

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	AS	AAS
CIP Number	1101010100	0101010100
Program Type	College Credit	College Credit
Standard Length	60-63 hours	60-63 hours
CTSO	N/A	N/A
SOC Codes (all applicable)	11-9011	11-9011
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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 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.

### **Program Structure**

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

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

The AAS/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 AAS/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.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student’s 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 postsecondary service provider. 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.

## **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 60-63 credit hours according to Rule 6A-14.030, F.A.C.

## **Standards**

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

- 01.0 Obtain & dispose of an agricultural enterprise
- 02.0 Prepare & administer an agricultural oriented plan (manage the crop/livestock plan)
- 03.0 Supervise & manage the operation, maintenance & repair of equipment
- 04.0 Manage facilities and structures
- 05.0 Select sources & methods of financing operation

- 06.0 Interpret & 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, & demonstrate management activities
- 13.0 Demonstrate a basic understanding of legal & 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: 454011 – Forest & 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: 373011 – Landscaping and Groundskeeping Workers
- 15.0 Demonstrate an understanding of the use of communications in an irrigation business environment.
  - 16.0 Demonstrate an understanding of the types of pipe installation common to irrigation systems.
  - 17.0 Demonstrate an understanding of irrigation system components.
  - 18.0 Demonstrate an understanding of basic design principles used in irrigation systems.
  - 19.0 Demonstrate an understanding of basic irrigation system maintenance and operation.
  - 20.0 Demonstrate an understanding of distribution systems used in the irrigation industry.
  - 21.0 Demonstrate an understanding of control systems used in irrigation installation and Repair.
  - 22.0 Demonstrate an understanding of water supply.
  - 23.0 Demonstrate an understanding of sprinkler performance.
  - 24.0 Demonstrate an understanding of site analysis in residential and commercial irrigation systems.
  - 25.0 Demonstrate an understanding of and practice in design principles used in residential and commercial irrigation systems.

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

## **Horticulture Technician**

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

- 15.0 Demonstrate an understanding of plant physiology and growth
- 16.0 Classify plants
- 17.0 Select, operate, and maintain tools and equipment
- 18.0 Fertilize plants
- 19.0 Manage a pest-control program
- 20.0 Prune and shape plants
- 21.0 Maintain landscape plants
- 22.0 Demonstrate employability skills
- 23.0 Determine drainage system needs and design a drainage system
- 24.0 Prune and shape plants
- 25.0 Maintain and analyze records
- 26.0 Prepare growing media and seedbeds
- 27.0 Propagate plants
- 28.0 Grow plants
- 29.0 Harvest, process, and ship plants
- 30.0 Market plants
- 31.0 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

- 15.0 Supervise and manage the operation, maintenance and repair of golf course equipment.
- 16.0 Schedule irrigation and manage the design, installation and maintenance of golf course irrigation systems.
- 17.0 Prescribe, supervise and manage the application of agricultural chemicals for the prevention and control of pests.
- 18.0 Prescribe, supervise and manage the fertilization of the turf and landscape.
- 19.0 Train and supervise employees in grooming and maintaining greens, tees, fairways, roughs and other areas.
- 20.0 Provide a safe environment for workers and patrons.
- 21.0 Keep and analyze maintenance, employee, equipment and inventory records.
- 22.0 Observe local, state and federal laws and regulations.
- 23.0 Demonstrate leadership, communication, public relations, employability and human relations skills.
- 24.0 Demonstrate an understanding of the types of pipe installation common to irrigation system.
- 25.0 Demonstrate an understanding of irrigation system components.
- 26.0 Demonstrate an understanding of basic design principles used in irrigation systems.
- 27.0 Demonstrate an understanding of basic irrigation system maintenance and operation.
- 28.0 Demonstrate an understanding of sprinkler performance.
- 29.0 Demonstrate an understanding of the basic principles of plant growth.
- 30.0 Demonstrate an understanding of the role of plant nutrients and fertilizers.
- 31.0 Demonstrate an understanding of pest management practice.

- 32.0 Demonstrate an understanding of the role of irrigation.
- 33.0 Demonstrate an understanding of the basic safety issues.
- 34.0 Demonstrate an understanding of the drip system components.
- 35.0 Demonstrate an understanding of basic design principles for low volume irrigation systems.
- 36.0 Demonstrate an understanding of procedures involved in installation of low volume irrigation systems.
- 37.0 Demonstrate an understanding of plant physiology and growth.
- 38.0 Classify plants.
- 39.0 Select, operate and maintain tools and equipment.
- 40.0 Fertilize plants.
- 41.0 Manage a pest-control program.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Agribusiness Management  
**CIP Numbers:** 1101010100 AS, 0101010100 AAS  
**Program Length:** 60-63 hours  
**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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Obtain & dispose of an agricultural enterprise - The student will be able to:

- 01.01 Establish & record agribusiness goals
- 01.02 Develop plan for type & size of agricultural enterprise.
- 01.03 Obtain title to real estate
- 01.04 Complete farm rental/lease Agreement
- 01.05 Purchase building insurance
- 01.06 Purchase liability insurance
- 01.07 Transfer agribusiness ownership

02.0 Prepare & 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 & review Soil Conservation Service Practices if applicable.
- 02.05 Contract for custom services.
- 02.06 Develop plan for purchase & 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 & manage the operation, maintenance & repair of equipment - The student will be able to:

- 03.01 Develop budgets for changing the machinery & equipment program.
- 03.02 Prepare inventory of farm machinery & equipment; harvest, fuel, & lubricants.
- 03.03 Obtain machinery & equipment by purchase, rent, lease or trade.
- 03.04 Develop plan for machinery & 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 & methods of financing operation - The student will be able to:
- 05.01 Analyze major sources of agricultural production credit.
  - 05.02 Analyze & select sources of credit for capital items & real estate.
  - 05.03 Prepare a case using accepted forms for obtaining credit from an agricultural lending institution.
  - 05.04 Analyze contracts, leases & other legal documents
  - 05.05 Analyze & 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 & 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 & registrations.
  - 06.03 Maintain a file of current rules & regulations relative to operation.
  - 06.04 List reasons for the necessity of inspections, certification & 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 & bank reconciliation.
  - 07.08 Interpret financial statements.
  - 07.09 Demonstrate knowledge of the accounting cycle.
  - 07.10 Demonstrate knowledge of budget principles & interpret budgets.
  - 07.11 Demonstrate accounting operations on a computer.
  - 07.12 Calculate & 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 & record capital gains & 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 & losses schedule, Investment credit schedule, 1040 schedule.
- 08.0 Perform communication activities - The student will be able to:
- 08.01 Demonstrate effective telephone usage & courtesy.



- 08.02 Demonstrate effective listening skills.
  - 08.03 Give, follow, & Interpret oral & written communication.
  - 08.04 Demonstrate knowledge of e-mail etiquette & ethics.
  - 08.05 Compose business correspondence & related documents & 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 & other visual media.
  - 08.09 Research & interpret information retrieved from print & electronic resources.
  - 08.10 Annotate letters, reports, & news articles.
  - 08.11 Proofread & edit documents.
  - 08.12 Research & 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 & 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 & demonstrate the unique human relations skills needed for success in the business sector.
  - 09.06 Recognize different personality styles & how to interact effectively with them in the workplace.
  - 09.07 Differentiate between an acceptable & unacceptable code of ethical conduct in business.
  - 09.08 Discuss how values & attitudes influence behavior
  - 09.09 Explain how understanding of self-concept & 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 & grooming habits.
  - 10.02 Identify sources of employment opportunities.
  - 10.03 Identify appropriate attire & grooming for a business office.
  - 10.04 Identify documents that may be required when applying for a job.
  - 10.05 Complete a resume & 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 & demonstrate appropriate responses to feedback from supervisors.
  - 10.12 Identify & 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 & lead an effective meeting.
- 11.02 Define effective leadership.
- 11.03 Identify & explain key leadership behaviors.
- 11.04 Compare different styles of leadership.
- 11.05 Relate leadership to other management & communication skills.
- 11.06 Examine ways effective leaders develop, coach, and motivate.
- 11.07 Define organization vision & mission
- 11.08 Identify characteristics of effective goals.
- 11.09 Describe personal leadership style.
- 11.10 Explain how effective leaders identify problems & 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 & 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, & hiring and firing.
- 12.04 Demonstrate knowledge of the relationship between authority & responsibility to task accomplishment.
- 12.05 Select the most effective communication systems.
- 12.06 Identify problems & make appropriate decisions.
- 12.07 Demonstrate understanding of organizational culture & its impact on communication.
- 12.08 Identify & discuss current management issues in business & other organizations.
- 12.09 Describe activities associated with the management functions of planning, organizing, staffing, leading and controlling.
- 12.10 Manage & Supervise Labor
- 12.11 Develop labor supply plan.
- 12.12 Hire and Dismiss employees.
- 12.13 Establish & 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 & 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 & 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 & e-mail communication.
- 14.03 Perform research using the internet and intranet.

### **Forest Operations**

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 southeast 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 south-eastern 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.

### **Irrigation Technology**

- 15.0 Demonstrate an understanding of the use of communications in an irrigation business environment - the student will be able to:
- 15.01 Explain the communications patterns used in the irrigation industry, including connected network and chain of command.
  - 15.02 Define common irrigation vocabulary terms.
  - 15.03 Locate specific engineering information from print and on-line sources.
- 16.0 Demonstrate an understanding of the types of pipe installation common to irrigation systems - the student will be able to:
- 16.01 List the different types and schedules of available polyvinyl chloride (PVC) pipes.
  - 16.02 Describe the different types of available fittings including solvent weld, o-rings, and mechanical joint (MJ) joints.
  - 16.03 Describe the basic chemical reactions that occur in the manufacture of PVC pipe.
  - 16.04 Explain the process of connecting PVC pipe by using solvent weld chemicals.
  - 16.05 Explain the process of connecting o-ring pipe by using push-on fittings.
- 17.0 Demonstrate an understanding of irrigation system components – the student will be able to:
- 17.01 Identify various irrigation system types such as rotors, sprays, and drip.
  - 17.02 Explain the process of time clock selection.
  - 17.03 Explain the process of valve selection.
  - 17.04 Explain the process of sprinkler head selection.
  - 17.05 Explain the process of low-voltage wire selection.
- 18.0 Demonstrate an understanding of basic design principles used in irrigation systems - the student will be able to:
- 18.01 Calculate the static or working water pressure at a given point in the system.
  - 18.02 Determine the velocity for certain type and size pipe at a given flow.
  - 18.03 Select appropriate sprinkler heads for specific applications.

- 18.04 Group irrigation heads to form irrigation zones complying with proper design criteria.
  - 18.05 Calculate specific friction loss through piping.
  - 18.06 Compute the precipitation rate for various sprinkler types and spacing patterns.
- 19.0 Demonstrate an understanding of basic irrigation system maintenance and operation - the student will be able to:
- 19.01 Determine the watering time needed per week per station.
  - 19.02 Develop a water schedule based on proper design principles.
  - 19.03 Read and explain an as-built drawing.
  - 19.04 Explain the process of Remove and Install sprinkler heads.
  - 19.05 Describe introductory the process of automatic control valve Repair.
  - 19.06 Describe the process of automatic controller Repair.
  - 19.07 Diagnose and correcting wiring problems.
- 20.0 Demonstrate an understanding of distribution systems used in the irrigation industry - the student will be able to:
- 20.01 Diagnose low and high pressure conditions that result from damaged piping, faulty installation, and clogged piping.
  - 20.02 Repair zone lines using solvent weld fittings.
  - 20.03 Repair main lines using mechanical joint MJ couplings.
- 21.0 Demonstrate an understanding of control systems used in irrigation installation and repair - the student will be able to:
- 21.01 Develop watering schedules and setting control timers.
  - 21.02 Diagnose control system using test meters and wire tracking equipment.
  - 21.03 Isolate problems into one of three areas for Repair: control timer, field wiring, and control valve.
  - 21.04 Repair or replacing an automatic control timer.
  - 21.05 Repair/splicing field wiring.
  - 21.06 Repair/replacing faulty parts on the irrigation control valve.
- 22.0 Demonstrate an understanding of water supply - the student will be able to:
- 22.01 Diagnose problems of water supply interruption.
  - 22.02 Diagnose problems with water quality.
  - 22.03 Repair or adjusting pump control systems.
  - 22.04 Repair adjusting backflow prevention devices.
  - 22.05 Clean filter media or screens.
- 23.0 Demonstrate an understanding of sprinkler performance - the student will be able to:
- 23.01 Diagnose sprinkler distribution problems.
  - 23.02 Measure and analyze precipitation rates.
  - 23.03 Remove, clean, and reinstall heads.
  - 23.04 Repair and adjust heads.
  - 23.05 Adjust sprinkler head spacing if required.

- 24.0 Demonstrate an understanding of site analysis in residential and commercial irrigation systems - the student will be able to:
- 24.01 Complete an accurate site drawing.
  - 24.02 Determine the watering requirements in view of the site plan.
  - 24.03 Identify unique site conditions that might affect installation.
  - 24.04 Identify the appropriate water source.
- 25.0 Demonstrate an understanding of and practice in design principles used in residential and commercial irrigation systems - the student will be able to:
- 25.01 Lay out heads on a print utilizing graphic symbol.
  - 25.02 Select/sizing control valve.
  - 25.03 Select/sizing zone lines.
  - 25.04 Select/sizing main line.
- 26.0 Demonstrate an understanding of job preparation necessary in residential and commercial irrigation systems - the student will be able to:
- 26.01 List the different types of underground utilities and how to locate them.
  - 26.02 Prepare a list of materials necessary to install the class designed irrigation system.
  - 26.03 Identify the tools and equipment needed to install the class designed irrigation system.
- 27.0 Demonstrate an understanding of installation techniques used in residential and commercial irrigation systems - the student will be able to:
- 27.01 Use a walk behind trencher to excavate trenches.
  - 27.02 Hand digs a trench.
  - 27.03 Backfill and compact a trench.
  - 27.04 Measure, cut, clean, prime, and glue solvent weld PVC pipe.
  - 27.05 Cut and Install o-ring pipe and fittings.
  - 27.06 Install spray heads and/or rotor heads.
  - 27.07 Install control valves.
  - 27.08 Install nozzles, adjusting flow rates, and setting pattern.
  - 27.09 Identify and Install low voltage direct burial wire.
  - 27.10 Produce an "as-built" drawing.
- 28.0 Demonstrate an understanding of how to obtain site information necessary in the residential irrigation system design process - the student will be able to:
- 28.01 Develop an accurate plot plan or site drawing.
  - 28.02 Determine the type of landscaping and water requirement for a specific site.
  - 28.03 Identify environmental traits such as soil type and weather for a specific site.
  - 28.04 Identify unique site conditions that might affect design or installation.
  - 28.05 Identify possible water sources and Select appropriate source.
- 29.0 Demonstrate an understanding of selection and safe use of equipment for residential irrigation system installation - the student will be able to:



- 29.01 Select appropriate sprinkler heads for each area.
- 29.02 Lay out heads on print utilizing graphic symbols in an irrigation design.
- 29.03 Group irrigation heads to form irrigation zones.
  
- 30.0 Demonstrate an understanding of how to select pipe sizes and valves appropriate for specific residential irrigation system installations - the student will be able to:
  - 30.01 Determine the water volume and pressure available from the water supply.
  - 30.02 Select and sizing a control valve for each zone.
  - 30.03 Select and sizing pipe main line.
  - 30.04 Select and sizing pipe for zone lines.
  
- 31.0 Demonstrate an understanding of microcomputer applications used to design residential irrigation systems - the student will be able to:
  - 31.01 Enter the elements of a site plan into the computer.
  - 31.02 Use a scanner to enter a site plan into a microcomputer application.
  - 31.03 Lay out heads using a microcomputer application.
  - 31.04 Use a microcomputer application to group heads together to form irrigation zones.
  - 31.05 Use a microcomputer application to select pipe size.
  
- 32.0 Demonstrate an understanding of the role of “the green industry” - the student will be able to:
  - 32.01 Describe the importance of the “green industry” to local, state, and national economies.
  - 32.02 Explain the importance and impact of local, state and federal regulations.
  - 32.03 Describe the relationship of the “green industry” to the environment.
  
- 33.0 Demonstrate an understanding of the principles of plant growth - the student will be able to:
  - 33.01 Describe the functions of plant parts including roots, stems, leaves, flowers and fruits.
  - 33.02 Describe the processes of plant growth including photosynthesis, respiration, nutrient uptake and respiration.
  - 33.03 Describe the growth characteristics, and use of subtropical and tropical landscape plants.
  - 33.04 Identify various landscape designs, natural systems and the plants associated with them.
  - 33.05 Describe the process of effective establishment of plants in the landscape.
  - 33.06 Describe the influences of the environment on the landscape including pollutants.
  
- 34.0 The student will demonstrate an understanding of the role of plant nutrients and fertilizers - the student will be able to:
  - 34.01 Identify the nutrients required for plant growth and the role of each.
  - 34.02 Identify the types and kinds of fertilizers.
  - 34.03 Read and interpreting fertilizer labels.
  - 34.04 Describe the application of various fertilizer formulations.

- 34.05 Identify symptoms of nutritional deficiencies and toxicities of plants.
- 35.0 The student will demonstrate an understanding of pest management practices - the student will be able to:
- 35.01 Describe the principles and benefits of integrated pest management.
  - 35.02 Explain the nature of physical and chemical damage to plants.
  - 35.03 Describe the selection process involved in the use of horticultural chemicals for arthropod pest control and subsequent implications of their usage.
  - 35.04 Explain the role of efficient irrigation in pest control.
  - 35.05 Explain the role of plant health in pest control.
- 36.0 Demonstrate an understanding of the role of irrigation - the student will be able to:
- 36.01 List the components of Florida's fresh water systems.
  - 36.02 Explain evaporation transpiration rate.
  - 36.03 Explain hydro zoning/precipitation rate.
  - 36.04 Identify the water needs of plants.
  - 36.05 Explain the role of mulches in the landscape.
  - 36.06 Describe soil moisture retention and movement for various soil types.
- 37.0 Demonstrate an understanding of the role of soil science - the student will be able to:
- 37.01 Identify soil types and textures.
  - 37.02 Explain the role of soil pH and soluble salts on plant growth.
  - 37.03 Explain the physical properties of fill soil.
  - 37.04 Explain the role of soil type as it affects water retention.
  - 37.05 Interpret soil test information.
  - 37.06 Read and understanding soil survey maps.
- 38.0 Demonstrate an understanding of plants used in urban and suburban landscapes - the student will be able to:
- 38.01 Describe the process of binomial nomenclature.
  - 38.02 Describe the use of bedding plants and other herbaceous perennials.
  - 38.03 Describe the use of ground covers, shrubs, trees, and vines including angiosperms and gymnosperms.
  - 38.04 Describe the use of palms, grasses, and other monocots.
- 39.0 Demonstrate an understanding of the basic safety issues involved in the "green industry" - the student will be able to:
- 39.01 List the most common causes of accidents in the "green industry."
  - 39.02 Discuss the importance of following proper safety precautions.
  - 39.03 Describe the symptoms of pesticide poisoning.
  - 39.04 Extract pertinent information from material safety data sheets.
- 40.0 Demonstrate an understanding of the water cycle - the student will be able to:
- 40.01 Describe the role of precipitation.
  - 40.02 Explain the effects of evaporation and transpiration.

