAFS.910.W.3.7 LAFS.1112.W.3.7		BS.02.05.03.a.
07.0 Apply environmental principles to the agricultural industry--The student will be able to:		SC.912.E.6.1, 4; SC.912.E.7.1, 4, 6, 7, 8; SC.912.L.17.4, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20; SC.912.L.18.12	BS.01.01.03.a.
07.01 Research how different climactic and geological activity influences agriculture.	LAFS.910.W.3.8 LAFS.1112.W.3.8		
07.02 Describe various ecosystems as they relate to the agriculture industry.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.02.06.09 CS.05.03.02
07.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		NRS.01.01.02.
07.04 Identify regulatory agencies that impact agricultural practices.	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS910.L.3.6 LAFS.1112.L.3.6		PS.03.02.04.c PS.02.01.01.a PS.02.02.02.c
07.05 Apply Best Management Practices that enhance the natural environment.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
07.06 Identify conservation practices related to natural resources.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		PS.03.04.01.b AS.08.01.01.c
08.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:		SC.912.E.5.4; SC.912.L.14.2, 3, 5, 6, 7, 8, 9, 53; SC.912.L15.9, 14, 15; SC.912.L.17.6, 12, 16, 17, 19; SC.912.L.18.7, 8, 9; SC.912.P.8.5, 7;	PS.03.04.01.a

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
08.01 Identify and describe the specializations within the plant science industry.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.02 Categorize plants based on specific characteristics according to industry and scientific standards.	LAFS.910.W.2.4 LAFS.1112.W.2.4		
08.03 Examine the processes of plant growth including photosynthesis, respiration, transpiration, absorption, transfer, storage, reproduction, etc....	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.01.01.c.
08.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.01.03.01 PS.01.03.02
08.05 Analyze information from a fertilizer label.	LAFS.910.RI.1.1 LAFS.1112.RI.1.1		PS.02.03.01
08.06 Propagate and grow plants through sexual and/or asexual reproduction.			PS.02.03.04
08.07 Investigate the impacts of various pests and propose solutions for their control.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.01.03 PS.03.01.02
08.08 Investigate the nature and properties of food, fiber, and by-products from plants.	LAFS.910.W.2.4 LAFS.1112.W.2.4		PS.03.03.02 PS.03.03.03 PS.03.03.04
08.09 Explore career opportunities in plant science.	LAFS.910.W.3.7 LAFS.1112.W.3.7		FPP01.01.01.a
09.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:		SC.912.L.14.11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 28, 29, 31, 32, 33, 34, 36, 40, 41, 42, 43, 45, 46, 47, 48, 51; SC.912.L.15.4, 5, 6, 7; SC.912.L.16.3, 4; SC.912.L.17.11, 12, 13, 15, 16, 17, 18, 19;	
09.01 Explain the economic importance of animals and the products obtained from animals.	LAFS.910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.2.4 LAFS.1112.W.2.4		
09.02 Analyze commercially important livestock breeds in Florida.	LAFS.910.W.2.4 LAFS.1112.W.2.4		AS.02.01.02.c

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
09.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.	LAFS.910.L.3.6 LAFS.1112.L.3.6		AS.02.01.01.c
09.04 Compare and contrast animal welfare issues.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.01.02.a AS.05.02.01.a
09.05 Investigate the nature and properties of food, fiber, and by-products from animals.			AS.02.02.01.c AS.02.02.05.a AS.02.02.05.b AS.02.02.06.b AS.02.03.01.b.
09.06 Explore career opportunities in animal science.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		AS.02.03.01.a AS.03.01.03.a AS.03.01.03.c. As.03.02.01.a AS.06.01.01.b
10.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to		SC.912.L.14.4; SC.912.P.12.2, 3, 4, 9;	AS.06.01.02.a AS.06.01.02.b AS.06.01.02.c
10.01 Select and demonstrate proper use of hand tools in agriculture.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		AS.06.02.01.a FPP01.01.01.a
10.02 Operate service and maintain agriscience equipment, and instruments.			AS.01.01.02.b.
10.03 Manage facilities and supplies.			
11.0 Demonstrate agribusiness, employability and human relation skills--The student will be able to:			CS.08.01.01.b PST.02.02.02. b.
11.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).	LAFS910.SL.1.1 LAFS.1112.SL.1.1 LAFS.910.W.3.7 LAFS.1112.W.3.7 LAFS.910.W.3.8 LAFS.1112.W.3.8 LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.SL.2.4 LAFS.1112.SL.2.4		PST.03.04.01. b PST.03.03.02. a.
11.02 Utilize a record keeping system to collect, interpret, and analyze data.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6		PST.04.04.03. a PST.04.04.06.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
	LAFS.1112.W.2.6		a
11.03 Enhance oral communications through telephone, interview and presentation skills.	LAFS.910.SL.2.6 LAFS.1112.SL.2.6		CS.08.03.01.c PST.03.02.03.c PST.01.03.01. a.
11.04 Enhance written communication by developing resumes and business letters.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.L.1.1 LAFS.1112.L.1.1 LAFS.910.L.1.2 LAFS.1112.L.1.2		
11.05 Demonstrate interpersonal (nonverbal) communication skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		
11.06 Demonstrate good listening skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.09.02.01.b CS.10.01.01.a.
12.0 Apply leadership and citizenship skills--The student will be able to:			CS.03.01.03.b.
12.01 Identify and describe leadership characteristics.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.02 Identify opportunities to apply acquired leadership skills.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.03.01.01 CS.03.01.02
12.03 Identify and demonstrate ways to be an active citizen.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.02.02
12.04 Participate in community based learning activities.			
12.05 Demonstrate the ability to work cooperatively.			CS.01.06.01.a.
12.06 Conduct formal and informal meetings using correct parliamentary procedure skills.	LAFS.910.W.2.4 LAFS.1112.W.2.4 LAFS.910.W.2.6 LAFS.1112.W.2.6		CS.02.02.02.b.
12.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.	LAFS910.SL.1.1 LAFS.1112.SL.1.1		CS.01.05.02.c.
12.08 Develop both a leadership and a career development plan utilizing SMART goals that include 5, 10, and 20 year benchmarks.			
13.0 Discuss components of food safety and handling practices in agriculture - The student will be able to:			

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci	National Standards
13.01 Demonstrate proper safety precautions and use of personal protective equipment.			
13.02 Evaluate the food safety responsibilities that occur along the food supply chain.			
13.03 Explain techniques and procedures for the safe handling of food products.			
13.04 Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).			
13.05 Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.			

Daggered for Deletion

Florida Department of Education  
Student Performance Standards

**Course Title:** Aquaculture 2  
**Course Number:** 8112010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of nature and origin, career opportunities, biological principles, safety, water quality, seed production, market outlets, rules and regulations, technological advances, problem solving and leadership employability communication and human relations skills.

**NOTE:** This program has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
01.0	Methods and strategies for using Florida Standards for grades 09-10 reading in Technical Subjects for student success in Aquaculture.	
01.01	Key Ideas and Details	
01.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  LAFS.910.RST.1.1	
01.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.  LAFS.910.RST.1.2	
01.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.  LAFS.910.RST.1.3	
01.02	Craft and Structure	
01.02.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.  LAFS.910.RST.2.4	
01.02.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction	

Florida Standards		Correlation to CTE Program Standard #
	force, energy).	LAFS.910.RST.2.5
01.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	LAFS.910.RST.2.6
01.03	Integration of Knowledge and Ideas	
01.03.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	LAFS.910.RST.3.7
01.03.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	LAFS.910.RST.3.8
01.03.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	LAFS.910.RST.3.9
01.04	Range of Reading and Level of Text Complexity	
01.04.1	By the end of grade 9, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.	
01.04.2	By the end of grade 10, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 9–10 text complexity band independently and proficiently.	LAFS.910.RST.4.10
02.0	Methods and strategies for using Florida Standards for grades 09-10 writing in Technical Subjects for student success in Aquaculture.	
02.01	Text Types and Purposes	
02.01.1	Write arguments focused on discipline-specific content.	LAFS.910.WHST.1.1
02.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	LAFS.910.WHST.1.2
02.02	Production and Distribution of Writing	
02.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	LAFS.910.WHST.2.4