- 40.03 Describe the effects of runoff on water supply and quality.
- 40.04 Explain the process of ground water infiltration.
- 40.05 Describe how different ecosystems affect the water supply.
- 41.0 Demonstrate an understanding of the uses of water resources - the student will be able to:
  - 41.01 List the uses and quantity of water used on a global scale.
  - 41.02 List the uses and quantity of water used in the United States.
  - 41.03 List the uses and quantity of water used in Florida.
- 42.0 Demonstrate an understanding of water resource policies in Florida - the student will be able to:
  - 42.01 Explain the role that planning agencies have on water supply and quality.
  - 42.02 Explain the effect the current legislation has on water supply and quality.
  - 42.03 List the pending legislation that may affect the water supply and quality.
- 43.0 Demonstrate an understanding of surface water supplies - the student will be able to:
  - 43.01 Explain the role of rivers, lakes and reservoirs.
  - 43.02 Explain the importance of flood damage reduction planning.
  - 43.03 Explain the issues involved in ensuring that surface water supplies are properly managed.
- 44.0 Demonstrate an understanding of groundwater supplies - the student will be able to:
  - 44.01 Describe groundwater's role as a water source.
  - 44.02 Describe the effect of pollutants on groundwater.
  - 44.03 Describe the role of the aquifer and the regional aquifer characteristics.
  - 44.04 Describe the effect that water pumped from the ground has on the water table.
- 45.0 Demonstrate an understanding of drip system components - the student will be able to:
  - 45.01 Identify the various types of water emitters.
  - 45.02 Identify and explain the use of drip lateral materials.
  - 45.03 Identify and explain the use of pressure regulators.
  - 45.04 Identify and explain the use of valves including flush valves, control valves and air vents.
- 46.0 Demonstrate an understanding of the characteristics of water emission devices - the student will be able to:
  - 46.01 Identify and explain the operation of orifice emitters.
  - 46.02 Identify and explain the operation of laminar flow emitters.
  - 46.03 Identify and explain the operation of turbulent flow emitters.
  - 46.04 Identify and explain the operation of vortex emitters.
  - 46.05 Identify and explain the operation of pressure compensating emitters.
  - 46.06 Explain emission uniformity and quality.

- 47.0 Demonstrate an understanding of basic design principles for low volume irrigation systems - the student will be able to:
  - 47.01 Analyze the irrigation site and gathering appropriate site data.
  - 47.02 Identify point or line source area.
  - 47.03 Determine the appropriate irrigation method for each area.
  - 47.04 Determine the number of water emitters required per plant per area.
  - 47.05 Adapt irrigation requirements to available water supply.
  
- 48.0 Demonstrate an understanding of procedures involved in installation of low volume irrigation systems - the student will be able to:
  - 48.01 Connect the main water line to a point of connection.
  - 48.02 Run lateral lines.
  - 48.03 Run distribution tubing.
  - 48.04 Install emitters.
  - 48.05 Develop an irrigation schedule.
  
- 49.0 Demonstrate an understanding of irrigation system computer software currently used in industry - the student will be able to:
  - 49.01 Participate seminars presented by industry professionals.
  - 49.02 Identify the basic concepts of computerized control systems.
  
- 50.0 Demonstrate an understanding of materials selection and costing needed for sales presentations - the student will be able to:
  - 50.01 Research materials costs for an irrigation project.
  - 50.02 Visit wholesale supply houses.
  
- 51.0 Develop an understanding of the breadth of the irrigation industry -the student will be able to:
  - 51.01 Describe an irrigation company.
  - 51.02 Describe o an irrigation supply wholesale business.
  - 51.03 Describe the use of irrigation in a greenhouse.
  - 51.04 Describe the use of irrigation in a golf course.
  - 51.05 Describe the use of irrigation in a park.
  - 51.06 Describe the use of irrigation in a commercial irrigation installation.
  - 51.07 Describe the use of irrigation in a residential irrigation installation.
  
- 52.0 Demonstrate an understanding of irrigation water requirements - the student will be able to:
  - 52.01 Explain common system components and their effective water use.
  - 52.02 Explain basic concepts such as application rates, sprinkler spacing, and distribution uniformity.
  - 52.03 Explain matched precipitation rates.
  - 52.04 List the different types of soils and their infiltration rates.

- 53.0 Demonstrate an understanding of economic analysis as applied to irrigation investment decisions - the student will be able to:
- 53.01 Describe the procedure for determining equipment and installation cost.
  - 53.02 Explain the process of computing ownership costs.
  - 53.03 Explain the process of determining total system cost.
- 54.0 Demonstrate an understanding of methods of develop overall operating and maintenance procedures - the student will be able to:
- 54.01 Develop an efficient site watering schedule.
  - 54.02 Obtain product maintenance information.
  - 54.03 Explain how to develop an "as-built" drawing.
- 55.0 Demonstrate an understanding of analysis of irrigation systems - the student will be able to:
- 55.01 List the different levels of evaluation.
  - 55.02 Describe and performing a visual inspection of an irrigation system.
  - 55.03 Describe and performing a flow inspection.
  - 55.04 Describe and performing a catch can test.
- 56.0 Demonstrate an understanding of how to obtain site information necessary in the commercial irrigation system design process - the student will be able to:
- 56.01 Develop an accurate site drawing.
  - 56.02 Determine the type of landscaping and water requirement for a specific site.
  - 56.03 Identify environmental traits such as soil type and weather for a specific site.
  - 56.04 Identify unique site conditions that might affect design or installation.
  - 56.05 Identify possible water sources and Select appropriate source.
- 57.0 Demonstrate an understanding of selection and safe use of equipment for a commercial irrigation system installation - the student will be able to:
- 57.01 Select appropriate sprinkler heads for each area.
  - 57.02 Lay out heads on print utilizing graphic symbols in an irrigation design.
  - 57.03 Group irrigation heads to form irrigation zones.
- 58.0 Demonstrate an understanding of how to select pipe sizes and valves appropriate for specific commercial irrigation system installations - the student will be able to:
- 58.01 Determine the water volume and pressure available from the water supply.
  - 58.02 Select and sizing a control valve for each zone.
  - 58.03 Select and sizing pipe main line.
  - 58.04 Select and sizing pipe for zone lines.
- 59.0 Demonstrate an understanding of writing irrigation specifications - the student will be able to:
- 59.01 Review manufacturing and engineering data sheets and downloading from web sites detailed drawings in preparation for an irrigation project.

59.02 Conform to the Florida Irrigation Society Guidelines for landscape irrigation systems.

59.03 Write specifications for a commercial irrigation project.

60.0 Demonstrate an understanding of advanced hydraulic and head layout concepts - the student will be able to:

60.01 Describe the factors that Determine system flow requirements.

60.02 Explain the concepts of uniformity and efficiency.

60.03 Explain the concepts of uniformity indicators.

60.04 Demonstrate the ability to read sprinkler profiles.

60.05 Demonstrate the ability to read sprinkler dens grams.

### **Horticulture Technician**

15.0 Demonstrate an understanding of plant physiology and growth— The student will be able to:

15.01 Describe the process of photosynthesis.

15.02 Identify and describe the functions of all parts of the plant.

15.03 Describe an asexual reproduction process.

15.04 Explain the differences between angiosperms and gymnosperms.

15.05 Identify the differences between woody and herbaceous plants.

16.0 Classify plants--The student will be able to:

16.01 Identify and group shade and flowering trees.

16.02 Identify and group fruit trees and plants.

16.03 Identify and group annuals, vegetables, and herbs.

16.04 Identify and group woody ornamentals, vines, and ground covers.

16.05 Identify and group tropical foliage plants.

16.06 Identify and group turf and ornamental grasses.

17.0 Select, operate, and maintain tools and equipment – The student will be able to:

17.01 Select and operate equipment for the job.

17.02 Maintain an inventory of parts and supplies.

18.0 Fertilize plants--The student will be able to:

18.01 Evaluate influences of nutrients on plant growth.

18.02 Apply fertilizers, using appropriate methods (dry, liquid, slow-release, injection, etc.).

18.03 Demonstrate proper handling and storage of fertilizers, observing safety precautions.

19.0 Manage a pest-control program--The student will be able to:

19.01 Develop an integrated pest management program or schedule.

19.02 Train employees in the safe use of pesticides.

19.03 Obtain a pesticide license.

- 20.0 Prune and shape plants--The student will be able to:
  - 20.01 Train employees in pruning techniques.
  - 20.02 Identify and use tools for pruning.
  - 20.03 Prune plants to achieve desired growth.
  - 20.04 Demonstrate sanitation and safety practices when pruning.
  
- 21.0 Maintain landscape plants – The student will be able to:
  - 21.01 Determine water requirements and apply at proper rates.
  - 21.02 Identify weeds and apply herbicides safely.
  - 21.03 Determine fertilization requirements and apply at proper rates.
  - 21.04 Regulate growth of landscape plants through chemical or mechanical means.
  - 21.05 Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).
  - 21.06 Identify plant pest problems and apply corrective measures.
  - 21.07 Cultivate and mulch plants.
  - 21.08 Brace and repair trees.
  
- 22.0 Demonstrate employability skills--The student will be able to:
  - 22.01 Conduct a job search.
  - 22.02 Secure information about a job.
  - 22.03 Identify documents that may be required when applying for a job.
  - 22.04 Complete a job application form.
  - 22.05 Demonstrate competency in job interview techniques.
  - 22.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
  - 22.07 Identify acceptable work habits.
  - 22.08 Demonstrate knowledge of how to make job changes.
  - 22.09 Demonstrate acceptable employee health habits.
  
- 23.0 Determine drainage system needs and design a drainage system --The student will be able to:
  - 23.01 Determine the texture and percolation characteristics of the soil.
  
- 24.0 Prune and shape plants--The student will be able to:
  - 24.01 Develop a pruning program and time schedule.
  - 24.02 Select and use chemical growth regulators.
  - 24.03 Root and prune ornamental plants and trees.
  
- 25.0 Maintain and analyze records – The student will be able to:
  - 25.01 Maintain fertilizer and pesticide application records.
  - 25.02 Use computers in the landscape and horticulture operations.
  
- 26.0 Prepare growing media and seedbeds – The student will be able to:

- 26.01 Identify media materials.
- 26.02 Mix rooting and growing media according to plant requirements.
- 26.03 Sterilize rooting, potting, and growing media.
- 26.04 Collect and test a soil sample from field and potting media.
- 26.05 Adjust pH and nutritional levels of media.
- 26.06 Prepare planting beds and sites.
- 26.07 Fill and level benches and pots with media.
- 26.08 Demonstrate sanitation practices when handling and storing plant media materials.

27.0 Propagate plants – The student will be able to:

- 27.01 Collect propagation materials at proper time (seeds, cuttings, scions, bulbs, etc.).
- 27.02 Demonstrate propagation by grafting, budding, layering, separating, dividing, cutting, and tissue culturing.
- 27.03 Prepare flats and a seedbed and plant seeds.
- 27.04 Prepare a rooting bed.
- 27.05 Prepare propagation materials (seeds, cuttings, scions, etc.)
- 27.06 Apply growth stimulants to propagation materials.
- 27.07 Transplant rooted propagation materials including tissue Culture transplants.
- 27.08 Demonstrate sanitation and safety practices when propagating.

28.0 Grow plants – The student will be able to:

- 28.01 Prepare media for containers.
- 28.02 Prepare field site for transplants.
- 28.03 Select plant containers.
- 28.04 Determine plant spacing in the field and on container beds.
- 28.05 Transplant propagated materials to various containers and to the field.
- 28.06 Determine and provide light requirements of various plant types.

29.0 Harvest, process, and ship plants – The student will be able to:

- 29.01 Grade and harvest field-grown plants (ball, burlap, bare-root, “grow-bags”).
- 29.02 Select, grade, and assemble container-grown plants.
- 29.03 Prepare for shipment, loading, and transporting harvested plant materials.

30.0 Market plants – The student will be able to:

- 30.01 Identify, inventory, and label marketable plants.

31.0 Design, install, and maintain nursery irrigation systems – The student will be able to:

- 31.01 Determine irrigation requirements.
- 31.02 Assess quality of irrigation water.
- 31.03 Operate and service various types of irrigation systems.

## **Golf Course Technician**

15.0 Supervise and manage the operation, maintenance and repair of golf course equipment



- 15.01 Define the role of the golf course equipment mechanic in relation to the organization.
  - 15.02 Determine the essential power, shop and hand tools required in a golf course mechanics shop.
  - 15.03 Design a shop layout.
  - 15.04 Compile a list of equipment required in the operation of an 18 hole golf course.
  - 15.05 Demonstrate knowledge and use of golf course equipment.
  - 15.06 Develop and supervise a system of preventive maintenance.
  - 15.07 Sharpen and grind blades and cutting surfaces on all mowing equipment.
  - 15.08 Monitor and record the use of fuel, lubricants and consumable shop supplies.
  - 15.09 Maintain a safe clean shop.
  - 15.10 Maintain current catalogs for supplies and equipment.
  - 15.11 Maintain tires and tire pressure on golf course equipment.
  - 15.12 Train and supervise employees in the safe use of tools and equipment.
- 16.0 Schedule irrigation and manage the design, installation and maintenance of golf course irrigation systems – The student will be able to:
- 16.01 Determine water requirements for a particular turf.
  - 16.02 Illustrate the design, computations, pumping capacity and pipe sizing needed to irrigate a given operation.
  - 16.03 Schedule irrigation as required.
  - 16.04 Store and handle chemicals safely.
  - 16.05 Recognize symptoms of agricultural chemical poisoning and apply first aid.
  - 16.06 Dispose of chemical containers.
  - 16.07 Read and interpret safety precautions provided on equipment and pesticide containers.
- 17.0 Prescribe, supervise and manage the application of agricultural chemicals for the prevention and control of pests – The student will be able to:
- 17.01 Instruct employees in the safe use of agricultural chemicals.
  - 17.02 Prepare proper proportions of chemicals and carrying agents.
  - 17.03 Compute amounts of active ingredients of chemicals to be used.
  - 17.04 Calibrate volume, pressure and output of equipment.
  - 17.05 Weigh and measure chemicals.
  - 17.06 Adjust height and width of equipment to achieve desired spray pattern.
  - 17.07 Recognize symptoms of pesticide damage.
  - 17.08 Identify fungi and bacteria.
  - 17.09 Recognize symptoms of insects and nematodes.
  - 17.10 Identify common insects, weeds, diseases and other pests common to golf courses.
  - 17.11 Clean and store sprayers.
- 18.0 Prescribe, supervise and manage the fertilization of the turf and landscape – The student will be able to:
- 18.01 Take soil and leaf samples for chemical analysis.
  - 18.02 Adjust pH level of soil.
  - 18.03 Interpret soil and tissue chemical analysis results.
  - 18.04 Apply fertilizer in liquid form.

- 18.05 Interpret labels on fertilizer containers.
  - 18.06 Apply dry fertilizers.
  - 18.07 Identify nutrient deficiency symptoms in turf and landscape plants.
  - 18.08 Determine kind and type of fertilizer to apply to a given area.
  - 18.09 Determine the nutrient requirements of various plants.
  - 18.10 Determine amount of fertilizer to apply to a given area.
  - 18.11 Analyze cost of various formulations and methods of application.
  - 18.12 Recognize fertilizer injury to plant materials.
- 19.0 Train and supervise employees in grooming and maintaining greens, tees, fairways, roughs and other areas – The student will be able to:
- 19.01 Supervise the mowing of greens, collars, roughs, aprons, and fairways.
  - 19.02 Determine the placement and location of cups and tees.
  - 19.03 Supervise the repair of divots.
  - 19.04 Determine conditions necessary for verticuting and aerifying turf.
  - 19.05 Supervise the care and maintenance of sand traps.
  - 19.06 Prune trees and shrubs.
  - 19.07 Develop maintenance schedule for grooming golf courses.
  - 19.08 Train and supervise employees in the care of golf courses.
  - 19.09 Follow written and verbal instructions.
- 20.0 Provide a safe environment for workers and patrons – The student will be able to:
- 20.01 Provide instruction for the safe use of chemicals, tools and equipment.
  - 20.02 Inspect tools and equipment for safe operation.
  - 20.03 Apply emergency first aid.
  - 20.04 Monitor employees work habits.
  - 20.05 Maintain safety awareness.
- 21.0 Keep and analyze maintenance, employee, equipment and inventory records – The student will be able to:
- 21.01 Maintain equipment use and maintenance records.
  - 21.02 Maintain pesticide use information.
  - 21.03 Keep inventory records.
  - 21.04 Prepare a written report or summary based on records.
  - 21.05 Observe and make recommendations based on records.
  - 21.06 Evaluate employees, equipment and practices based on records.
- 22.0 Observe local, state and federal laws and regulations – The student will be able to:
- 22.01 Observe OSHA rules and regulations.
  - 22.02 Observe EPA rules and regulations.
  - 22.03 Maintain a list of agencies responsible for regulating the industry.
- 23.0 Demonstrate leadership, communication, public relations, employability and human relations skills. – The student will be able to:
- 23.01 Conduct a job search.
  - 23.02 Secure information about a job.

- 23.03 Identify documents that may be required when applying for a job.
- 23.04 Complete a job application form correctly.
- 23.05 Demonstrate competence in job interview techniques.
- 23.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
- 23.07 Demonstrate acceptable employee health habits.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	AS	AAS
CIP Number	1101029901	0101029901
Program Type	College Credit	College Credit
Standard Length	67 credit hours	67 credit hours
CTSO	N/A	N/A
SOC Codes (all applicable)	49-3053	49-3053
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fl DOE.org/workforce/perkins/perkins_resources.asp">http://www.fl DOE.org/workforce/perkins/perkins_resources.asp</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 turf equipment sector within 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.

### Program Structure

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

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these

occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The Professional Turf Equipment Service Technology 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 as identified on the secondary student's 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 postsecondary service provider. 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.

### **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 67 credit hours according to Rule 6A-14.030, F.A.C.

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

### **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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Turf Equipment Technology  
**CIP Numbers:** 0101029902 AS, 0101029903 AAS  
**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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. 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.
  - 05.07 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.
  
- 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.
- 19.05 Communicate in basic Spanish.

2011 - 2012

**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	0101029902	A020608
CIP Number	0101029902	0101029903
Grade Level	Applied Technology Diploma (ATD)	Applied Technology Diploma (ATD)
Standard Length	38 credit hours	1140 Clock Hours
CTSO	N/A	N/A
SOC Codes (all applicable)	49-3053	49-3053
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Basic Skills Level	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 turf equipment sector within 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.

### **Program Structure**

This program is an Applied Technology Diploma program that is part of a technical degree program, is less than 60 credit hours, and leads to employment in a specific occupation. An applied technology diploma program may consist of either technical credit or college credit. A

public school district may offer an applied technology diploma 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	

### **Community College**

When offered at the community college level, this ATD program is part of the Turf Equipment Management AS/AAS program (1101029901AS, 0101029901 AAS) and has a program length of 38 credits.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Either a community college or school district may offer the Applied Technology Diploma program as college credit or vocational credit (vocational technical Center may offer only as vocational credit). Students completing an ATD at a vocational technical center will be awarded the guarantee college credit upon enrollment to the community college.

Minimum entrance requirements for this program include a high school diploma or GED. Students must meet the minimum basic skills levels to complete the program.

Faculty teaching this program must have a minimum of an AS degree in the discipline area or meet the "exceptional cases" criteria as established by the Southern Association for Colleges and Schools.

No fees will be charged for the transfer of credit from a vocational technical center to a community college. The established statewide fee structure will be adhered to by both delivery systems.

The Professional Turf Equipment Service Technology Association (T.E.S.T.A.) is the recommended professional organization and participation should be encouraged.

## **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. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

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 pursuant to Section 1008.29, F.S.; 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.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

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(s)/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). For further information, see Rule 6A-6.0312, F.A.C., Course Modifications for Exceptional Students, and the latest pertinent Technical Assistance Paper (<http://www.fldoe.org/ese/tap-home.asp>).

## **Articulation**

The information related to the guaranteed transfer of credit between an applied technology diploma program and AS/AAS degree must be documented and maintained by the Articulation Coordinating Committee (ACC). The transfer of the applied technology diploma to an AS/AAS degree is guaranteed for a period of three (3) years following the date of the award of the applied technology diploma.

## **Program Length**

In accordance with Rule 6A-10.024, F.A.C. an Applied Technology Diploma program consists of a course of study that is part of an AS/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 applied technology diploma 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 applied technology diploma 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 Applied Technology Diploma.

Community Colleges may offer either college or career credit toward the applied technology diploma. A Career Center in a public school district may offer an applied technology diploma 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.

## **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.



2011 - 2012

**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.

**PSAV Course Number: SER0004**  
**Occupational Completion Point: A**  
**Outdoor Power Equipment and Other Small Engine Mechanics 1 – 435 Hours – SOC Code 49-3053**

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.

**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.

**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 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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Turf Equipment Technology  
**ATD CIP Number:** 0101029902  
**SOC Code(s):** 49-3053

When this program is offered by a community or state college, 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:
- 01.09 Evaluate horsepower and torque.
  - 01.10 Disassemble and reassemble a two-cycle and four-cycle engine.
  - 01.11 Identify crankcase and cylinder assembly.
  - 01.12 Identify and be able to assemble valves, piston assembly, crankshaft, cooling system, and air filters.
  - 01.13 Identify and assemble parts of the carburetor assembly.
  - 01.14 Identify and assemble the ignition system, governor, alternator, and starter system.
  - 01.15 Identify types of batteries.
  - 01.16 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:
- 02.07 Identify turf equipment electrical systems.
  - 02.08 Service hydraulic systems on a variety of turf equipment.
  - 02.09 Service turf equipment power train systems.
  - 02.10 Identify and service various lubricating systems and understand types of fuels and lubricants.
  - 02.11 Operate and repair the various mechanical and hydraulic controls on turf equipment.
  - 02.12 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:
- 03.08 Repair and sharpen various types of reel mowers.
  - 03.09 Grind reel bedknives with various bedknife grinders.
  - 03.10 Lap reel mower blades.
  - 03.11 Follow safety procedures when using reel and bedknife grinders.
  - 03.12 Adjust reel mowers to produce proper cutting heights.
  - 03.13 Sharpen and balance rotary mower blades.
  - 03.14 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:

- 04.08 Control pollution
  - 04.09 Protect water quality
  - 04.10 Demonstrate fire prevention methods
  - 04.11 Identify and prevent health hazards and demonstrate proper first aid
  - 04.12 Identify and manage hazardous waste on the golf course
  - 04.13 Manage fertilizer storage demonstrating proper handling techniques
  - 04.14 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:
- 05.08 Follow basic OSHA safety regulations and shop fire prevention techniques.
  - 05.09 Perform basic first aid procedures.
  - 05.10 Establish a file system for shop records.
  - 05.11 Identify and use shop hand tools and equipment that relate to turf equipment maintenance.
  - 05.12 Select the appropriate fasteners, bearings, seals, belts, chains, fuels, and lubricants for various turf equipment.
  - 05.13 Establish and maintain appropriate shop space for specific shop tasks.
  - 05.14 Establish an appropriate equipment inventory system.
- 12.0 Order and stock parts and keep shop records--The student will be able to:
- 12.01 Use the various equipment manuals to identify parts and service procedures.
  - 12.02 Order parts properly.
  - 12.03 Establish a system for stocking appropriate turf equipment parts.
  - 12.04 Gather the appropriate forms for establishing a recordkeeping system.
  - 12.05 Maintain computer-based inventory and record-keeping system.
- 13.0 Perform basic welding tasks using both gas and arc welding techniques--The student will be able to:
- 13.01 Follow welding symbols, and safety practices.
  - 13.02 Connect and operate oxy-acetylene welding equipment.
  - 13.03 Run beads and weld various types of joints.
  - 13.04 Braze and solder metal.
  - 13.05 Cut metal with and oxy-acetylene torch.
  - 13.06 Select appropriate welding rods.
  - 13.07 Set up an electrical arc welding machine.
  - 13.08 Arc weld various types of joints.
- 14.0 Identify and safely operate turf care equipment--The student will be able to:
- 14.01 Identify the appropriate use for commonly used turf care equipment.
  - 14.02 Identify the operation safety procedures for commonly used turf equipment.
  - 14.03 Operate properly all commonly used turf care equipment.
- 15.0 Demonstrate employability skills--The student will be able to:
- 15.01 Conduct a job search.

- 15.02 Secure information about a job.
  - 15.03 Identify documents which may be required when applying for a job interview.
  - 15.04 Complete a job application correctly.
  - 15.05 Demonstrate competence in a job interview.
  - 15.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
  - 15.07 Identify acceptable work habits.
  - 15.08 Demonstrate knowledge or how to make job changes appropriately.
  - 15.09 Demonstrate acceptable employee health habits.
  - 15.10 Identify appropriate attire and grooming to maintain a functional and professional atmosphere in the equipment maintenance facility.
- 16.0 Identify the various professional organizations and publications that pertain to the turf management industry--The student will be able to:
- 16.01 Identify major points in the history of the golf course/turf industry.
  - 16.02 Identify and understand various professional turf publications.
  - 16.03 Identify and understand the basic role of professional turf organizations.
  - 16.04 Identify the basics of the seed production and sod production industries.
  - 16.05 Identify the various classes of golf courses and turf maintenance organizations.
- 17.0 Design a functional golf course maintenance facility and select appropriate maintenance equipment--The student will be able to:
- 17.01 Evaluate the organization and management styles utilized by various golf courses.
  - 17.02 Classify, by use, the various equipment used on a typical 18-hole golf course.
  - 17.03 List the equipment needed to properly maintain an 18-hole golf course.
  - 17.04 Design and organize a golf course maintenance complex.
  - 17.05 Develop an equipment budget for an 18-hole golf course.
- 15.0 Develop preventive maintenance programs for turf care equipment—The student will be able to:
- 15.01 Use equipment manufacturers' manuals to implement proper service procedures.
  - 15.02 Develop a recordkeeping system to record equipment use.
  - 15.03 Develop a recordkeeping system to record service work performed on equipment.
- 16.0 Develop human relations skills--The student will be able to:
- 16.01 Demonstrate appropriate work habits.
  - 16.02 Identify traits that promote good human relations and increase job performance.
  - 16.03 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.
- 17.0 Perform decision-making activities--The student will be able to:
- 17.01 Develop the ability to solve problems in a logical sequence.
  - 17.02 Demonstrate the ability to determine proper work priorities.

- 17.03 Prepare a day's work schedule for the superintendent.
- 17.04 Choose appropriate action in situations requiring following a chain of command.
- 17.05 Choose appropriate action in situations requiring effective time management.
- 17.06 Choose appropriate action in situations requiring application of business ethics.
- 17.07 Identify ways to assign work to others.



2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	AS	AAS
CIP Number	1101030301	0101030301
Program Type	College Credit	College Credit
Standard Length	63 credit hours	63 credit hours
CTSO	N/A	N/A
SOC Codes (all applicable)	11-9011.03	11-9011.03
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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 aquaculture industry 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 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.

### **Program Structure**

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

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these

occupations. 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.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

### **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 63 credit hours according to Rule 6A-14.030, F.A.C.

### **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/AAS degree program includes the following College Credit Certificates:

Aquaculture Technology (01030302) – 26 credit hours

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

### **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 Perform general aquaculture nursery systems operations.
  - 04.0 Demonstrate an understanding of water quality and aquaculture.
  - 05.0 Maintain good nutrition for aquaculture organisms.
  - 06.0 Recognize 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 Demonstrate an ability to manage aquatic species in multiple production units over time.
  - 10.0 Apply business, economic and marketing principles to the production of an aquatic crop.
  - 11.0 Demonstrate management skills required to operate an aquaculture farm.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Aquaculture Management  
**CIP Numbers:** 1101030301 AS, 0101030301 AAS  
**Program Length:** 63 credit hours  
**SOC Code(s):** 11-9011.03

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. 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 Operate and perform system maintenance on aquaculture production units.
  - 02.05 List techniques for routine maintenance of aquaculture ponds, cage culture systems, and submerged lands.
  - 02.06 Identify common aquaculture predators and list predator control techniques
  - 02.07 Describe feeds and feeding techniques for various aquaculture species and aquaculture production units.
  - 02.08 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.
  - 02.09 Demonstrate practical hands-on or field experience in operating a variety of aquaculture production units.

03.0 Perform general aquaculture nursery systems operations - The student will be able to:

- 03.01 Describe reproduction, spawning behavior, larviculture, metamorphosis and juvenile stages of growth of important aquaculture species studied in this program.
- 03.02 Maintain, clean and operate a broodstock tank and list important practices in managing broodstock.
- 03.03 Start, maintain, count and harvest live feeds.
- 03.04 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.
- 03.05 Describe and differentiate between land-based and field-based nursery systems, equipment and operations.
- 03.06 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.
- 03.07 List and describe nursery production systems and larval husbandry techniques for fish, crustaceans, and mollusks.
- 03.08 Demonstrate practical hands-on experience in handling a variety of juvenile aquaculture organisms and operating nursery production units.

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 good nutrition for aquaculture organisms - The student will be able to:

- 05.01 Outline the basic concepts of nutrition for plants, mollusks, crustaceans, and fish.
- 05.02 Discuss the importance of nutrition to growth and survival of various aquaculture species.

- 05.03 Identify feeding habits and practices of a variety of aquaculture species.
- 05.04 List common ingredients and additives of aquatic feeds and identify practices in feeds formulation and manufacturing.
- 05.05 Demonstrate an ability to culture live feeds including microalgae, rotifers and artemia and discuss their importance.
- 05.06 Calculate feeding rates, growth and feed conversion ratios for various aquaculture species stocked at different densities and rates.
- 05.07 List different feeding methods, measure feed and maintain feed records in logs and computers.
- 05.08 Discuss and differentiate feeding practices for hatchery, nursery and grow out of mollusks.
- 05.09 Discuss nutrition practices for culturing aquatic plants.
- 05.10 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.

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 a system to culture aquatic plants.
- 07.04 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.
- 07.05 List equipment options of a recirculating system including solids removal, biofiltration, sterilization and aeration, and explain their basic functions.
- 07.06 Operate and perform system maintenance on a recirculating system.
- 07.07 Estimate pumping requirements and select an appropriately sized pump for a given system and water volume.
- 07.08 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.
- 07.09 Layout and put together an aeration system operated on airlift technology.
- 07.10 Replace and install a pump.
- 07.11 Perform simple calculations related to water volume, water flow and system

loading.

07.12 Use and operate tools and equipment safely.

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 Demonstrate an ability to manage aquatic species in multiple production units over time -

The student will be able to:

- 09.01 Identify routine management techniques involved in aquaculture.
- 09.02 Calculate system volume and stocking strategies for given aquaculture production units.
- 09.03 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.
- 09.04 Periodically sample or other wise determine growth and production unit biomass/density and adjust feeding rates accordingly.
- 09.05 List methods of harvesting aquatic crops from various aquaculture production units and preparing them for shipment to market.
- 09.06 Acclimate and transfer aquatic animals from one water source to another.
- 09.07 Design, layout, build, and plumb a simple aquaculture recirculating or other aquaculture production unit system.
- 09.08 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.
- 09.09 Demonstrate an understanding of management principles and use of management decision-making tools, including a computer.
- 09.10 List communication skills and identify work habits necessary for supervising employees.

10.0 Apply business, economic and marketing principles to the production of an aquatic crop -  
The student will be able to:

- 10.01 Describe aquaculture production and value of selected species in Florida, domestically, and internationally.
- 10.02 List and access sources of market information and statistics for selected aquaculture species.
- 10.03 Identify sources of competition both locally and globally.
- 10.04 Identify critical risk factors which may limit success of a farm.
- 10.05 Itemize fixed and variable costs of an aquaculture venture.
- 10.06 Write a hypothetical business plan and a production plan for an aquaculture venture.
- 10.07 Describe factors and variables in selecting a site for an aquaculture facility, including land, water, proximity of markets, labor and community acceptance.
- 10.08 Link culture system options to a given site and water resources.
- 10.09 Predict hypothetical production numbers for a given facility with given variables.
- 10.10 Outline a simple operating budget for an aquaculture facility including cash flow and financial statement.
- 10.11 Describe characteristics of a well-planned aquaculture facility.
- 10.12 Demonstrate use of a computer for record keeping, production and decision-making.

11.0 Demonstrate management skills required to operate an aquaculture farm - The student will be able to:

- 11.01 List rules, state statutes and federal regulations important to aquaculture.
- 11.02 Describe permitting procedures for various species, sites and aquaculture production units.
- 11.03 List Best Management Practices necessary to operate and permit selected aquaculture facilities.
- 11.04 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.
- 11.05 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.
- 11.06 Define HACCP and discuss its importance to both processing and aquaculture.
- 11.07 List management skills necessary for effective supervision of employees.



2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

<b>CCC</b>	
CIP Number	0101030302
Program Type	College Credit Certificate (CCC)
Program Length	26 credit hours
CTSO	N/A
SOC Codes (all applicable)	45-1011.06
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 Aquaculture Management AS/AAS degree program (1101030301/0101030301).

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.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Standards**

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

- 01.0 Operate an aquaculture farm.
- 02.0 Manage and supervise aquaculture employees.
- 03.0 Manage fish.
- 04.0 Manage a pond operation.
- 05.0 Identify common aquaculture organisms.
- 06.0 Diagnose and treat common aquaculture maladies.
- 07.0 Operate aquaculture equipment.
- 08.0 Manage aquaculture facilities.
- 09.0 Breed fish.
- 10.0 Maintain optimal nutrition for aquaculture organisms.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Aquaculture Technology  
**CIP Number:** 0101030302  
**Program Length:** 26 credit hours  
**SOC Code(s):** 45-1011.06

This certificate program is part of the Aquaculture Management AS/AAS degree program (1101030301/0101030301). At the completion of this program, the student will be able to:

01.0 Operate an aquaculture farm - The student will be able to:

- 01.01 Discuss a variety of aquaculture techniques.
- 01.02 Compare different techniques for aquaculture.
- 01.03 Describe fish rearing techniques.
- 01.04 Operate a fish aquaculture operation.
- 01.05 Discuss aquaculture operations.

02.0 Manage and supervise aquaculture employees - The student will be able to:

- 02.01 Explain the basic principles of management.
- 02.02 Evaluate techniques for aquaculture marketing.
- 02.03 Explain the regulations that govern aquaculture on the local, state and national levels.
- 02.04 Explain the principles of production economics to include costs, taxes, interest, depreciation, record keeping, cash flow and financial statements.
- 02.05 Estimate production in aquaculture.

03.0 Manage fish - 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:
  - Skeletal systems
  - Musculature
  - Nervous system
  - Vascular system
  - Respiratory system
  - Urogenital system
  - Digestive system
  - Reproductive system
- 03.03 Identify the major anatomical fish structures.
- 03.04 Describe the physiological characteristics of fish for the following:
  - Color
  - Bioluminescence
  - Sound production
  - Sensory systems
  - Osmoregulation
- 03.05 Classify fish.
- 03.06 Explain the basics of fish nutrition.

- 03.07 Describe the aquatic environment.
- 03.08 Discuss the basics of fish reproduction.
- 03.09 Discuss the basics of fish behavior.
- 03.10 Identify the muscles of a fish.
- 03.11 Measure the physical characteristics of fish.
- 03.12 Use a taxonomic key to identify fish.
- 03.13 Identify the major taxa of fish.

04.0 Manage a pond operation - The student will be able to:

- 04.01 Explain the basic techniques for building aquaculture ponds.
- 04.02 Identify water quality measurements necessary for raising fish.
- 04.03 Explain the aquifer water quality in Florida.
- 04.04 Perform water chemistry quality measurements and explain their importance.
- 04.05 Produce aquatic plants in an aquaculture environment.
- 04.06 Identify filtration systems for aquaculture.
- 04.07 Manage water quality.
- 04.08 Explain water treatments.
- 04.09 Perform plankton analysis.
- 04.10 Describe the value of aeration systems.
- 04.11 Set up a closed system.
- 04.12 Set up cage systems.
- 04.13 Measure primary productivity.
- 04.14 Explain the importance of pond fertilization.
- 04.15 Explain the feeding techniques for large pond operations.
- 04.16 Measure density of organisms per acre.

05.0 Identify common aquaculture organisms - The student will be able to:

- 05.01 Evaluate techniques for aquaculturing marine fish.
- 05.02 Explain aquaculture techniques for pompano, redfish, snook, spotted sea trout, yellowtail, marine salmon, aquarium marine fish, and bait fish.
- 05.03 Evaluate techniques for aquaculturing invertebrates.
- 05.04 Explain techniques for the aquaculture of shrimp, lobster, blue crabs, oysters, clams, scallops, mussels, gastropods, and squid.
- 05.05 Evaluate techniques for culturing fresh and salt water plants.

06.0 Diagnose and treat common aquaculture maladies - The student will be able to:

- 06.01 Identify the common diseases that infect aquaculture organisms.
- 06.02 Describe the basic mechanisms for control of disease.
- 06.03 Identify bacterial diseases in fish.
- 06.04 Identify treatments for bacterial diseases in fish.
- 06.05 Identify mycotic diseases in fish.
- 06.06 Identify treatments for mycotic diseases in fish.
- 06.07 Identify viral diseases in fish.
- 06.08 Identify treatments for viral diseases in fish.
- 06.09 Identify protozoan infections in fish.
- 06.10 Identify treatments for protozoan infections in fish.
- 06.11 Identify the basic mechanisms of immunity in fish.
- 06.12 Identify nutritional diseases in fish.

- 06.13 Identify neoplastic diseases in fish.
- 06.14 Identify toxic environmental diseases in fish.
- 06.15 Culture common bacteria in the laboratory.
- 06.16 Identify common bacteria.
- 06.17 Identify common fungi in the laboratory.
- 06.18 Identify common aquatic parasites found in Florida waters.
- 06.19 Conduct nutritional experiments on aquaculture organisms.
- 06.20 Conduct necropsies on fish.

07.0 Operate aquaculture equipment - The student will be able to:

- 07.01 Set up standard aquaria.
- 07.02 Set up field aquaculture ponds.
- 07.03 Measure field parameters such as temperature, salinity, and hardness.
- 07.04 Set up aquaculture filtration systems.
- 07.05 Set up systems for culture of aquatic plants.
- 07.06 Measure productivity in aquaculture systems.