Florida Standards		Correlation to CTE Program Standard #
02.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.910.WHST.2.5	
02.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. LAFS.910.WHST.2.6	
02.03	Research to Build and Present Knowledge	
02.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.910.WHST.3.7	
02.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. LAFS.910.WHST.3.8	
02.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.910.WHST.3.9	
02.04	Range of Writing	
02.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.910.WHST.4.10	
03.0	Methods and strategies for using Florida Standards for grades 09-10 Mathematical Practices in Technical Subjects for student success in Aquaculture.	
03.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
03.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
03.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
03.04	Model with mathematics. MAFS.K12.MP.4.1	



Florida Standards	Correlation to CTE Program Standard #
03.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
03.06 Attend to precision.	MAFS.K12.MP.6.1
03.07 Look for and make use of structure.	MAFS.K12.MP.7.1
03.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
14.0 Describe the nature and origin of and career opportunities in aquaculture – the students will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.E.6.4, 5, 6 SC.912.L.14.2, 3, 6, 33 SC.912.L.15.3, 6, 7, 9, 13 SC.912.L.16.9, 14, 15, 16 SC.912.L.17.7, 9 10, 12, 13, 14, 15, 16, 17, 18 SC.912.N.1.2, 3, 4, 5, 6; SC.912.N.2.5;
14.01 List the definition of aquaculture as defined by the Florida Division of Aquaculture.		
14.02 Compare and contrast aquaculture and fisheries.		
14.03 List and describe major global aquatic crops and animals.		
14.04 Explain the history of aquaculture.		
14.05 List and describe aquaculture related occupations.		
14.06 Determine the educational requirements and experience needed to enter and advance in aquaculture occupations.		
15.0 Demonstrate the management and environmentally sound use of water and land resources – the student will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.E.5.6 SC.912.E.6.2, 4, 5, SC.912.E.7.1, 2, 3, 4, 5, 6, 7, 8 9