08.0 Manage aquaculture facilities - The student will be able to:

- 08.01 Understand the basic principles of management.
- 08.02 Evaluate techniques for aquaculture marketing.
- 08.03 Understand the regulations that govern aquaculture on the local, state, and national levels.
- 08.04 Understand the principles of production economics to include costs, taxes, interest, depreciation, record keeping, cash flow and financial statements.
- 08.05 Estimate production in aquaculture.
- 08.06 Understand and use management decision-making tools.
- 08.07 Use a computer for record keeping, production, and decision-making.

09.0 Breed fish - The student will be able to:

- 09.01 Explain the reproductive anatomy of fish.
- 09.02 Explain production of sperm and eggs in fish.
- 09.03 Identify sex differences between fish.
- 09.04 Explain the sexual maturation in fish.
- 09.05 Explain the reproductive cycles in fish.
- 09.06 Set environmental factors for successful reproduction in fish.
- 09.07 Explain how and when to use hormones to accelerate reproduction cycles.
- 09.08 Explain the techniques for the care of fish eggs and the young fish.

10.0 Maintain optimal nutrition for aquaculture organisms - The student will be able to:

- 10.01 Explain the digestive anatomy of fish.
- 10.02 Explain the basic concepts of fish nutrition.
- 10.03 Explain the growth processes of fish.
- 10.04 Identify the feeding habits of fish.
- 10.05 Identify the nutritional requirements of fish.
- 10.06 Identify the feeding habits of fish.
- 10.07 Analyze fish food content.
- 10.08 Explain fish metabolic rates.

- 10.09 Identify fish food additives.
- 10.10 Explain the established feeding practices for a variety of fish.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	AS	AAS
CIP Number	1101050700	0101050700
Program Type	College Credit	College Credit
Standard Length	64 credit hours	64 credit hours
CTSO	N/A	N/A
SOC Codes (all applicable)	45-1011.08	45-1011.08
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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 equine industry within 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 three 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. **Therapeutic Riding Management** offers students preparation and certification as Instructor, Therapeutic Riding under the North American Riding for the Handicapped Association (NAHRA) as well as preparation for positions in barn management and volunteer coordinator in a therapeutic riding center. **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 all three 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.

### **Program Structure**

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

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

### **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education



coursework according to SACS. The standard length of this program is 64 credit hours according to Rule 6A-14.030, F.A.C.

### **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/AAS degree program includes the following College Credit Certificates:

Equine Assistant Management (0101050701) – 24 hours

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

### **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. Therapeutic Riding Management Specialization Learning Outcomes**

- 12.0 Identify, analyze, and apply therapeutic riding management skills in preparation for the NAHRA Certified Instructor examination.
- 13.0 Recruit, train, manage and reward volunteers in the therapeutic riding environment.
- 14.0 Manage horses and barn activities in the therapeutic riding environment.

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

- 15.0 Design and manage physiological conditioning programs for the equine athlete.

- 16.0 Apply manual therapies for maintenance and therapeutic applications.
- 17.0 Identify and apply rehabilitation techniques using state-of-the-art equipment.
- 18.0 Evaluate hoof care, tack and equipment for different equine athletic endeavors.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Equine Studies  
**CIP Numbers:** 1101050700 AS, 0101050700 AAS  
**Program Length:** 64 hours  
**SOC Code(s):** 45-1011.08

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

**Equine Science Core Learning Outcomes:**

- 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.

**Business Management Specialization Learning Outcomes:**

- 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.

### **Therapeutic Riding Management Specialization Learning Outcomes**

- 12.0 Identify, analyze, and apply therapeutic riding management skills in preparation for the NAHRA Certified Instructor examination – The student will be able to:
  - 12.01 Understand methodology of using horses for therapy in human disabling conditions to increase the patient's social skills, improve muscle tone, increase focus and responsiveness.
  - 12.02 Develop lesson plans and execute plans in concert with patient and volunteers.
  - 12.03 Recognize physical or mental disabling conditions and determine the type of lesson goals for each condition.
  - 12.04 Train volunteers to ensure safety of all involved.
  - 12.05 Match horse and client for maximum benefit of client.
  - 12.06 Ensure satisfaction with customer (parent, guardian, partner, child).
- 13.0 Recruit, train, manage and reward volunteers in the therapeutic riding environment – The student will be able to:

- 13.01 Work as a volunteer in a therapeutic riding center.
  - 13.02 Working under the supervision of a volunteer coordinator, participate in volunteer recruiting and training.
  - 13.03 Contribute to the volunteer reward program.
- 14.0 Manage horses and barn activities in the therapeutic riding environment – The student will be able to:
- 14.01 Develop the nutritional program for each horse to meet nutrient requirements.
  - 14.02 Ensure all horses have safe and adequate housing.
  - 14.03 Schedule farrier, dental and veterinary visits for horses as necessary.
  - 14.04 Provide for clear horse identification, organized tack and feed areas, clean and orderly housing and a safe environment for volunteers and customers.  
Understand and apply different training/conditioning techniques for various equine athletics.
  - 14.05 Understand equine biomechanics and how they influence equine performance.
  - 14.06 Develop optimum conditioning programs to minimize risk of injury to the horse.

**Exercise Physiology Learning Outcomes:**

- 15.0 Design and manage physiological conditioning programs for the equine athlete – The student will be able to:
- 15.01 Understand different manual therapies that can be applied by non-veterinarians for the health and well-being of the horse.
  - 15.02 Develop expertise in the application of different manual therapies for the horse.
  - 15.03 Develop optimum conditioning programs to minimize risk of injury to the horse.
- 16.0 Apply manual therapies for maintenance and therapeutic applications – the student will be able to:
- 16.01 Understand different manual therapies that can be applied by non-veterinarians for the health and well-being of the horse.
  - 16.02 Develop expertise in the application of different manual therapies for the horse.
- 17.0 Identify and apply rehabilitation techniques using state-of-the-art equipment – The student will be able to:
- 17.01 Understand concepts of rehabilitation for horses, including different therapeutic modalities and equipment.
  - 17.02 Work in a rehabilitation center to gain familiarity with different equipment and rehabilitation strategies.
- 18.0 Recognize Evaluate hoof care, tack and equipment for different equine athletic endeavors- The student will be able to:
- 18.01 Understand different farrier techniques for various equine athletic endeavors.
  - 18.02 Understand action of bits and hackamores in the control and training of horses.
  - 18.03 Evaluate saddle fit.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

<b>CCC</b>	
CIP Number	0101050701
Program Type	College Credit Certificate (CCC)
Program Length	24 credit hours
CTSO	N/A
SOC Codes (all applicable)	45-1011.08
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 Equine Studies AS/AAS degree program (1101050701/0101050701).

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.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Standards**

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

- 01.0 Demonstrate Planning and Scheduling.
- 02.0 Demonstrate Leadership, Communication and Human Relations Skills.
- 03.0 Perform Marketing and Sales Management.
- 04.0 Demonstrate Techniques in Selection, Breeding and Care of Equine.
- 05.0 Demonstrate Ability to Oversee All Farm Facilities, Equipment-Planning, Oversight, Maintenance.
- 06.0 Identify and Inspect Regulations and Certificates.
- 07.0 Analyze Contracts, Leases and Other Legal Documents.



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Equine Management  
**CIP Number:** 0101050701  
**Program Length:** 24 credit hours  
**SOC Code(s):** 45-1011.08

This certificate program is part of the Equine Studies AS/AAS degree program (1101050701/0101050701). At the completion of this program, the student will be able to:

- 01.0 Demonstrate Planning and Scheduling – The student will be able to:
- 01.01 Maintain and analyze equine records.
  - 01.02 Discuss the legal requirements of maintaining equine health records, and maintain and analyze equine health records.
  - 01.03 Maintain basic equine business records (inventory, depreciation, receipts and expenses) using computer application.
- 02.0 Demonstrate Leadership, Communication and Human Relations Skills – The student will be able to:
- 02.01 Demonstrate punctuality, initiative, courtesy, dependability, flexibility and honesty.
  - 02.02 Demonstrate ability to work effectively as part of a team.
  - 02.03 Conduct a job search.
  - 02.04 Select and hire farm managers who will work with various levels of farm workers, work well in a team environment and care about equine.
- 03.0 Perform Marketing and Sales Management – The student will be able to:
- 03.01 Secure and interpret equine information.
  - 03.02 Actively participate in equine sales contacts, events, planning, pricing, etc.
  - 03.03 Interpret elements of equine marketing agreements.
  - 03.04 Actively participate in equine marketing activities/promotions-demos, shows, meeting with groups/associations, speaking and relating to public, etc.
- 04.0 Demonstrate Techniques in Selection, Breeding and Care of Equine - The student will be able to:
- 04.01 Prepare feeding schedule.
  - 04.02 Determine mineral and feed supplement requirements.
  - 04.03 Identify the different digestive systems of equine and the nutritional requirements of selected equine.
  - 04.04 Explain the differences between animal welfare and animal rights.
  - 04.05 Identify parts and functions of various equine systems.
  - 04.06 Evaluate and report common ailments.
  - 04.07 Sterilize instruments and supplies.
  - 04.08 Interpret and follow directions on medications and animal health aids.
  - 04.09 Provide first aid for equine.

- 04.10 Restrain equine.
  - 04.11 Select equine suited for particular (pedigree/blood lines) enterprise.
  - 04.12 Evaluate desirable conformation characteristics of equine.
  - 04.13 Identify various equine blood lines for breeding.
- 05.0 Demonstrate Ability to Oversee All Farm Facilities, Equipment-Planning, Oversight, Maintenance – The student will be able to:
- 05.01 Develop a general maintenance schedule.
  - 05.02 Maintain an inventory of equipment, tools, spare parts and supplies.
  - 05.03 Clean and maintain equipment and instruments.
  - 05.04 Repair and maintain stalls and other facilities structures.
  - 05.05 Maintain a clean, sanitary and healthy environment for equine.
  - 05.06 Purchase, operate and maintain tools and equipment.
- 06.0 Identify and Inspect Regulations and Certificates – The student will be able to:
- 06.01 Secure necessary inspection certificates and registrations.
  - 06.02 Observe rules and regulations related to the production and marketing of equine.
  - 06.03 Maintain a file of current equine rules and regulations.
  - 06.04 Observe EPA pesticide use of regulations.
- 07.0 Analyze Contracts, Leases and Other Legal Documents – The student will be able to:
- 07.01 Contract for labor and services.
  - 07.02 List sources of legal services.
  - 07.03 List sources of credit for capital items and real estate.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	<b>AS</b>	<b>AAS</b>
CIP Number	1101060500	0101060500
Program Type	College Credit	College Credit
Standard Length	64 credit hours	64 credit hours
CTSO	N/A	N/A
SOC Codes (all applicable)	37-1012, 11-9011.01	37-1012, 11-9011.01
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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 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, 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 & designer.

### **Program Structure**

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

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these

occupations. 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.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

### **Articulation**

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following industry certifications articulate credit into this degree program. These statewide articulation agreements have been approved by the Articulation Coordinating Committee.

Certified Horticulture Professional (FNGLA001) – 6 credit hours

For details on existing articulation agreements, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 64 credit hours according to Rule 6A-14.030, F.A.C.

## **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/AAS 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.

## **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:**

- 13.0 Analyze and design the project (landscape and interiorscape).
- 14.0 Prepare, estimate, and establish contracts.
- 15.0 Analyze and organize the project.
- 16.0 Lay out and install landscape and interiorscape.
- 17.0 Plan and install a drainage system.
- 18.0 Maintain customer relations and observe follow-up procedures.
- 19.0 Maintain landscape plants.
- 20.0 Select, operate, and maintain landscape tools and equipment.

21.0 Plan, install, and service landscape irrigation systems.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Landscape and Horticulture Technology  
**CIP Numbers:** 1101060500 AS, 0101060500 AAS  
**Program Length:** 64 credit hours  
**SOC Code(s):** 37-1012, 11-9011.01

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. 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 plants 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.

**A. HORTICULTURE SPECIALIZATION:**

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:**

13.0 Analyze and design the project (landscape and interiorscape – The student will be able to:

- 13.01 Determine the purpose, problems, or desired effect of the project.
- 13.02 Analyze the environmental conditions of the landscape or interiorscape.
- 13.03 Determine site analysis problems.
- 13.04 Demonstrate working knowledge of computer-assisted drafting (CAD) system.
- 13.05 Design hardscape plan.
- 13.06 Design and select appropriate plant materials for desired effect and function.
- 13.07 Determine the method and form of presentation of the project.

14.0 Prepare, estimate, and establish contracts – The student will be able to:

- 14.01 Develop a list of materials required for the project.
- 14.02 Determine equipment needs.
- 14.03 Estimate time and man hours.
- 14.04 Determine cost of materials, equipment, and labor.
- 14.05 Prepare a price for customer, based on specifications.
- 14.06 Establish terms of a contract.

15.0 Analyze and organize the project – The student will be able to:

- 15.01 Interpret plans and specifications.
  - 15.02 Identify safety requirements.
  - 15.03 Organize site preparation.
  - 15.04 Locate project materials.
  - 15.05 Determine personnel needs.
  - 15.06 Determine equipment needs.
  - 15.07 Establish project schedule.
- 16.0 Lay out and install landscape and interiorscape – The student will be able to:
- 16.01 Locate existing utilities.
  - 16.02 Rough grade site.
  - 16.03 Install large materials.
  - 16.04 Install irrigation system.
  - 16.05 Construct hardscape (walls, walks, patio, drives, etc.)
  - 16.06 Lay out and install plants.
  - 16.07 Prepare interiorscape.
  - 16.08 Prepare final grade.
  - 16.09 Install lawns.
  - 16.10 Install mulch.
  - 16.11 Perform final clean up.
- 17.0 Plan and install a drainage system – The student will be able to:
- 17.01 Plan the construction of an underground drainage system.
  - 17.02 Estimate and order appropriate fill materials.
  - 17.03 Establish proper elevations and grade a landscape site.
  - 17.04 Read soil and contour maps.
- 18.0 Maintain customer relations and observe follow-up procedures –The student will be able to:
- 18.01 Conduct walk-through of project with client to ensure satisfaction.
  - 18.02 Identify current and future maintenance requirements.
  - 18.03 Analyze project records for profitability and employee performance.
- 19.0 Maintain landscape plants – The student will be able to:
- 19.01 Determine water requirements and apply at proper rates.
  - 19.02 Identify weeds and apply herbicides safely.
  - 19.03 Determine fertilization requirements and apply at proper rates.
  - 19.04 Regulate growth of landscape plants through chemical or mechanical needs.
  - 19.05 Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).
  - 19.06 Identify plant pest problems and apply corrective measures.
  - 19.07 Cultivate and mulch plants.
  - 19.08 Brace and repair trees.
- 20.0 Select, operate, and maintain landscape tools and equipment – The student will be able to:

- 20.01 Determine equipment needs for the company.
- 20.02 Select and operate equipment for the job.
- 20.03 Supervise the service and maintenance of service equipment.
- 20.04 Supervise the repair and maintenance of facilities.
- 20.05 Instruct and supervise employees in the safe use of tools and equipment.
- 20.06 Maintain an inventory of parts and supplies.

21.0 Plan, install, and service landscape irrigation systems – The student will be able to:

- 21.01 Determine irrigation requirements.
- 21.02 Assess quality of irrigation water.
- 21.03 Plan an irrigation system.
- 21.04 Supervise the installation of irrigation equipment.
- 21.05 Service and maintain electric engine-driven pumps.
- 21.06 Operate and service low-volume irrigation system.
- 21.07 Operate and service overhead irrigation system.
- 21.08 Operate and maintain automatic system.
- 21.09 Calculate cost efficiency of an irrigation system.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

<b>CCC</b>	
CIP Number	0101060503
Program Type	College Credit Certificate (CCC)
Program Length	12 credit hours
CTSO	N/A
SOC Codes (all applicable)	37-3011, 45-2092.01
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 Landscape and Horticulture Technology AS/AAS degree program (1101060500/0101060500).

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.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

### **Standards**

After successfully completing this course 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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Landscape and Horticulture Specialist  
**CIP Number:** 0101060503  
**Program Length:** 12 credit hours  
**SOC Code(s):** 37-3011.00, 45-2092.01

This certificate program is part of the Landscape and Horticulture Technology AS/AAS degree program (1101060500/0101060500). 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.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

<b>CCC</b>	
CIP Number	0101060504
Program Type	College Credit Certificate (CCC)
Program Length	18 credit hours
CTSO	N/A
SOC Codes (all applicable)	37-1012, 11-9011.01
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 Landscape and Horticulture Technology AS/AAS degree program (1101060500/0101060500).

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 a horticulture professional.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Standards**

After successfully completing this course 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 Fertilize plants.
- 04.0 Manage a pest-control program.
- 05.0 Prune and shape plants.
- 06.0 Demonstrate Employability Skills.
- 07.0 Maintain landscape plants

2011 - 2012

**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, 11-9011.01

This certificate program is part of the Landscape and Horticulture Technology AS/AAS degree program (1101060500/0101060500). 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.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

<b>CCC</b>	
CIP Number	0101060505
Program Type	College Credit Certificate (CCC)
Program Length	30 credit hours
CTSO	N/A
SOC Codes (all applicable)	37-1012, 11-9011.01
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 Landscape and Horticulture Technology AS/AAS degree program (1101060500/0101060500).

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.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Standards**

After successfully completing this course 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:**

- 09.0 Determine drainage system needs and design a drainage system.
- 10.0 Prune and shape plants.
- 11.0 Maintain and analyze records.
- 12.0 Prepare growing media and seedbeds.
- 13.0 Propagate plants.
- 14.0 Grow plants.

- 15.0 Harvest, process, and ship plants.
- 16.0 Market plants.
- 17.0 Design, install, and maintain nursery irrigation systems.



2011 - 2012

**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, 11-9011.01

This certificate program is part of the Landscape and Horticulture Technology AS/AAS degree program (1101060500/0101060500). 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 means.
- 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.

Landscape Specialization:

09.0 Plan, install, and maintain 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 and interiorscape – 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.