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
		SC.912.L.17. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 18, 20 SC.912.L.18.6, 12 SC.912.P.8.2, 6, 10, 11, 12 SC.912.P.12.9, 12
15.01 Identify and describe the physical and chemical characteristics of water for use in aquaculture.		
15.02 Explain how changes in water affect aquatic life.		
15.03 Be able to measure the dissolved oxygen, pH, total ammonia nitrogen (TAN), unionized ammonia, nitrite, nitrate, salinity, hardness, alkalinity, turbidity, chlorine/chloramine and carbon dioxide in a water system		
15.04 Explain how the nitrogen cycle is related to maintaining healthy fish.		
16.0 Apply biological principles to the reproduction, identification and growth of aquaculture species – the students will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.L.14.1, 3, 4, 6, 11, 12, 13, 14, 16, 17, 18, 19, 21, 28, 29, 30, 31, 32, 33, 36, 42, 43, 44, 46, 48, 49, 50, 51, 52, 53 SC.912.L.15.4, 5, 6, 7 SC.912.L.15.7, 9 SC.912.L.17.13 SC.912.L.18.1, 2, 3, 4, 7, 8, 9, 10, 11, 12 SC.912.N.3.1, 2, 5 SC.912.N.4.1, 2 SC.912.P.8.7, 8, 11, 12, 13
16.01 Define morphology, anatomy, and physiology.		
16.02 Identify and describe the anatomy and physiology of crustaceans.		
16.03 Identify and describe the anatomy and physiology of mollusks.		
16.04 Identify and describe the anatomy and physiology of fish.		
16.05 Identify and describe the basic morphology of aquatic macroalgae and microalgae.		
16.06 List and describe important characteristics in choosing a production species.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
16.07	Identify and describe common aquaculture organism by family, genus and species.		
16.08	List and describe the chemical and physical factors which influence the growth of aquatic fauna and flora.		
16.09	Identify aquaculture species of commercial importance in your area.		
16.10	Describe necessary biosecurity measures for various aquaculture facilities.		
17.0	Safely operate, maintain and repair machinery, equipment and facilities used in aquaculture – the student will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.L.17.7 SC.912.P.8.2 SC.912.P.10.2, 3, 4, 5, 7, 8, 14, 15 SC.912.P.12.2, 3, 5, 5, 9, 13
17.01	Recognize and observe safety practices necessary in carrying out aquaculture activities.		
17.02	Inspect, maintain and perform basic repairs on aquaculture machinery, equipment and facilities.		
17.03	Safely operate aquaculture machinery and equipment.		
17.04	Discuss the safety and maintenance of a re-circulating aquaculture system (RAS) including biological, chemical, and mechanical filtration, degassing, sterilization, and foam fractionation.		
18.0	Assist in the propagation and culture of an aquaculture organism – the student will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.L.15.12, 13, 15 SC.912.L.16.1, 2, 3, 4, 7, 9, 10, 12, 14, 15, 16, 17 SC.912.L.17.4, 5, 6, 7, 8, 9, 11, 14, 15, 17 SC.912.N.1.7 SC.912.P.12.13
18.01	Identify/describe facilities used in a grow-out operation.		
18.02	List sources of aquaculture organisms and how they are produced.		
18.03	Determine the purpose and functions of a hatchery.		
18.04	Describe and contrast the reproductive anatomy of aquaculture organisms.		
18.05	Describe and contrast types of spawning exhibited by aquaculture organisms.		
18.06	Discuss proper broodstock conditioning and spawning techniques for aquaculture organisms.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.07 Discuss proper grow-out techniques for aquaculture organisms.		
19.0 Describe procedures used in locating markets and marketing aquaculture products – the student will be able to:		SC.912.E.5.10 SC.912.N.1.1, 5, 7 SC.912.N.2.2, 3, 4, 5 SC.912.P.8.1, 2, 7, 10, 11, 12
19.01 Identify possible market outlets for aquaculture products.		
19.02 Identify the steps in securing a specific market outlet for a given species.		
19.03 Describe the product characteristics of a marketable product.		
20.0 Apply business management skills in managing an aquaculture operation – the student will be able to:	MAFS.912.S-IC.2	
20.01 Identify and list functions in the management process.		
20.02 Demonstrate basic bookkeeping skills.		
20.03 Complete Supervised Agricultural Experience (SAE) records.		
21.0 Identify applicable local, state and federal rules, regulations and assistance programs – the student will be able to:	MAFS.912.N-Q.1.3 MAFS.912.S-IC.2	SC.912.N.4.1, 2
21.01 Identify and observe laws and regulations affecting the industry in the local area.		
21.02 Describe process to obtain required permits, licenses, leases, etc. for production and marketing.		
21.03 Identify and list agencies regulating the industry and their functions.		
21.04 Identify and list government assistance programs available to the industry.		
22.0 Demonstrate leadership, employability, communication, and human relations skills – the student will be able to:		SC.912.N.1.7
22.01 Conduct group meetings, using parliamentary procedure and public-speaking skills.		
22.02 Identify acceptable work habits (ethics) and desired personal characteristics.		
22.03 Demonstrate acceptable employee-hygiene habits.		
22.04 Secure information about a job.		
22.05 Complete a job application.		
23.0 Students evaluate the importance of the food and fiber system to understand the impact on		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
global economy – the student will be able to:		
23.01 Assess the agricultural impact upon the US gross national product and the total global economy.		
23.02 Investigate local, state, and national regulatory laws, industry regulations, and legislation for agricultural businesses.		
23.03 Identify and describe the primary government agencies involved with agriculture.		
23.04 Research new and emerging technologies and their impact on the economy.		
23.05 Recognize the value of the food and agribusiness industry.		
24.0 Students examine the scope of career opportunities in and the importance of agriculture to the economy – the student will be able to:		
24.01 Define and explore agriculture and agribusinesses and their role in the economy.		
24.02 Evaluate and explore the agribusiness career opportunities in agriculture.		
24.03 Compare how key organizational structures and processes affect organizational performance and the quality of products and services.		
24.04 Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society		
25.0 Describe the nature and origin of and career opportunities in aquaculture – the students will be able to:		
25.01 List the definition of aquaculture as defined by the Florida Division of Aquaculture.		
25.02 Compare and contrast aquaculture and fisheries.		
25.03 List and describe major global aquatic crops and animals.		