Horticulture Specialization:

- 09.0 Determine drainage system needs and design a drainage system --The student will be able to:
  - 09.01 Determine the texture and percolation characteristics of the soil.
- 10.0 Prune and shape plants--The student will be able to:
  - 10.01 Develop a pruning program and time schedule.
  - 10.02 Select and use chemical growth regulators.
  - 10.03 Root and prune ornamental plants and trees.
- 11.0 Maintain and analyze records – The student will be able to:
  - 11.01 Maintain fertilizer and pesticide application records.
  - 11.02 Use computers in the landscape and horticulture operations.
- 12.0 Prepare growing media and seedbeds – The student will be able to:
  - 12.01 Identify media materials.
  - 12.02 Mix rooting and growing media according to plant requirements.
  - 12.03 Sterilize rooting, potting, and growing media.
  - 12.04 Collect and test a soil sample from field and potting media.
  - 12.05 Adjust pH and nutritional levels of media.
  - 12.06 Prepare planting beds and sites.
  - 12.07 Fill and level benches and pots with media.
  - 12.08 Demonstrate sanitation practices when handling and storing plant media materials.
- 13.0 Propagate plants – The student will be able to:
  - 13.01 Collect propagation materials at proper time (seeds, cuttings, scions, bulbs, etc.).
  - 13.02 Demonstrate propagation by grafting, budding, layering, separating, dividing, cutting, and tissue culturing.
  - 13.03 Prepare flats and a seedbed and plant seeds.
  - 13.04 Prepare a rooting bed.
  - 13.05 Prepare propagation materials (seeds, cuttings, scions, etc.)
  - 13.06 Apply growth stimulants to propagation materials.
  - 13.07 Transplant rooted propagation materials including tissue culture transplants.
  - 13.08 Demonstrate sanitation and safety practices when propagating.
- 14.0 Grow plants – The student will be able to:

- 14.01 Prepare media for containers.
  - 14.02 Prepare field site for transplants.
  - 14.03 Select plant containers.
  - 14.04 Determine plant spacing in the field and on container beds.
  - 14.05 Transplant propagated materials to various containers and to the field.
  - 14.06 Determine and provide light requirements of various plant types.
- 15.0 Harvest, process, and ship plants – The student will be able to:
- 15.01 Grade and harvest field-grown plants (ball, burlap, bare-root, “grow-bags”).
  - 15.02 Select, grade, and assemble container-grown plants.
  - 15.03 Prepare for shipment, loading, and transporting harvested plant materials.
- 16.0 Market plants – The student will be able to:
- 16.01 Identify, inventory, and label marketable plants.
- 17.0 Design, install, and maintain nursery irrigation systems – The student will be able to:
- 17.01 Determine irrigation requirements.
  - 17.02 Assess quality of irrigation water.
  - 17.03 Operate and service various types of irrigation systems.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	<b>AS</b>	<b>AAS</b>
CIP Number	1101060701	0101060701
Program Type	College Credit	College Credit
Standard Length	69 hours	69 hours
CTSO	N/A	N/A
SOC Codes (all applicable)	37-1012	37-1012
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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 golf course 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 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.

### **Program Structure**

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

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

The Florida Nurserymen and Growers Association (FNGA) is the appropriate professional organization.

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 as identified on the secondary student's 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 postsecondary service provider. 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.

## **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 69 credit hours according to Rule 6A-14.030, F.A.C.

## **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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Golf Course Operations  
**CIP Numbers:** 1101060701 AS, 0101060701 AAS  
**Program Length:** 69 hours  
**SOC Code(s):** 37-1012.00

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. 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 Prepare surface and paint equipment.
- 01.10 Demonstrate gas and electric arc welding techniques on golf course equipment.
- 01.11 Compile, stock and manage a parts inventory.
- 01.12 Monitor and record the use of fuel, lubricants and consumable shop supplies.
- 01.13 Maintain a safe clean shop.
- 01.14 Maintain current catalogs for supplies and equipment.
- 01.15 Maintain tires and tire pressure on golf course equipment.
- 01.16 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.
- 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 verticuting 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.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	<b>AS</b>	<b>AAS</b>
CIP Number	1102010100	0102010100
Program Type	College Credit	College Credit
Standard Length	60 credit hours	60 credit hours
CTSO	N/A	N/A
SOC Codes (all applicable)	11-9012	11-9012
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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/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.

### **Program Structure**

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

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 as identified on the secondary student's 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 postsecondary service provider. 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.

## **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 60 credit hours according to Rule 6A-14.030, F.A.C.

## **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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Agricultural Production Technology**  
**CIP Numbers: 1102010100 AS, 0102010100 AAS**  
**Program Length: 60 credit hours**  
**SOC Code(s): 11-9012.00**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. 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.



2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	AS	AAS
CIP Number	1102029900	0102029900
Program Type	College Credit	College Credit
Standard Length	66 credit hours	66 credit hours
CTSO	N/A	N/A
SOC Codes (all applicable)	39-2010, 39-2011, 39-2021	39-2010, 39-2011, 39-2021
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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.

### Program Structure

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

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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. The student must receive compensation for work performed.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 66 credit hours according to Rule 6A-14.030, F.A.C.

## **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 Capture and restrain animals.
- 03.0 Manage animal housing and sanitation.
- 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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Zoo Animal Technology  
**CIP Numbers:** 1102029900 AS, 0102029900 AAS  
**Program Length:** 66 credit hours  
**SOC Code(s):** 39-2010, 39-2011, 39-2021

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. 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 Manage a 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.

02.0 Capture and restrain animals--The student will be able to:

- 02.01 Identify and use techniques and equipment for the capture and restraint of animals.
- 02.02 Identify circumstances justifying the capture and restraint of animals.
- 02.03 Transport animals safely.

03.0 Manage animal housing and sanitation--The student will be able to:

- 03.01 Dispose of animal waste.
- 03.02 Identify specific sanitation procedures applicable to managing the collection.
- 03.03 Select and use appropriate cleaning aids and disinfectants.
- 03.04 Develop a sanitation schedule.
- 03.05 Assign animals to appropriate housing according to species requirements.
- 03.06 Maintain environmental conditions required by species.

04.0 Manage animal nutrition and feeding--The student will be able to:

- 04.01 Identify nutritional requirements of various animal species in the wild.
- 04.02 Provide appropriate diets to maintain various species in captivity.
- 04.03 Properly store and maintain animal food supplies.
- 04.04 Prepare and dispense food.
- 04.05 Manage condition under which animals are fed.

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 Operate and maintain sterilization equipment.
  - 05.04 Use and maintain capture and restraint equipment.
  - 05.05 Operate communications equipment.
  - 05.06 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 blood specimens.
  - 07.02 Collect urine specimens.
  - 07.03 Collect fecal specimens.
  - 07.04 Collect tissue samples.
  - 07.05 Collect environmental samples.
  - 07.06 Properly package and handle specimens for shipment or analysis.
- 08.0 Analyze and keep records--The student will be able to:
- 08.01 Keep and maintain equipment service and 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 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 Use taxonomical keys to 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 licenses, certificates, bonds and permits.
  - 11.03 Interpret rules and regulations.
  - 11.04 Identify agencies regulating the profession.
- 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 Form and pour concrete.
  - 13.04 Perform simple electrical repairs.
  - 13.05 Perform simple plumbing repairs.
  - 13.06 Paint wood, metal and masonry surfaces.
  - 13.07 Perform repairs on wooden structures.
  - 13.08 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 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
  - 14.07 Identify acceptable work habits.
  - 14.08 Demonstrate knowledge of how to make job changes appropriately.
  - 14.09 Demonstrate 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 Manage the breeding of various species.
  - 15.05 Identify behavior of animals following parturition.
  - 15.06 Provide pre-natal and post-partum care for animals.
  - 15.07 Observe and recognize abnormal animal behavior.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	<b>AS</b>	<b>AAS</b>
CIP Number	1102040300	0102040300
Program Type	College Credit	College Credit
Standard Length	62 hours	62 hours
CTSO	N/A	N/A
SOC Codes (all applicable)	45-1011.07	45-1011.07
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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 citrus production sector within 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.

### **Program Structure**

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

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 as identified on the secondary student's 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 postsecondary service provider. 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.

## **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 62 credit hours according to Rule 6A-14.030, F.A.C.

## **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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Citrus Production Technology  
**CIP Numbers:** 1102040300 AS, 0102040300 AAS  
**Program Length:** 62 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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. 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.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	<b>AS</b>	<b>AAS</b>
CIP Number	1102040800	0102040800
Program Type	College Credit	College Credit
Standard Length	62 credit hours	62 credit hours
CTSO	N/A	N/A
SOC Codes (all applicable)	37-3012	37-3012
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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 pest control 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 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.

### **Program Structure**

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

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 62 credit hours according to Rule 6A-14.030, F.A.C.

## **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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Pest Control Technology  
**CIP Numbers:** 0102040800 AAS, 1102040800 AS  
**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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. 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.

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.
- 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.

2011 - 2012

**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	0102040802	0102040803
Grade Level	Applied Technology Diploma (ATD)	Applied Technology Diploma (ATD)
Standard Length	24 credit hours	720 clock hours
CTSO	N/A	N/A
SOC Codes (all applicable)	37-3012	37-3012
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Basic Skills Level	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 pest control sector within 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.

### **Program Structure**

This program is an Applied Technology Diploma program that is part of a technical degree program, is less than 60 credit hours, and leads to employment in a specific occupation. An applied technology diploma program may consist of either technical credit or college credit. A public school district may offer an applied technology diploma 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	Pesticide Handlers, Sprayers, and Applicators, Vegetation 37-3012
	ORH0868	Pesticide Handlers, Sprayers, and Applicators, Vegetation 2	360 hours	

### **Community College**

When offered at the community college level, this ATD program is part of the Pest Control Technology (1102040800 AS, 0102040800 AAS) and has a program length of 24 credits.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Either a community college or school district may offer the Applied Technology Diploma program as college credit or vocational credit (vocational technical Center may offer only as vocational credit). Students completing an ATD at a vocational technical center will be awarded the guarantee college credit upon enrollment to the community college.

This program is part of the Pest Control Technology AS degree and guarantees transfer of 24 credit hours toward the related AS degree. Minimum entrance requirements for this program include a high school diploma or GED. Students must meet the minimum basic skills levels to complete the program.

Faculty teaching this program must have a minimum of an AS degree in the discipline area or meet the "exceptional cases" criteria as established by the Southern Association for Colleges and Schools.

No fees will be charged for the transfer of credit from a vocational technical center to a community college. The established statewide fee structure will be adhered to by both delivery systems.

### **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. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rff/basic-skills.rtf>).

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 pursuant to Section 1008.29, F.S.; 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.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

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(s)/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). For further information, see Rule 6A-6.0312, F.A.C., Course Modifications for Exceptional Students, and the latest pertinent Technical Assistance Paper (<http://www.fldoe.org/ese/tap-home.asp>).

### **Articulation**

The information related to the guaranteed transfer of credit between an applied technology diploma program and AS/AAS degree must be documented and maintained by the Articulation Coordinating Committee (ACC). The transfer of the applied technology diploma to an AS/AAS degree is guaranteed for a period of three (3) years following the date of the award of the applied technology diploma.

## **Program Length**

In accordance with Rule 6A-10.024, F.A.C. an Applied Technology Diploma program consists of a course of study that is part of an AS/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 applied technology diploma 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 applied technology diploma 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 Applied Technology Diploma.

Community Colleges may offer either college or career credit toward the applied technology diploma. A Career Center in a public school district may offer an applied technology diploma 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.

## **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.

2011 - 2012

**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.

**PSAV Course Number: ORH0867**  
**Occupational Completion Point: A**  
**Pesticide Handlers, Sprayers, and Applicators, Vegetation 1 – 360 Hours – SOC Code 37-3012.00**

- 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.
- 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 37-3012.00**

- 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.

2011 - 2012

**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 by a community or state college, the following standards, and benchmarks apply.

- 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.
- 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.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	<b>AS</b>	<b>AAS</b>
CIP Number	1103050601	0103050601
Program Type	College Credit	College Credit
Standard Length	75 credit hours	75 credit hours
CTSO	N/A	N/A
SOC Codes (all applicable)	19-1032	19-1032
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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 forestry sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to assist foresters and forest resource managers in the professional management, harvesting, regeneration and multiple-use concepts of the forest and forest lands. Instruction includes the study of forest measurements, forest management and planning, dendrology, forest economics, silviculture and reforestation, forest protection, forest law, forest soils, hydrology and water quality, forest ecology, aerial photo interpretation, forest surveying and mapping, forest equipment maintenance and operations, computerized forestry skills, forest safety and human relations, including communication skills.

### **Program Structure**

This program is a planned sequence of instruction consisting of 75 hours.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The program shall meet the standards as set forth by the Society of American Foresters (S.A.F.), the national organization that represents all segments of the forestry profession. (The Society of American Foresters "accredits" baccalaureate programs and "recognizes" associate programs.) The typical length of this program for the average achieving student is the associate degree. The standard credit hour length for this program is 75 hours.

Planned and supervised occupational activities may be provided through directed laboratory experience, practical 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 may receive compensation for work performed.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

### **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 75 credit hours according to Rule 6A-14.030, F.A.C.

### **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/AAS degree program includes the following College Credit Certificates:

Forest Operations (0103050602) – 27 hours

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

## **Standards**

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

- 01.0 Prepare and administer forest management plans.
- 02.0 Plan and administer forest inventories.
- 03.0 Assist registered land surveyor in location of property corners and boundary lines, road and bridge construction and drainage projects.
- 04.0 Prepare and administer forest fire and smoke management plans and assist in forest fire suppression and control.
- 05.0 Identify major forest tree species.
- 06.0 Identify and control major forest insects and diseases.
- 07.0 Evaluate forest ecosystems.
- 08.0 Evaluate forest goals with respect to chemical and fertilizer applications and hydrology.
- 09.0 Collect, maintain and/or analyze data and records.
- 10.0 Prepare, analyze and enforce contracts and other legal documents
- 11.0 Supervise contractors and sub-contractors.
- 12.0 Supervise and train forest technicians and other employees.
- 13.0 Demonstrate communication and managerial skills.
- 14.0 Administer the purchase, sale and/or marketing of forest products.
- 15.0 Demonstrate effective human resource skills as a paraprofessional manager.
- 16.0 Prepare and effect work schedules.
- 17.0 Demonstrate decision-making skills.
- 18.0 Demonstrate skills in effective conflict resolution.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Forest Management  
**CIP Numbers:** 1103050601 AS, 0103050601 AAS  
**Program Length:** 75 credit hours  
**SOC Code(s):** 19-1032

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Prepare and administer forest management plans--The student will be able to:

- 01.01 Prepare and conduct a statistically based forest inventory.
- 01.02 Calculate, analyze and evaluate forest inventory data.
- 01.03 Utilize Geographical Information Systems (GIS) data to prepare tract maps and management recommendations.
- 01.04 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.
- 01.05 Select and execute appropriate silvicultural system for tract.
- 01.06 Conduct a prescribed burn including pre-planning, permitting, firing systems, smoke management and suppression techniques.
- 01.07 Plan and execute timber stand improvement when needed.
- 01.08 Plan and execute appropriate site preparation, tree planting and harvesting.
- 01.09 Incorporate wildlife and recreational components into management plan as appropriate.
- 01.10 Demonstrate knowledge of ordinances related to harvesting and regeneration activities.

02.0 Plan and administer forest inventories--The student will be able to:

- 02.01 Prepare and conduct a statistically based forest inventory using area samples, i.e. fixed-radius plot inventory.
- 02.02 Prepare and conduct a statistically based forest inventory using point sample, i.e. prism inventory.
- 02.03 Operate dendrometers such as tree calipers and diameter tape.
- 02.04 Operate hypsometers such as altimeter, clinometer and relaskop.
- 02.05 Operate hand-held magnetic compass and demonstrate proper pacing procedure in forested situations.
- 02.06 Locate forest tracts using legal description, maps, aerial photos and atlases.
- 02.07 Select and use appropriate volume tables.
- 02.08 Calculate timber volumes by forest products.
- 02.09 Calculate and prepare valuation of forest tract based on product and current market prices.
- 02.10 Prepare "lump sum" timber bid.
- 02.11 Prepare "per unit" timber bid.



- 02.12 Calculate and prepare stand and stock tables.
- 02.13 Calculate and prepare growth projections and regeneration stocking.
- 02.14 Calculate tract averages using maps, aerial photos and/or pacing.
- 03.0 Assist registered land surveyor in location of property corners and boundary lines, road and bridge construction and drainage projects--The student will be able to:
  - 03.01 Set up and operate transit to determine horizontal and vertical angles.
  - 03.02 Set up and operate level to determine forest topography and contours.
  - 03.03 Determine proper horizontal distance using tape (chain) and/or electronic distance measuring (EDM) device.
  - 03.04 Identify forest tracts based on legal description and write proper legal description for given forest tract.
  - 03.05 Conduct an on-the-ground survey and, using field notes, correct and close traverse, determine acreage and prepare map.
  - 03.06 Locate and mark forest tract corners and boundary lines.
  - 03.07 Determine forest road location and identify on the ground.
  - 03.08 Determine drainage patterns for watershed and locate proper stream crossing points.
  - 03.09 Determine proper stream crossing device, i.e. culvert, portable bridge, permanent bridge.
  - 03.10 Obtain proper permits for stream crossings, i.e. culverts, bridges.
  - 03.11 Prepare map of forest tract using GIS, when available.
  - 03.12 Assist land surveyor with use of Global Positioning System (GPS).
- 04.0 Prepare and administer forest fire and smoke management plans and assist in forest fire suppression and control--The student will be able to:
  - 04.01 Demonstrate knowledge of various firing techniques.
  - 04.02 Demonstrate knowledge of weather conditions as related to forest fire-prescribed and wildfire - and smoke management.
  - 04.03 Select proper firing techniques based on landowner objectives and weather conditions.
  - 04.04 Demonstrate knowledge of fire suppression tools and equipment, both hand tools and mechanical.
  - 04.05 Demonstrate knowledge of pre-suppression forest fire activities.
  - 04.06 Evaluate acreage and damages of wildfire and recommend future forest management activities to renew resource.
  - 04.07 Plan and administer a fire and smoke management plan including proper burning authorizations.
  - 04.08 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").
- 05.0 Identify major forest tree species--The student will be able to:
  - 05.01 Identify major forest tree species of the United States by scientific name, common name and habitat.
  - 05.02 Identify major commercial forest species of the Southeast United States by scientific name, common name, habitat and commercial products derived from species.

- 05.03 Identify major commercial forest species of Florida, with or without foliage, by personal observation using the five senses.
- 05.04 Use dichotomous key to identify unfamiliar species.
- 06.0 Identify and control major forest insects and diseases--The student will be able to:
  - 06.01 Identify major forest insects and diseases of the United States by scientific name, common name and damage inflicted.
  - 06.02 Identify major forest insects and diseases of the Southeast United States by scientific name, common name, symptoms, damage inflicted and recommendations for control.
  - 06.03 Identify major forest insects and diseases of Florida in the forest by personal observation and recommend appropriate controls.
  - 06.04 Demonstrate knowledge of chemical and biological control of forest pests.
  - 06.05 Where required, become properly licensed to handle and apply insecticides.
  - 06.06 Evaluate damages by forest insects and diseases and make recommendations for future forest management.
- 07.0 Evaluate forest ecosystems--The student will be able to:
  - 07.01 Demonstrate knowledge of the major forest ecosystems of the United States.
  - 07.02 Identify the major forest ecosystems of Florida.
  - 07.03 Identify the relationship between human activities and forest flora and fauna.
  - 07.04 Demonstrate knowledge of carrying capacities and ecological niches.
  - 07.05 Identify endangered species of Florida and associated regulations and/or recommended forest practices.
  - 07.06 Demonstrate knowledge of threatened species of Florida and associated regulations and/or recommended forest practices.
  - 07.07 Demonstrate knowledge of forest ecosystem practices on both private and public lands.
- 08.0 Evaluate forest soils with respect to chemical and fertilizer applications and hydrology--  
The student will be able to:
  - 08.01 Demonstrate knowledge of the major forest soil types in the Southeastern United States.
  - 08.02 Identify and classify the major forest soil types of Florida.
  - 08.03 Identify types, uses and application rates of approved forest herbicides.
  - 08.04 Prepare and execute a herbicide plan.
  - 08.05 Where required, become properly licensed to handle and apply forest herbicides.
  - 08.06 Identify fertilizer formulations applicable to Florida forest soils.
  - 08.07 Identify proper fertilizer formulations rates with proper soil type on Florida forest soils.
  - 08.08 Define major watersheds and hydrology of a given forest area.
  - 08.09 Demonstrate knowledge of Best Management Practices (BMP), especially streamside management zones (SMZ).
  - 08.10 Identify and locate SMZ on the ground.
  - 08.11 Obtain proper permits relating to stream crossings, ditching, cut and fill and wetland harvesting.
- 09.0 Collect, maintain and/or analyze data and records--The student will be able to:

- 09.01 Collect field data from forest inventory and enter into personal computer.
  - 09.02 Demonstrate knowledge of portable data terminals and personal computers.
  - 09.03 Setup and supervise equipment maintenance and service schedules.
  - 09.04 Setup and maintain files of technical forestry information.
  - 09.05 Setup spreadsheet on personal computer and analyze data.
  - 09.06 Setup and maintain personnel files.
  - 09.07 Setup and maintain accounting systems for billings and/or payments on wood accounts.
  - 09.08 Demonstrate knowledge of federal, state and local regulations related to forestry practices.
  - 09.09 Determine owning and operating costs for equipment, depreciation schedules and interest capitalization.
  - 09.10 Record and maintain accident reports and records.
  - 09.11 Setup and maintain inventory system.
- 10.0 Prepare, analyze and enforce contracts and other legal documents--The student will be able to:
- 10.01 Demonstrate knowledge of types of contracts and legal documents related to forestry practices.
  - 10.02 Select proper timber sale contract for given situation and prepare and execute same under supervision of forester and/or legal counsel.
  - 10.03 Prepare and execute equipment lease.
  - 10.04 Prepare and execute land lease under supervision of forester and/or legal counsel.
  - 10.05 Prepare and execute other leases, such as hunting, mineral, bee and grazing, under supervision of forester and/or legal counsel.
  - 10.06 Demonstrate knowledge of equipment insurance.
  - 10.07 Obtain and maintain proper licensure, certifications and registrations.
  - 10.08 Maintain file of network of agencies or other sources of assistance and/or regulation.
- 11.0 Supervise contractors and sub-contractors--The student will be able to:
- 11.01 Demonstrate knowledge of various approaches to management of people and/or organizations.
  - 11.02 Communicate clearly and concisely project expectations and requirements, both verbally and written.
  - 11.03 Successfully mediate conflicts involving contractors and sub-contractors.
  - 11.04 Negotiate contracts with contractor and sub-contractor.
  - 11.05 Negotiate and enforce time/work schedules for contractor and sub-contractor.
  - 11.06 Demonstrate knowledge of safety practices and regulations, especially Occupational Safety and Health Administration (OSHA), related to forestry, and wage and hour laws.
- 12.0 Supervise and train forest technicians and other employees--The student will be able to:
- 12.01 Demonstrate knowledge of various management styles and human personalities.
  - 12.02 Demonstrate knowledge of company, agency or organization management structures.

- 12.03 Demonstrate knowledge of company, agency or organization objectives, goals and expectations.
- 12.04 Communicate clearly and concisely with trainee/employee, both verbally and written.
- 12.05 Demonstrate knowledge of basic teaching-learning techniques and styles.
- 13.0 Demonstrate communication and managerial skills--The student will be able to:
  - 13.01 Demonstrate ability to communicate properly with others by written and verbal method.
  - 13.02 Identify abilities and limitations of workforce and place workers accordingly.
  - 13.03 Demonstrate knowledge of modern technology such as personal computer, fax machines, copy machines, and portable electronic equipment.
  - 13.04 Properly use telephone systems, including phone etiquette.
  - 13.05 Prepare and deliver public speech to social, civic or other groups.
  - 13.06 Demonstrate basic knowledge of different types of media.
  - 13.07 Prepare media release.
  - 13.08 Prepare a current resume.
  - 13.09 Demonstrate knowledge of interviewing techniques.
  - 13.10 Plan and administer effective work flow and/or trail.
- 14.0 Administer the purchase, sale and/or marketing of forest products--The student will be able to:
  - 14.01 Demonstrate knowledge of various forest products and markets.
  - 14.02 Identify Florida forest products and current market valuations.
  - 14.03 Identify timber harvesting systems used in Southeast United States.
  - 14.04 Demonstrate knowledge of operation and maintenance of timber harvesting equipment, including safety practices.
  - 14.05 Prepare and execute a timber sale, either lump sum or per unit.
  - 14.06 Supervise timber harvesting activities.
  - 14.07 Scale forest products.
  - 14.08 Maintain network of forest product manufacturers and/or processors.
- 15.0 Demonstrate effective human resource skills as a paraprofessional manager--The student will be able to:
  - 15.01 Demonstrate knowledge of supervisory skills.
  - 15.02 Review and evaluate job applications, including resumes.
  - 15.03 Develop appropriate job description.
  - 15.04 Interview prospective employees based on job description.
  - 15.05 Evaluate employees.
- 16.0 Prepare and effect work schedules--The student will be able to:
  - 16.01 Demonstrate knowledge of computer-based scheduling.
  - 16.02 Prepare work schedules utilizing data-bases or spread sheets.
  - 16.03 Manipulate work schedules based on employer and employee needs.
  - 16.04 Demonstrate knowledge of federal, state and local workforce regulations.
- 17.0 Demonstrate decision-making skills--The student will be able to:

- 17.01 Make appropriate job-related decisions.
- 17.02 Demonstrate knowledge of listening skills.
- 17.03 Justify management decisions.
- 17.04 Encourage employee participation in decision-making process.

18.0 Demonstrate skills in effective conflict resolution--The student will be able to:

- 18.01 Demonstrate basic negotiating skills.
- 18.02 Demonstrate ability to listen to all factors and all sides of an issue.
- 18.03 Effect compromise between conflicting parties.
- 18.04 Create situation where all parties are satisfied with decisions.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	<b>AS</b>	<b>AAS</b>
CIP Number	1317051200	0317051200
Program Type	College Credit	College Credit
Standard Length	73 credit hours	73 credit hours
CTSO	HOSA	HOSA
SOC Codes (all applicable)	29-2056, 31-9099	29-2056, 31-9099
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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 veterinary industry within 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. Program approval is defined as being approved by the Committee on Veterinary Technician Education and Activities (CVTEA).

The Health Careers Core must be taken by all students (secondary, postsecondary adult and postsecondary vocational) planning to complete any Health Occupations program. Once successfully completed, the core does not need to be repeated at any instructional level.

Reinforcement of basic skills in English, mathematics, and science appropriate for the job preparatory programs occurs 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 health care industry; planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

### **Program Structure**

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

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

This program meets the Department of Health HIV/AIDS and domestic violence education requirements. Upon completion of this program the instructor will provide a certificate to the student verifying that the HIV/AIDS and domestic violence requirements have been met.

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

Health Occupations Students of America, Inc. (HOSA) 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 as identified on the secondary student's 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 postsecondary service provider. 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.

### **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 73 credit hours according to Rule 6A-14.030, F.A.C.

## **Standards**

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

### **Health Careers Core (01-11) OCP A-Basic Healthcare Worker-Title- SOC 31-9099 Healthcare Support Worker, All Other**

- 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 legal and ethical responsibilities.
- 04.0 Demonstrate an understanding of and apply wellness and disease concepts.
- 05.0 Recognize and practice safety and security procedures.
- 06.0 Recognize and respond to emergency situations.
- 07.0 Recognize and practice infection control procedures.
- 08.0 Demonstrate an understanding of information technology applications in healthcare.
- 09.0 Demonstrate employability skills.
- 10.0 Demonstrate knowledge of blood borne diseases, including AIDS.
- 11.0 Apply basic math and science skills.

### **Veterinary Technician (12-29) SOC Code 29-2056 (Veterinary Technologists and Technicians)**

- 12.0 Perform office procedures utilized in the management of a veterinary office.
- 13.0 Demonstrate an understanding of animal pharmacology by the proper handling and use of related drugs.
- 14.0 Perform under supervision, physical examinations, and laboratory procedures.
- 15.0 Assist with routine surgical and obstetrical procedures.
- 16.0 Prepare animals for surgical procedures.
- 17.0 Assist with anesthesia under supervision.
- 18.0 Perform surgical clean-up.
- 19.0 Perform large and small animal nursing techniques.
- 20.0 Perform urinalysis laboratory procedures.
- 21.0 Perform hematology laboratory procedures.
- 22.0 Perform parasitology laboratory procedures.
- 23.0 Perform microbiology laboratory procedures.
- 24.0 Perform necropsy laboratory procedures.
- 25.0 Perform cytology laboratory procedures.
- 26.0 Perform veterinary radiographic procedures.
- 27.0 Demonstrate research techniques on laboratory animals.
- 28.0 Apply knowledge of hospital management and equipment standards.
- 29.0 Apply knowledge of professional ethics, jurisprudence and professionalism.



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Veterinary Technology  
**CIP Numbers:** 1317051200 AS, 0317051200 AAS  
**Program Length:** 73 credit hours  
**SOC Code(s):** 29-2056, 31-9099

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Demonstrate knowledge of the health care delivery system and health occupations --  
The student will be able to:

- 01.01 Identify the basic components of the health care delivery system including public, private, government and non-profit.
- 01.02 Identify common methods of payment for healthcare services.
- 01.03 Describe the various types of healthcare providers and the range of services available including resources to victims of domestic violence.
- 01.04 Describe the composition and functions of a healthcare team.
- 01.05 Identify the general roles and responsibilities of the individual members of the healthcare team.
- 01.06 Identify the roles and responsibilities of the consumer within the healthcare delivery system.
- 01.07 Identify characteristics of effective teams.
- 01.08 Recognize methods for building positive team relationships.
- 01.09 Analyze attributes and attitudes of an effective leader.
- 01.10 Recognize factors and situations that may lead to conflict.
- 01.11 Demonstrate effective techniques for managing team conflict.
- 01.12 Describe factors that influence the current delivery system of healthcare.
- 01.13 Explain the impact of emerging issues including technology, 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 medical terminology and abbreviations.
- 02.07 Recognize the importance of courtesy and respect for patients and other healthcare workers and maintain good interpersonal relationships.
- 02.08 Recognize the importance of patient/client educations regarding 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 Recognize elements of communication using a sender-receiver model.
  - 02.11 Distinguish between and report subjective and objective information.
  - 02.12 Report relevant information in order of occurrence.
- 03.0 03.0 Demonstrate legal and ethical responsibilities -- The student will be able to:
- 03.01 Discuss the legal framework of the healthcare occupations including scope of practice legislation.
  - 03.02 Explain practices that could result in malpractice, liability and/or negligence.
  - 03.03 Demonstrate procedures for accurate documentation and record keeping.
  - 03.04 Interpret healthcare facility policy and procedures.
  - 03.05 Explain the "Patient's Bill of Rights".
  - 03.06 Identify standards of the Health Insurance Portability and Accountability Act (HIPAA).
  - 03.07 Describe advance directives.
  - 03.08 Describe informed consent.
  - 03.09 Explain the laws governing harassment, labor and employment.
  - 03.10 Differentiate between legal and ethical issues in healthcare.
  - 03.11 Describe a code of ethics consistent with the healthcare occupation.
  - 03.12 Identify and compare personal, professional, and organizational ethics.
  - 03.13 Recognize the limits of authority and responsibility of healthcare workers.
  - 03.14 Recognize and report illegal and/or unethical practices of healthcare workers.
  - 03.15 Recognize and report abuse including domestic violence and neglect.
- 04.0 04.0 Demonstrate an understanding of and apply wellness and disease concepts -- The student will be able to:
- 04.01 Describe strategies for prevention of diseases including health screenings and examinations.
  - 04.02 Identify personal health practices and environmental factors which affect optimal function of each of the major body systems.
  - 04.03 Identify psychological reactions to illness including defense mechanisms.
  - 04.04 Identify complimentary and alternative health practices.
  - 04.05 Discuss the adverse effects of the use of alcohol, illegal drugs, steroids and other high-risk behaviors on the human body.
  - 04.06 Explain the basic concepts of positive self image, wellness and stress.
  - 04.07 Develop a wellness and stress control plan that can be used in personal and professional life.
  - 04.08 Explain the nutrition pyramid.
  - 04.09 Recognize the steps in the grief process.
- 05.0 05.0 Recognize and practice safety and security procedures -- The student will be able to:
- 05.01 Recognize safe and unsafe working conditions and report safety hazards.
  - 05.02 Demonstrate the safe use of medical equipment.
  - 05.03 Identify and practice security procedures for medical supplies and equipment.
  - 05.04 Demonstrate personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations (including standard precautions).

- 05.05 Recognize Materials Data Safety Sheets (MSDS) and comply with safety signs, symbols and labels.
  - 05.06 Demonstrate proper body mechanics and ergonomics.
  - 05.07 Demonstrate the procedure for properly identifying patients.
  - 05.08 Demonstrate procedures for the safe transport and transfer of patients.
  - 05.09 Describe fire, safety, disaster and evacuations procedures.
  - 05.10 Discuss JCAHO patient safety goals ([www.jcaho.org](http://www.jcaho.org))
- 06.0 Recognize and respond to emergency situations -- The student will be able to:
- 06.01 Monitor and record vital signs.
  - 06.02 Describe legal parameters relating to the administration of emergency care.
  - 06.03 Obtain and maintain training or certification on cardiopulmonary resuscitation (CPR), automated external defibrillator (AED), foreign body airway obstruction (FBAO) and first aid.
  - 06.04 Recognize adverse drug related emergencies and take appropriate first aid action.
- 07.0 Recognize and practice infection control procedures -- The student will be able to:
- 07.01 Define principles of infection control.
  - 07.02 Demonstrate knowledge of medical asepsis and practice procedures such as hand-washing and isolation.
  - 07.03 Demonstrate knowledge of surgical asepsis.
  - 07.04 Describe how to dispose correctly of biohazardous materials according to appropriate government guidelines such as OSHA.
- 08.0 Demonstrate an understanding of information technology applications in healthcare --  
The student will be able to:
- 08.01 Describe the uses of computers in healthcare. .
  - 08.02 Define terms and demonstrate basic computer skills.
  - 08.03 Recognize technology applications in healthcare.
  - 08.04 Interpret information from electronic medical documents.
  - 08.05 Identify methods of communication to access and distribute data such as fax, e-mail and internet.
- 09.0 Demonstrate employability skills -- The student will be able to:
- 09.01 Identify personal traits or attitudes desirable in a member of the healthcare team.
  - 09.02 Define basic professional standards of healthcare workers as they apply to hygiene, dress, language, confidentiality and behavior (i.e. courtesy and self-introductions).
  - 09.03 Identify documents that may be required when applying for a job.
  - 09.04 Write an appropriate resume.
  - 09.05 Conduct a job search.
  - 09.06 Complete a job application form correctly.
  - 09.07 Demonstrate competence in job interview techniques.
  - 09.08 Recognize levels of education, credentialing requirements, employment opportunities, workplace environments and career growth potential.
  - 09.09 Identify acceptable work habits.

- 09.10 Recognize appropriate affective/professional behavior.
- 09.11 Compare careers within the health science career pathways (diagnostic services, therapeutic services, health informatics, support services or biotechnology research and development).
- 10.0 Demonstrate knowledge of blood borne diseases, including aids -- The student will be able to:
  - 10.01 Recognize emerging diseases and disorders
  - 10.02 Distinguish between fact and fallacy about the transmission and treatment of diseases caused by blood borne pathogens including Hepatitis B.
  - 10.03 Identify community resources and services available to the individuals with diseases caused by blood borne pathogens.
  - 10.04 Identify "at risk" behaviors which promote the spread of diseases caused by blood borne pathogens and the public education necessary to combat the spread of these diseases.
  - 10.05 Apply infection control techniques designed to prevent the spread of diseases caused by blood borne pathogens to the care of all patients following Centers for Disease Control (CDC) guidelines.
  - 10.06 Demonstrate knowledge of the legal aspects of AIDS, including testing.
- 11.0 Apply basic math and science skills -- The student will be able to:
  - 11.01 Draw, read, and report on graphs, charts and tables.
  - 11.02 Measure time, temperature, distance, capacity, and mass/weight.
  - 11.03 Make and use measurements in both traditional and metric units.
  - 11.04 Make estimations and approximations and judge the reasonableness of the result.
  - 11.05 Convert from regular to 24 hour time.
  - 11.06 Demonstrate ability to evaluate and draw conclusions.
  - 11.07 Organize and communicate the results obtained by observation and experimentation.
  - 11.08 Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solution of such questions.
  - 11.09 Calculate ratios.

**Veterinary Technician (12-29):** Students completing intended outcomes 12-29 have met the requirements for the occupational completion point of veterinary technicians and veterinary technologists. SOC Code 29-2056 (Veterinary Technologists and Technicians) Applicants for the certification examination given by the Florida Veterinary Medical Association must be graduates of an approved two-year program.

- 12.0 Perform office procedures utilized in the management of a veterinary office--The student will be able to:
  - 12.01 Make appointments.
  - 12.02 List and describe appropriate information on state/federal health regulations and prepare health and vaccination certificated for signatures.
  - 12.03 Admit patients, take history, and maintain records.
  - 12.04 Demonstrate basic filing of x-rays, lab reports, etc.

- 12.05 Demonstrate client and public relations in the reception, discharge and educating of clients.
  - 12.06 Demonstrate knowledge of ethics and jurisprudence as related to veterinary technology.
  - 12.07 Demonstrate knowledge of First-Aid and CPR as they relate to animal care.
  - 12.08 Identify documentation procedures for responding to veterinarian medical emergencies.
  - 12.09 Practice basic cleanliness and orderliness in relationship to the on-going activity of a veterinary facility (including hospital, clinic, center, practice, laboratory, etc.).
  - 12.10 Demonstrate the knowledge of the technician's role in generation of veterinary practice income.
  - 12.11 Demonstrate basic bookkeeping.
  - 12.12 Demonstrate business letter and report writing.
  - 12.13 Use a computer to perform simple word processing for veterinary office billing and recordkeeping.
- 13.0 Demonstrate an understanding of animal pharmacology by the proper handling and use of related drugs--The student will be able to:
- 13.01 Identify and discuss general types and groups of drugs.
  - 13.02 Label and package dispensed drugs correctly.
  - 13.03 Read and fill prescriptions.
  - 13.04 Calculate dosages.
  - 13.05 Store and handle biologic and therapeutic agents appropriately.
  - 13.06 Identify controlled substances and identify controlled handling.
  - 13.07 Diagram and describe inventory control.
  - 13.08 Prepare medications.
  - 13.09 Discuss the signs of adverse drug reactions.
  - 13.10 Use and explain appropriate routes and methods of drug administration.
- 14.0 Perform under supervision, physical examinations, and laboratory procedures--The student will be able to:
- 14.01 List "normal" temperature, pulse and respiration in all common species.
  - 14.02 Use proper medical terminology in oral and written communications as related to veterinary technology.
  - 14.03 Perform under supervision and explain to clients immunizations, procedure, types, and schedules.
  - 14.04 Identify common breeds of large, small and laboratory animals.
  - 14.05 Restrain patients by: removing from and placement in restraint of small and laboratory animals in/on cages/tables; haltering horses and cattle, basic rope usage and knot tying, application of nose tongs, twitch, hog holder, Elizabethan collar, dog safety muzzle, sheep restraint, bovine tail restraint, hose leg restraint, restraint of birds and operation of cattle chute.
  - 14.06 Identify heart and lung sounds with stethoscope.
  - 14.07 Explain routine hospital procedures (e.g. surgeries, dental work, worming, patient care, etc.).
  - 14.08 Explain and use knowledge of general nutritional requirements and practical approach to feeding common species.
  - 14.09 Collect blood, skin scrapings, administer specific drugs under supervision of veterinarian.