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Aquaculture 3  
**Course Number:** 8112020  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the area of management and use of water, the propagation and rearing of seed, producing aquaculture species, control of diseases, pests and water quality problems, harvesting and processing, marketing and transportation, management skills and leadership, employability, communication and human relation skills.

**NOTE:** This program has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District’s discretion, continue taking courses in the program until completion.

Florida Standards		Correlation to CTE Program Standard #
26.0	Methods and strategies for using Florida Standards for grades 11-12 reading in Technical Subjects for student success in Aquaculture.	
26.01	Key Ideas and Details	
26.01.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.1	
26.01.2	Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. LAFS.1112.RST.1.2	
26.01.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. LAFS.1112.RST.1.3	
26.02	Craft and Structure	
26.02.1	Determine the meaning of symbols key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. LAFS.1112.RST.2.4	
26.02.2	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	

Florida Standards		Correlation to CTE Program Standard #
	LAFS.1112.RST.2.5	
26.02.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	
	LAFS.1112.RST.2.6	
26.03	Integration of Knowledge and Ideas	
26.03.1	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem.	
	LAFS.1112.RST.3.7	
26.03.2	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.	
	LAFS.1112.RST.3.8	
26.03.3	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	
	LAFS.1112.RST.3.9	
26.04	Range of Reading and Level of Text Complexity	
26.04.1	By the end of grade 11, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.	
26.04.2	By the end of grade 12, read and comprehend literature [informational texts, history/social studies texts, science/technical texts] at the high end of the grades 11–CCR text complexity band independently and proficiently.	
	LAFS.1112.RST.4.10	
27.0	Methods and strategies for using Florida Standards for grades 11-12 writing in Technical Subjects for student success in Aquaculture.	
27.01	Text Types and Purposes	
27.01.1	Write arguments focused on discipline-specific content.	
	LAFS.1112.WHST.1.1	
27.01.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
	LAFS.1112.WHST.1.2	
27.02	Production and Distribution of Writing	
27.02.1	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
	LAFS.1112.WHST.2.4	

Florida Standards		Correlation to CTE Program Standard #
27.02.2	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. LAFS.1112.WHST.2.5	
27.02.3	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. LAFS.1112.WHST.2.6	
27.03	Research to Build and Present Knowledge	
27.03.1	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. LAFS.1112.WHST.3.7	
27.03.2	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. LAFS.1112.WHST.3.8	
27.03.3	Draw evidence from informational texts to support analysis, reflection, and research. LAFS.1112.WHST.3.9	
27.04	Range of Writing	
27.04.1	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. LAFS.1112.WHST.4.10	
28.0	Methods and strategies for using Florida Standards for grades 11-12 Mathematical Practices in Technical Subjects for student success in Aquaculture.	
28.01	Make sense of problems and persevere in solving them. MAFS.K12.MP.1.1	
28.02	Reason abstractly and quantitatively. MAFS.K12.MP.2.1	
28.03	Construct viable arguments and critique the reasoning of others. MAFS.K12.MP.3.1	
28.04	Model with mathematics. MAFS.K12.MP.4.1	



Florida Standards	Correlation to CTE Program Standard #
28.05 Use appropriate tools strategically.	MAFS.K12.MP.5.1
28.06 Attend to precision.	MAFS.K12.MP.6.1
28.07 Look for and make use of structure.	MAFS.K12.MP.7.1
28.08 Look for and express regularity in repeated reasoning.	MAFS.K12.MP.8.1

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts

NGSSS-Sci = Next Generation Sunshine State Standards for Science

*Note: This course is pending alignment in the following categories: FS-M/LA*

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
29.0 Exhibit the management and environmentally sound use of water and land resources – the student will be able to:		SC.912.L.17.5, 7, 8, 13, 14, 15, 16, 17, 20 SC.912.L.18.12 SC.912.N.4.1, 2, 6 SC.912.P.8.1, 10, 11, 12, 13 SC.912.P.10.2, 3, 9; SC.912.P.12.2, 5, 6, 9, 12
29.01 Calculate volume in circular, rectangular and irregular shaped water structures.		
29.02 Identify and explain point and non-point pollution management associated with aquaculture.		
29.03 Determine soil types, land slope and other factors to consider in choosing a location for an aquaculture operation.		
29.04 Discuss Florida Department of Agriculture and Consumer Services (FDACS) Best Management Practices (BMP) for managing water usage and aquaculture affluent.		
29.05 Discuss different stages of construction of ponds and/or other aquaculture production facilities.		
29.06 Discuss the advantages and disadvantages of hydroponics and aquaponics.		
30.0 Complete the propagation and culture of an aquaculture organism. – the student will be able to:		SC.912.E.5.8 SC.912.E.6.4, 5, 6 SC.912.E.7.1, 6, 8 SC.912.L.14.4, 6, 31, 33, 41, 43, 44, 46, 52

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci
		SC.912.L.15.6, 7, 9 SC.912.L.16.1, 2, 3, 7, 9, 12, 14 SC.912.L.17.1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20 SC.912.L.18.1, 2, 3, 4 SC.912.N.1.1 SC.912.N.2.4, 5
30.01 Identify and describe the methods of reproducing aquaculture organisms.		
30.02 Identify and describe the hatchery facilities used in aquaculture.		
30.03 Select a method of producing seed for a selected species.		
30.04 List and explain the process for hatching eggs in different aquaculture organisms.		
30.05 Determine the types and sizes of feeds to grow different life stages of aquaculture organisms.		
30.06 Discuss the proper methods for harvesting, grading and transporting seed, fry and juvenile aquaculture organisms.		
31.0 Demonstrate procedures used in locating markets and marketing aquaculture products – the student will be able to:		SC.912.N.1.1, 3, 4, 5, 6 SC.912.N.2.2, 4, 5 SC.912.N.3.5 SC.912.N.4.1, 2
31.01 Develop a marketing plan for an aquaculture product.		
31.02 Determine laws and regulations involved in transporting and marketing aquaculture organisms.		
31.03 Market aquaculture products.		
32.0 Incorporate business management skills in managing an aquaculture operation – the student will be able to:	MAFS.912.S-IC.2	SC.912.N.2.5 SC.912.N.3.5 SC.912.N.4.1, 2 SC.912.P.8.2, 6, 9, 11, 12, 13 SC.912.P.10.2, 13, 14, 15
32.01 Determine cost of production/harvesting and profitability of different systems.		
32.02 Determine procedures and costs for acquiring the land/water, machinery, equipment structures, etc., needed for an operation specified by the instructor.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
32.03 Complete forms related to (a) land purchase, (b) water leases, (c) permits, (d) licenses, (e) financial loans, (f) insurance, (g) others specified by the instructor.		
32.04 Keep records related to: (a) property ownership, (b) equipment acquired, (c) equipment repair and maintenance, (d) income and expense, (e) employee time and days, (f) income tax and social security, (g) insurance, (h) others specified by instructor.		
32.05 Manage a production/harvesting system.		
32.06 Complete Supervised Occupational Experienced (SAE) records.		
33.0 Demonstrate leadership, employability, communication, and human relations skills – the student will be able to:		SC.912.N.1.1, 3, 5, 7 SC.912.N.2.2, 5 SC.912.N.4.1, 2
33.01 Demonstrate competence in job-interview techniques.		
33.02 Demonstrate proper office procedures.		
33.03 Demonstrate appropriate response to criticism from employer, supervisor, or other persons in the workplace.		
33.04 Demonstrate knowledge of how to appropriately make a career change, including resigning from a job.		
33.05 Write a resume.		
34.0 Produce an aquaculture species in one or more of the following: pond, cage, tank, raceway, net pen – the student will be able to:		SC.912.E.5.8 SC.912.E.6.4, 5 SC.912.E.7.1, 2, 3, 4, 5, 6, 8, 9 SC.912.L.14.4, 6, 7, 16, 19, 46, 53 SC.912.L.17.2, 3, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 SC.912.L.18.1, 2, 3, 4 SC.912.N.1.3, 4, 5, 6, 7 SC.912.N.2.4, 5 SC.912.N.3.5 SC.912.N.4.1, 2 SC.912.P.8.1, 6, 7, 8, 9, 10, 11, 12 SC.912.P.10.2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 18 SC.912.P.12.2, 3, 4, 5, 6, 7, 8, 9