- 14.10 Obtain and record patient history.
- 14.11 Describe training of companion animals and correction of behavior problems.
- 14.12 Identify common grains, grass, hay.
- 14.13 Identify common poisonous plants.

15.0 Assist with routine surgical and obstetrical procedures--The student will be able to:

- 15.01 Describe and identify knowledge of the following routine surgical procedures:
  - ovariohysterectomy - dogs and cats
  - Cesarean section - all common species
  - orthopedic procedures
  - castration - all common species
  - tail docking- pups and lambs
  - laparotomies- all common species
  - dystocias in common species - recognition of obstetrical equipment
  - dehorning - cattle and goats
  - prolapse - common species and incidence
- 15.02 Describe and demonstrate knowledge to assist in the artificial insemination techniques and equipment in various species and discuss pregnancy examination.

16.0 Prepare animals for surgical procedures--The student will be able to:

- 16.01 Prepare surgical sites - aseptic techniques.
- 16.02 Clean surgical instruments.
- 16.03 Prepare sterile surgical packs.
- 16.04 Prepare and use gowns, masks, gloves, and drapes.
- 16.05 Sterilize instruments and supplies using steam and cold methods.
- 16.06 Identify instruments.
- 16.07 Operate and maintain autoclaves.
- 16.08 Sanitize operating room and care for used equipment.
- 16.09 Identify and use common suture materials, types, etc.
- 16.10 Position patients for common procedures.
- 16.11 Arrange lighting during surgery.
- 16.12 Demonstrate knowledge of gas sterilization of instruments and supplies.

17.0 Assist with anesthesia under supervision--The student will be able to:

- 17.01 List and describe the pre-operative medications, local anesthesia, regional anesthesia and general anesthesia, including species variation and types of IV anesthesia, inhalant anesthesia (methoxy-flurane, halothane, nitrous oxide), induction, and those requiring the use of endotracheal tube suplus, equipment types and operation, chemical restraints and muscle relaxants.
  - 17.01.01 Anesthetic monitoring:
    - 17.01.01.1 use of esophageal stethoscope
    - 17.01.01.2 EKG usage and audible monitoring
    - 17.01.01.3 stages and planes of anesthesia - recognition of clinical signs of stages and planes and understanding of significance of stages and planes.

- 17.01.02 Recognition of anesthetic emergencies requiring resuscitation, respirators and describe anesthetic antagonists and their use.
- 17.01.03 Monitoring and care during anesthetic recovery
- 17.01.04 Care and maintenance of anesthetic machine
- 17.01.05 Waste anesthetic gas disposal and knowledge of human toxicity
- 17.02 Assist surgically with instrument handling, maintenance of asepsis, care of exposed tissues and organs, obstetrical assistance and operative records.

18.0 Perform surgical clean-up--The student will be able to:

- 18.01 Describe and perform surgical clean-up including equipment, surgical room or area, instruments, patient, personnel and proper disposal of waste and tissue.

19.0 Perform large and small animal nursing techniques--The student will be able to:

- 19.01 Demonstrate injection techniques including intravenous, subcutaneous, intramuscular, intradermal, intraperitoneal and sublingual.
- 19.02 Demonstrate intravenous catheterization including the jugular vein and cephalic and saphenous vein (small animals).
- 19.03 Maintain fluid therapy (maintain catheter placement, determining and maintaining correct rate).
- 19.04 Describe and perform pre and post-operative patient care.
- 19.05 Administer oral medication by means of dose syringe, balling gun, oral speculum, hand pilling - small animals and gastric lavage - small animals.
- 19.06 Demonstrate bandaging techniques.
- 19.07 Apply and remove casts and splints.
- 19.08 Perform suture removal.
- 19.09 Apply emergency splint application.
- 19.10 Perform dental prophylaxis, using hand and machine techniques.
- 19.11 Perform therapeutic bathing, grooming, and dipping of small animals.
- 19.12 Demonstrate routine recordkeeping, care, and observation of hospitalized patients.
- 19.13 Practice stomach tubing of dogs, cats, cattle and sheep.
- 19.14 Describe and perform intramammary treatment (mastitis therapy only).
- 19.15 Implement patient and personnel safety measures.
- 19.16 Describe and perform orphan animal care of small, large and exotic animals.
- 19.17 Feed preparation and prescription diets to animals.
- 19.18 Clean and care for cages, kennels, and stalls.
- 19.19 Practice nail trimming for dogs, cats, and birds, and beak-trimming for birds.
- 19.20 Practice equine leg and tail wraps.
- 19.21 Express canine anal sacs.
- 19.22 Practice blood collection and transfusion.
- 19.23 Practice ear cleaning and dressing.
- 19.24 Demonstrate enema administration.
- 19.25 Demonstrate catheterization of urinary tract of canine, feline and large animals.
- 19.26 Take and examine skin scrapings.
- 19.27 Demonstrate emergency care of trauma patients.
- 19.28 Clean, prep, and medicate wounds or abscesses.
- 19.29 Apply topical medication to the eye.
- 19.30 Describe and perform nursing care of newborns.
- 19.31 Care and repair equipment.

- 19.32 Prepare for equine vaginal examination and cervical culture.
- 19.33 Demonstrate bovine mastitis testing.
- 19.34 Demonstrate bovine, equine, ovine, and porcine hoof trimming.
- 19.35 Mark and tattoo animals (sites and purposes).
- 19.36 Practice physical therapy.
- 19.37 Demonstrate sheath cleaning-equine.

20.0 Perform urinalysis laboratory procedures--The student will be able to:

- 20.01 Perform and demonstrate skill in the following: Urinalysis, sample collection, physical properties, color, clarity, specific gravity including urometer, refractometer and chemical properties, dipstick and tablet tests, microscopic sediment exam and chemical evaluation of calculi.

21.0 Perform hematology laboratory procedures--The student will be able to:

- 21.01 Perform and demonstrate skill in the following: Hematology:
  - 21.01.01 Sample Collection procedures of all types
  - 21.01.02 CBC
    - 21.01.02.1 hemoglobin
    - 21.01.02.2 hematocrit
    - 21.01.02.3 sedimentation rate
    - 21.01.02.4 total protein (refractometer)
    - 21.01.02.5 white cell count
      - glass pipette
      - unopette
      - automatic cell counter
    - 21.01.02.6 red cell count
      - glass pipette
      - unopette
      - automatic cell counter
    - 21.01.02.7 microscopic exam
      - preparation of blood film
      - staining with a variety of Romanowsky like stain
      - leukocyte differential - normal/abnormal
      - RBC morphology evaluation -normal/abnormal
      - platelet estimation
      - calculation of absolute value
      - white blood cell correction for nucleated red cells
  - 21.01.03 Reticulocyte count
  - 21.01.04 Platelet count
  - 21.01.05 Total eosinophil count
  - 21.01.06 Blood parasite identification
    - 21.01.06.1 dirofilaria sp
      - direct blood exam
      - hematocrit tube method
      - knotts test
      - filter test
      - heartworm kit
    - 21.01.06.2 anaplasma sp
    - 21.01.06.3 babesia sp



- 21.01.06.4 trypanosoma sp
- 21.01.06.5 eperythrozoan sp
- 21.01.07 Coagulation to include knowledge of clotting principles, knowledge of one-step prothrombin time, knowledge of partial thromboplastin time and knowledge of fibrinogen assay.
- 21.01.08 Chemistries
  - 21.01.08.1 use of various types of instruments
  - 21.01.08.2 perform common tests (BUN, glucose, common enzymes, etc.)
  - 21.01.08.3 pregnancy tests (MIP tests)
  - 21.01.08.4 theory of colorimetry and photometry
  - 21.01.08.5 Serology - perform various types of slide/card agglutinations
  - 21.01.08.6 cross matching
  - 21.01.08.7 Coombs' test
  - 21.01.08.8 canine brucellosis

22.0 Perform parasitology laboratory procedures--The student will be able to:

22.01 Perform and demonstrate skill in the following: Parasitology:

- 22.01.01 Sample collection
- 22.01.02 External parasites
  - 22.01.02.1 sample preparation
  - 22.01.02.2 identification of common ectoparasites
    - mites
    - lice
    - ticks
  - 22.01.02.3 Internal parasites
    1. fecal floatation techniques
    2. identification of parasites and their ova
      - nematodes
      - trematodes
      - cestodes
      - flukes
    3. knowledge of parasite life cycles

22.02 Perform and demonstrate skill in coprology, occult blood and fecal fat, trypsin.

23.0 Perform microbiology laboratory procedures--The student will be able to:

23.01 Perform and demonstrate skill in the following: Microbiology:

- 23.01.01 Sample collection
- 23.01.02 Bacteriology to include culture and sensitivity, identification of common bacteria, common biological tests and staining procedures.
- 23.01.03 Mycology to include fungal culture and wet mount and identification of common fungi.
- 23.01.04 Virology to include principles of sampling and testing
- 23.01.05 Principles of immunology

24.0 Perform necropsy laboratory procedures--The student will be able to:

- 24.01 Perform and demonstrate skill in necropsy procedures such as sample collection, storage and shipment, disposal of dead animals, Euthanasia procedures and handling of rabies suspects.
- 25.0 Perform cytology laboratory procedures--The student will be able to:
- 25.01 Perform and demonstrate skill in the following: Cytology:
- 25.01.01 Sample collection techniques for cytologic specimens to include color and clarity before and after centrifugation, specific gravity, total protein, white cell count, smear preparation and staining procedure and basic cell identification (normal and common abnormal).
  - 25.01.02 Joint fluids to include color and clarity before and after centrifugation, specific gravity, total protein, viscosity, mucin precipitate test, white cell count (WBC pipette and saline diluent only), smear preparation and staining procedure and basic cell identification (normal and common abnormal).
  - 25.01.03 Cerebrospinal fluids to include color and clarity before and after centrifugation, specific gravity, quantitative protein, red and white cell count, smear preparation and staining procedures, and basic cell identification (normal and common abnormal).
  - 25.01.04 Airway washings (tracheal washes, nasal flushes, etc.)
    - 25.01.04.1 smear preparation and staining procedures
    - 25.01.04.2 basic cell identification (normal and abnormal)
    - 25.01.04.3 Tissue aspirates and impressions
    - 25.01.04.4 smear preparation and staining procedures
    - 25.01.04.5 basic cell identification (normal and common abnormal)
  - 25.01.05 Bone marrow's to include smear preparation and staining procedure, basic cell identification (normal and common abnormal) and M/E ratio.
  - 25.01.06 Vaginal smears to include slide preparation and staining procedures, basic cell identification (normal and common abnormal) and knowledge of estrous cycle.
  - 25.01.07 Semen evaluation to include collection techniques, slide preparation and staining procedures, sperm count, and identification of abnormal sperm types.
- 25.02 Perform and demonstrate skill in the following miscellaneous laboratory procedures, such as preparation, preservation, and shipment of laboratory samples, care and maintenance of laboratory equipment, quality control (normal and abnormal controls), initiation and maintenance of laboratory records, basic principles of laboratory safety and preparation of common reagents.
- 26.0 Perform veterinary radiographic procedures--The student will be able to:
- 26.01 Perform and demonstrate the following radiographic procedures:
- 26.01.01 Implement safety measures.
  - 26.01.02 Prepare and use technique charts.
  - 26.01.03 Take and process diagnostic radiographs including small, large and laboratory or exotic animal positioning and techniques.
  - 26.01.04 Use darkroom procedures including hand processing and automatic processing.
  - 26.01.05 Replace or replenish developer and fixer.
  - 26.01.06 Demonstrate film labeling, filing, and storage.

- 26.01.07 Maintain radiographic quality control.
- 26.01.08 Maintain equipment including hanging or storage of gloves or aprons, cleaning screens, detecting or suspecting faulty equipment operation.
- 26.01.09 Proper use of both stationary and portable x-ray machines.
- 26.01.10 Perform special radiographic techniques (including contrast media studies).

27.0 Demonstrate research techniques on laboratory animals--The student will be able to:

- 27.01 Explain basic principles of research, and necessity for use of laboratory animals.
- 27.02 Identify and restrain common species of small laboratory animals.
- 27.03 Determine sex of laboratory animals.
- 27.04 Perform and/or supervise basic animal care procedure, e.g. feeding, watering, breeding, identification, and handling.
- 27.05 Administer or inject drugs or medicaments using appropriate sites and routes.
- 27.06 Collect body tissues or fluids.
- 27.07 Demonstrate knowledge of gnotobiotic techniques.
- 27.08 Perform oral dosing (intubation, blunt needle, stomach tube)
- 27.09 Anesthetize laboratory animals.
- 27.10 Identify common disease signs of laboratory animals.
- 27.11 Identify species of non-human primates.

28.0 Apply knowledge of hospital management and equipment standards--The student will be able to:

- 28.01 Demonstrate knowledge of the principles of infection control, cross contamination, and zoonosis.
- 28.02 Maintain inventory of supplies, medications and disposables.
- 28.03 Demonstrate knowledge of personnel management, assignments.
- 28.04 Determine personnel needs on each shift.
- 28.05 Perform routine maintenance checks and monitor equipment use.
- 28.06 Describe risk management techniques.

29.0 Apply knowledge of professional ethics, jurisprudence and professionalism--The student will be able to:

- 29.01 List the benefits of belonging to a professional organization of animal techniques.
- 29.02 Describe the technician/veterinarian relationship.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

	<b>AS</b>	<b>AAS</b>
CIP Number	1715059901	0715059901
Program Type	College Credit	College Credit
Standard Length	64 credit hours	64 credit hours
CTSO	N/A	N/A
SOC Codes (all applicable)	19-4091	19-4091
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</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 & 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 environmental science industry within the Agriculture, Food & 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.

### **Program Structure**

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

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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: (1) a training plan signed by the student, the instructor and the employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; and (2) a work station which reflects equipment, skills, and tasks relevant to the student's career goal. Students must receive compensation for work performed.

In accordance with State Board of Education Rule 6A-10.0315, minimum basic skill levels have been established for admittance into a college associate degree program.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Program Length**

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 64 credit hours according to Rule 6A-14.030, F.A.C.

## **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/AAS degree program includes the following College Credit Certificates:

- Assessment and Safety Compliance Specialist (0715059905) – 13 hours
- Hazardous Materials Specialist (0715059906) – 14 hours
- Mold Assessment Specialist (0715059908) – 16 hours

Mold Remediation Specialist (0715059909) – 13 hours  
Water Quality Technician (0715059907) – 12 hours

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

### **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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Environmental Science Technology  
**CIP Numbers:** 1715059901 AS, 0715059901 AAS  
**Program Length:** 64 credit hours  
**SOC Code(s):** 194091

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. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. 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.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Assessment and Safety Compliance Specialist  
**Career Cluster:** Agriculture, Food & Natural Resources

<b>CCC</b>	
CIP Number	0715059905
Program Type	College Credit Certificate (CCC)
Program Length	13 credit hours
CTSO	N/A
SOC Codes (all applicable)	192041
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/AAS degree program (1715059901/0715059901).

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 & 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 environmental science industry within the Agriculture, Food & 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.

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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: (1) a training plan signed by the student, the instructor and the employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; and (2) a work station which reflects equipment, skills, and tasks relevant to the student's career goal. Students must receive compensation for work performed.

In accordance with State Board of Education Rule 6A-10.0315, minimum basic skill levels have been established for admittance into a college associate degree program.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Standards**

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

**Intended Outcomes:** After successfully completing this certificate, the student will be able to:

- 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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Assessment and Safety Compliance  
**CIP Number:** 0715059905  
**Program Length:** 13 credit hours  
**SOC Code(s):** 192041

This certificate program is part of the Environmental Science Technology AS/AAS degree program (1715059901/0715059901). 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.
  - 01.05 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.
- 02.0 Demonstrate knowledge of the principles of managing and remediation of air pollution--The student will be able to:
- 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.
  - 02.07 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.
- 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:
  - 06.02 Discuss types and sources of radiation.
  - 06.04 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.
  - 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:
  - 08.02 Secure information about a job.
  - 08.03 Identify documents that may be required when applying for a job.
  - 08.05 Demonstrate competence in job interview techniques.
  - 08.07 Identify acceptable work habits.
  - 08.08 Demonstrate knowledge of how to make job changes appropriately.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

CCC	
CIP Number	0715059906
Program Type	College Credit Certificate (CCC)
Program Length	14 credit hours
CTSO	
SOC Codes (all applicable)	194091
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/AAS degree program (1715059901/0715059901).

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 & 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 environmental science industry within the Agriculture, Food & 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.

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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: (1) a training plan signed by the student, the instructor and the employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; and (2) a work station which reflects equipment, skills, and tasks relevant to the student's career goal. Students must receive compensation for work performed.

In accordance with State Board of Education Rule 6A-10.0315, minimum basic skill levels have been established for admittance into a college associate degree program.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Standards**

After successfully completing this course 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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Hazardous Materials Specialist  
**CIP Number:** 0715059906  
**Program Length:** 14 hours  
**SOC Code(s):** 194091

This certificate program is part of the Environmental Science Technology AS/AAS degree program (1715059901/0715059901). 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.
  - 01.05 Identify types and sources of water contamination.
  - 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.
- 02.0 Demonstrate knowledge of the principles of managing and remediation of air pollution--The student will be able to:
- 02.03 Collect and analyze air samples.
  - 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.
- 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:
- 06.05 Discuss nuclear power plant design, nuclear power hazards, and safety features.
  - 06.06 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.
  - 07.06 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:
- 08.02 Secure information about a job.
  - 08.03 Identify documents that may be required when applying for a job.
  - 08.05 Demonstrate competence in job interview techniques.
  - 08.08 Demonstrate knowledge of how to make job changes appropriately.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Water Quality Technician  
**Career Cluster:** Agriculture, Food & Natural Resources

<b>CCC</b>	
CIP Number	0715059907
Program Type	College Credit Certificate (CCC)
Program Length	12 credit hours
CTSO	N/A
SOC Codes (all applicable)	194091
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/AAS degree program (1715059901/0715059901).

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 & 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 environmental science industry within the Agriculture, Food & Natural Resources career cluster.

The content includes but is not limited to analysis and dispensing of water in accordance with appropriate federal, state, and local laws and regulations. The certificate will cover industry standards such as those included in the Clean Water Act. 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, and the Environmental Protection Agency (EPA); and to control the process to transfer or treat water or liquid waste.

***This program does not prepare individuals for the D, C, B or A level of Water or Wastewater Treatment Facility Operator Certification as those requirements are outlined in Department of Environmental Protection Rule 62-602.***

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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: (1) a training plan signed by the student, the instructor and the employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; and (2) a work station which reflects equipment, skills, and tasks relevant to the student's career goal. Students must receive compensation for work performed.