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
34.01 Identify the types of growing systems and important factors in their selection, design and use.		
34.02 Determine economic factors to consider in choosing a system for commercial production.		
34.03 Identify and describe facility construction and site requirements.		
34.04 Select species for a specific culture facility.		
34.05 Determine feeding methods and calculate feeding rates for an aquaculture organism.		
34.06 Assist in managing water quality in one or more production systems.		
35.0 Control disease, pest and water quality problems – the student will be able to:		SC.912.E.5.8 SC.912.E.6.5, 6 SC.912.L.14.2, 3, 4, 6, 11, 12, 16, 19, 29, 42, 43, 44, 45, 46, 47, 52, 53 SC.912.L.15.15 SC.912.L.16. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 SC.912.L.17.1, 2, 3, 5, 6, 7, 8, 9, 13, 14, 15, 16, 17, 18 SC.912.L.18.5, 7, 8, 9, 11, 12 SC.912.N.2.4, 5 SC.912.N.3.5 SC.912.P.8.9
35.01 Identify major diseases of several locally important commercial species and list different methods of prevention and treatment.		
35.02 Identify major pests of several locally important commercial species and list recommended control methods.		
35.03 Describe methods of prevention, treatment and control of the major diseases and pests previously identified.		
35.04 Identify water quality problems.		
35.05 Determine water quality parameters and describe corrective action where needed.		
36.0 Assist in harvesting and processing aquaculture species – the student will be able to:		SC.912.E.5.8 SC.912.E.6.5, 6 SC.912.L.14.2, 3, 4, 6, 11, 12, 16, 19, 29,

CTE Standards and Benchmarks	FS-M/LA	NGSS-Sci
		42, 43, 44, 45, 46, 47, 52, 53 SC.912.L.15.15 SC.912.L.16. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 SC.912.L.17.1, 2, 3, 5, 6, 7, 8, 9, 13, 14, 15, 16, 17, 18 SC.912.L.18.5, 7, 8, 9, 11, 12 SC.912.N.2.4, 5 SC.912.N.3.5 SC.912.P.8.9
36.01 Recognize and observe safety and sanitary practices including biosecurity in harvesting and processing aquaculture organisms.		
36.02 Determine harvesting practices recommended for aquaculture organisms.		
36.03 Determine equipment, labor, financial and legal requirements for harvesting aquaculture organisms.		
36.04 Harvest aquaculture organisms using recommended practices.		
36.05 Determine processing and packaging practices recommended for aquaculture organisms.		
36.06 Determine equipment, labor, financial and legal requirements for processing and packaging aquaculture organisms.		
36.07 Process and/or package aquaculture organisms using recommended practices.		
36.08 Compare and contrast methods for shipping aquaculture organisms.		
36.0 Explain the components of the American business system – the student will be able to:		
36.01 Describe the five basic ways American business is organized.		
36.02 Distinguish and identify between the characteristics of each method of doing business.		
36.03 Evaluate the advantages and disadvantages provided by each business method.		
36.04 Evaluate how cooperative principles and practices differentiate cooperatives from other businesses.		
37.0 Investigate agricultural cooperatives structure and function – the student will be able to:		
37.01 Explain the definition of a cooperative.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
37.02 Understand the history of cooperative principles and practices.		
37.03 Describe the five areas that classify cooperative structure.		
37.04 Distinguish and identify between the five types of cooperative structure and their functions.		

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## **Additional Information**

### **Laboratory Activities**

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Career and Technical Student Organization (CTSO)**

FFA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Cooperative Training – OJT**

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

### **Additional Resources**

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>

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