In accordance with State Board of Education Rule 6A-10.0315, minimum basic skill levels have been established for admittance into a college associate degree program.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Standards**

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

- 01.0 Demonstrate knowledge of the principles of managing and remediation of water pollution.
- 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.
- 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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Water Quality Technician  
**CIP Number:** 0715059907  
**Program Length:** 12 credit hours  
**SOC Code(s):** 194091

This certificate program is part of the Environmental Science Technology AS/AAS degree program (1715059901/0715059901). 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).

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.
- 05.05 Identify and perform the correct analysis for selected parameters listed with state and federal regulations for wastewater effluent.

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:

- 07.08 Discuss the possibilities of contaminants (leachates) seeping into the groundwater.
- 07.09 Discuss the need to have monitoring well located around a sanitary landfill.
- 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.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Mold Assessment Specialist  
**Career Cluster:** Agriculture, Food & Natural Resources

<b>CCC</b>	
CIP Number	0715059908
Program Type	College Credit Certificate (CCC)
Program Length	16 credit hours
CTSO	N/A
SOC Codes (all applicable)	17-3025
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/AAS degree program (1715059901/0715059901).

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 & 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 environmental science industry within the Agriculture, Food & Natural Resources career cluster.

The content includes but is not limited to supervising the analysis, handling, and dispensing of hazardous materials in accordance with appropriate federal, state, and local laws and regulations. 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 and the Clean Air Act.

The Mold Assessment Specialist Certificate will prepare those responsible for assessing mold infestation in homes and businesses and will follow guidelines established by the State of Florida and the Environmental Protection Agency (EPA). Graduates of this certificate program will be able to research applicable local, state, and federal regulations and implement methods and strategies to ensure compliance in regard to mold remediation, mold assessment, and indoor air quality; to maintain records as required by OSHA, and the EPA, to develop and

implement hazardous materials handling procedures and to protect employees/workers/communities from hazardous material exposures.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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: (1) a training plan signed by the student, the instructor and the employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; and (2) a work station which reflects equipment, skills, and tasks relevant to the student's career goal. Students must receive compensation for work performed.

In accordance with State Board of Education Rule 6A-10.0315, Minimum basic skill levels have been established for admittance into a college associate degree program.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

### **Standards**

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

- 02.0 Demonstrate knowledge of the principles of managing and remediation of air pollution.
- 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.
- 08.0 Demonstrate employability skills.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Mold Assessment Specialist  
**CIP Number:** 0715059908  
**Program Length:** 16 credit hours  
**SOC Code(s):** 173025

This certificate program is part of the Environmental Science Technology AS/AAS degree program (1715059901/0715059901). At the completion of this program, the student will be able to:

- 02.0 Demonstrate knowledge of the principles of managing and remediation of air pollution--  
 The student will be able to:
- 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.
  - 02.07 Measure the air pollutant of a specific source.
  - 02.08 Record, interpret and report laboratory analyses.
- 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.
- 08.0 Demonstrate employability skills--The student will be able to:
- 08.02 Secure information about a job.
  - 08.03 Identify documents that may be required when applying for a job.
  - 08.05 Demonstrate competence in job interview techniques.
  - 08.07 Identify acceptable work habits.
  - 08.08 Demonstrate knowledge of how to make job changes appropriately.



2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Mold Remediation Specialist  
**Career Cluster:** Agriculture, Food & Natural Resources

<b>CCC</b>	
CIP Number	0715059909
Program Type	College Credit Certificate (CCC)
Program Length	13 credit hours
CTSO	N/A
SOC Codes (all applicable)	173025
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/AAS degree program (1715059901/0715059901).

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 & 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 environmental science industry within the Agriculture, Food & Natural Resources career cluster.

The content includes but is not limited to handling and dispensing of hazardous materials in accordance with federal, state, and local laws and regulations as appropriate. The certificate will provide information on industry standards such as those included in the Occupational Health and Safety Administration (OSHA) 29CFR1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard, and the Clean Air Act.

The Mold Remediation Specialist Certificate will prepare those responsible for remediating mold infestation in homes and businesses and will follow guidelines established by the State of Florida and the Environmental Protection Agency (EPA). Graduates of this certificate program should be able to research applicable local, state, and federal regulations and implement methods and strategies to ensure compliance in regard to mold remediation and indoor air quality; to maintain records as required by OSHA, and the Environmental Protection Agency (EPA); to develop and implement hazardous materials handling procedures; and to protect employees/workers/communities from hazardous material exposures.

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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: (1) a training plan signed by the student, the instructor and the employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; and (2) a work station which reflects equipment, skills, and tasks relevant to the student's career goal. Students must receive compensation for work performed.

In accordance with State Board of Education Rule 6A-10.0315, Minimum basic skill levels have been established for admittance into a college associate degree program.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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.

## **Standards**

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

- 02.0 Demonstrate knowledge of the principles of managing and remediation of air pollution.
- 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.
- 08.0 Demonstrate employability skills.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Mold Remediation Specialist  
**CIP Number:** 0715059909  
**Program Length:** 13 credit hours  
**SOC Code(s):** 173025

This certificate program is part of the Environmental Science Technology AS/AAS degree program (1715059901/0715059901). At the completion of this program, the student will be able to:

- 02.0 Demonstrate knowledge of the principles of managing and remediation of air pollution--  
 The student will be able to:
- 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.
  - 02.07 Measure the air pollutant of a specific source.
  - 02.08 Record, interpret and report laboratory analyses.
- 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.
- 08.0 Demonstrate employability skills--The student will be able to:
- 08.02 Secure information about a job.
  - 08.03 Identify documents that may be required when applying for a job.
  - 08.05 Demonstrate competence in job interview techniques.
  - 08.07 Identify acceptable work habits.
  - 08.08 Demonstrate knowledge of how to make job changes appropriately.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Course Title:** Agriculture Education Directed Study  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Course Number	<b>8100100</b>
CIP Number	0101999901
Grade Level	11-12, 30, 31
Standard Length	Multiple credits
Teacher Certification	AGRICULTUR 1 @2 ANY AGRICULTURE EDUC G
CTSO	FFA

### **Purpose**

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.

### **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.

### **Laboratory Activities**

A learning laboratory is provided as required to support the educational activities of the student. This laboratory may be in the traditional classroom, in an industry setting, or a virtual learning environment.

### **Special Notes**

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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).

### **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.

### **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.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriculture Education Directed Study  
**Course Number:** 8100100  
**Course Credit:** 1

01.0 Demonstrate expertise in a specific occupation within the career cluster.

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.

04.05 Construct charts/tables/graphs using functions and data.

**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

Middle School	
Course Number	<b>8100110</b>
CIP Number	01019910CE
Grade Level	6-8 30, 31
Standard Length	<a href="#">One Semester or the equivalent of one-half a school year</a>
Teacher Certification	AGRICULTUR 1 @2 EXP AG @4
CTSO	FFA
Facility Code	[200] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)

### **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 Resources career cluster. The content includes but is not limited to a focus on understanding the agricultural food system, environmental resources, strategies used to produce and market agricultural products, and an exploration of research through the use of the scientific method. Reinforcement of academic skills occurs through the 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.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

### **Career Planning**

The career and education planning course required by Section 1003.4156, Florida Statutes, has been integrated into this course. This course must include career exploration using CHOICES or a comparable cost-effective program and educational planning using the online student

advising system known as Florida Academic Counseling and Tracking for Students at the Internet website FACTS.org; and shall result in the completion of a personalized academic and career plan.

### **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.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 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 (ESE) will need modifications to meet their special 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.

### **Standards**

After successfully completing this course 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:** 8100110  
**Course Credit:** 0.5

**Course Description:**

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 Resources career cluster.

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 horticultural, forestry, and agronomic crops.
- 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.

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.

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 Develop a production and marketing plan for a food product.
- 04.04 Read and interpret a food label.

05.0 Demonstrate knowledge and skills in agriscience laboratories--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, or 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.
- 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 agricultural product from farm to consumer.
  - 06.03 Prepare, process, and/or 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 Recycle or conserve a natural resource.
- 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.
- 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.
  - 09.07 Describe the historical evolution of agriculture.

**Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes.**

**Understanding the Workplace**

- 10.0 Describe how work relates to the needs and functions of the economy, society, and personal fulfillment.
- 11.0 Describe the influences that societal, economic, and technological changes have on

- employment trends and future training.
- 12.0 Describe the need for career planning, changing careers, and the concept of lifelong learning and how they relate to personal fulfillment.
- 13.0 Describe how legislation such as the Americans with Disabilities Act and Child Labor Laws regulates employee rights.

### **Self- Awareness**

- 14.0 Use results of an interest assessment to describe their top interest areas and relate to careers/career clusters.
- 15.0 Identify five values that they consider important in making a career choice.
- 16.0 Identify skills needed for career choices and match to personal abilities.
- 17.0 Demonstrate the ability to apply skills of self-advocacy and self-determination throughout the career planning process.
- 18.0 Identify strengths and areas in which assistance is needed at school.
- 19.0 Apply results of all assessments to personal abilities in order to make realistic career choices.

### **Exploring Careers**

- 20.0 Demonstrate the ability to locate, understand, and use career information.
- 21.0 Use the Internet to access career and education planning information.
- 22.0 Identify skills that are transferable from one occupation to another.
- 23.0 Demonstrate use of career resources to identify occupational clusters, career opportunities within each cluster, employment outlook, and education/ training requirements.
- 24.0 Explain the relationship between educational achievement and career success.

### **Goal Setting and Decision-Making**

- 25.0 Identify and demonstrate use of steps to make career decisions.
- 26.0 Identify and demonstrate processes for making short and long term goals.

### **Workplace Skills**

- 27.0 Demonstrate personal qualities (e.g. dependability, punctuality, responsibility, integrity, getting along with others) that are needed to be successful in the workplace.
- 28.0 Demonstrate skills to interact positively with others.
- 29.0 Demonstrate employability skills such as working on a team, problem-solving and organizational skills.

### **Career and Education Planning**

- 30.0 Identify secondary and postsecondary school courses that meet tentative career plans.
- 31.0 Identify advantages and disadvantages of entering various secondary and postsecondary programs for the attainment of career goals.
- 32.0 Demonstrate knowledge of varied types and sources of financial aid to obtain assistance for postsecondary education.
- 33.0 Identify inappropriate discriminatory behaviors that may limit opportunities in the workplace.
- 34.0 Develop a career and education plan that includes short and long-term goals, high

- school program of study, and postsecondary/work goals.
- 35.0 Describe how extracurricular programs can be incorporated in career and education planning.
  - 36.0 Demonstrate knowledge of high school exit options (e.g., standard diploma, certificate of completion, special diploma, GED, etc.) and impact on post-school opportunities.
  - 37.0 Describe high school credits and explain how GPAs are calculated.

### **Job Search**

- 38.0 Demonstrate skills to complete a job application.
- 39.0 Demonstrate skills essential for a job interview.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Introduction to Agriscience  
**Program Type:** Orientation/Exploratory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Middle School</b>	
Program Number	<b>8100120</b>
CIP Number	01019921EX
Grade Level	6-8, 30, 31
Standard Length	0.5 credits
Teacher Certification	AGRICULTUR 1 @2 EXP AG @4
CTSO	FFA
Facility Code	[200] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)

### **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 Resources 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.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 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 (ESE) will need modifications to meet their special 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.

### **Standards**

After successfully completing this course, 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 Credit:** 0.5

**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.

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. Describe the importance of agriculture in each individual's life.
- 01.03 Collect and discuss information on current agricultural events.
- 01.04 Trace the evolution of agriculture.
- 01.05 Identify conditions necessary for agricultural production.
- 01.06 Identify the major agricultural production areas of the United States and of Florida.
- 01.07 Describe the diversity of career opportunities in agriscience and technology.
- 01.08 Describe the relationship between environmental resources and agriculture.
- 01.09 Describe technology used in agricultural production.
- 01.10 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.
- 02.03 Prepare written and/or oral materials using correct English grammar.
- 02.04 Identify the main idea in oral presentations and/or written materials.
- 02.05 Locates, organizes, and interprets information from a variety of agricultural sources.
- 02.06 Describe the historical evolution of agriculture. Select and study a problem that can be tested under controlled conditions to establish a hypothesis or to illustrate a known law.

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.

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.
  
- 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.



**Florida Department of Education  
Curriculum Framework**

**Program Title:** Exploration of Agriscience  
**Program Type:** Orientation/Exploratory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Middle School</b>	
Program Number	8100210
CIP Number	01019920EX
Grade Level	6-8, 30, 31
Standard Length	0.5
Teacher Certification	AGRICULTUR 1 @2 EXP AG @4
CTSO	FFA
Facility Code	[200] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)

### **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 Resources career cluster. The content includes but is not limited to instruction that explores the tasks, training, education and physical requirements of a broad range of agriscience and natural resources careers. Reinforcement of academic skills occurs through the 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.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 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 (ESE) will need modifications to meet their special 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.

## **Standards**

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

- 01.0 Apply knowledge and skills in the area of agricultural research and related professions.
- 02.0 Apply knowledge and skills in biotechnology.
- 03.0 Apply knowledge and skills in plant sciences.
- 04.0 Apply knowledge and skills in animal sciences.
- 05.0 Demonstrate knowledge and skills in food science.
- 06.0 Apply knowledge and skills in processing and marketing.
- 07.0 Apply knowledge and skills in environmental resources.
- 08.0 Demonstrate the value of responsibility, good work habits, and planning for career opportunities in agriculture.
- 09.0 Apply leadership and communication skills.
- 10.0 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 Credit:** 0.5

**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.

01.0 Apply knowledge and skills in the area of agricultural research and related professions--  
The student will be able to:

- 01.01 Identify agricultural research and methods of experimentation.
- 01.02 Conduct a scientific experiment to solve an agricultural problem or answer an agricultural question.

02.0 Apply knowledge and skills in biotechnology--The student will be able to:

- 02.01 Define biotechnology.
- 02.02 Discuss current and future uses of genetic engineering.
- 02.03 Identify issues associated with biotechnology.

03.0 Apply knowledge and skills in plant sciences--The student will be able to:

- 03.01 Produce an agricultural crop.
- 03.02 Discuss the technology involved in the development of improved crops.
- 03.03 Identify agribusinesses that provide supplies and services to plant science industries in the local area.
- 03.04 Identify the recommended uses and safety precautions from a pesticide label.
- 03.05 Complete or construct an agriscience laboratory project that demonstrates use of agricultural knowledge and/or skills.
- 03.06 Compare landscaping methods.
- 03.07 Develop a landscape design.
- 03.08 Develop a care and maintenance program for horticultural, forestry, and/or agronomic crops.
- 03.09 Identify pests, pathogens, parasites, and predators of horticultural, forestry, and/or agronomic crops.
- 03.10 Describe the major components of soil.
- 03.11 Explain methods of soil conservation.
- 03.12 Identify the major forest regions of the United States and Florida.
- 03.13 Describe the importance of forests and forest products.
- 03.14 Describe how trees grow and reproduce.
- 03.15 Use tools and techniques common to the forest industry.

- 04.0 Apply knowledge and skills in animal sciences--The student will be able to:
- 04.01 Describe the differences between animal welfare and animal rights.
  - 04.02 Raise and care for an agricultural animal.
  - 04.03 Discuss the technology involved in the development of improved animal products.
  - 04.04 Identify agribusinesses that provide supplies and services to animal science industries in the local area.
  - 04.05 Demonstrate knowledge and skills in food science--The student will be able to:
  - 04.06 Demonstrate the proper handling and storage of food products.
  - 04.07 Demonstrate at least one method of food preservation.
  - 04.08 Conduct a food taste test.
  - 04.09 Produce and market a food product.
  - 04.10 Read, interpret, and develop a food label.
- 05.0 Apply knowledge and skills in agricultural processing and marketing--The student will be able to:
- 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 Prepare, process, and 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.
- 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 Describe personality aspects to consider when choosing a career.
  - 07.03 Identify the basic steps in career planning.
  - 07.04 Develop basic career plan.
  - 07.05 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.
  - 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 or conducting a demonstration.
- 08.06 Use a computer to assist in the completion of an agricultural project.
- 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.
  - 09.07 Describe the historical evolution of agriculture.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Orientation to Agriscience  
**Program Type:** Orientation/Exploratory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Middle School</b>	
Program Number	<b>8100310</b>
CIP Number	01019910OR
Grade Level	6-8, 30, 31
Standard Length	0.5 credits
Teacher Certification	AGRICULTUR 1 @2 EXP AG @4
CTSO	FFA
Facility Code	[200] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)

### **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 Resources career cluster. The content includes but is not limited to a focus on understanding the agricultural food system, environmental resources, strategies used to produce and market agricultural products, and an exploration of research through the use of the scientific method. Reinforcement of academic skills occurs through the 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.

### **Laboratory Activities**

Laboratory activities are an integral part of this program and include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 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 (ESE) will need modifications to meet their special 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.

## **Standards**

After successfully completing this course, 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:** 8100110  
**Course Credit:** 0.5

**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.

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 horticultural forestry and agronomic crops.
- 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.

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.

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--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 or 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.
- 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.
  - 06.03 Prepare process and/or 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 Recycle or conserve a natural resource.
- 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.
- 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.
  - 09.07 Describe the historical evolution of agriculture.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Course Title:** Fundamentals of Agriscience  
**Course Type:** Non Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Non Career Preparatory</b>	
Course Number	<b>8100320</b>
CIP Number	01019931PA
Grade Level	9-12, 30, 31
Standard Length	1 credit
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
Facility Code	[201] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)

### **Purpose**

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.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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.

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 cannot be modified.

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Standards**

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

- 01.0 Describe the unique relationship between Agriscience and the environment.
- 02.0 Initiate a supervised agricultural experience (SAE) program based on identified career opportunities.
- 03.0 Demonstrate basic leadership skills in parliamentary procedure, public speaking, and group dynamics.
- 04.0 Demonstrate basic skills in natural resources.
- 05.0 Demonstrate basic skills in pest management.
- 06.0 Demonstrate the fundamental skills in plant science.
- 07.0 Demonstrate the aesthetic and environmental use of plants.
- 08.0 Demonstrate the basic skills in animal science.
- 09.0 Demonstrate the fundamental skills in food science and technology.
- 10.0 Demonstrate the basic skills in agricultural business management.
- 11.0 Demonstrate the basic mechanical skills.

2011 - 2012

**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.

01.0 Describe the unique relationship between agriscience and the environment--The student will be able to:

- 01.01 Identify the major sciences that explain the development, existence, and improvement of living things.
- 01.02 Describe the elements of a healthful environment.
- 01.03 Describe the efforts made to improve the environment.

02.0 Initiate a supervised agricultural experience (SAE) program based on identified career opportunities--The student will be able to:

- 02.01 Identify career opportunities in agriscience.
- 02.02 Identify how careers are classified and determine preparation requirements.
- 02.03 Plan a supervised agricultural experience program.
- 02.04 Demonstrate employability skills.

03.0 Demonstrate basic leadership skills in parliamentary procedure, public speaking, and group dynamics--The student will be able to:

- 03.01 Explain the importance of effective leadership in agriscience.
- 03.02 Prepare and present an oral report.
- 03.03 Prepare and submit a written report on an agriscience topic.
- 03.04 Describe the opportunities available through the FFA organization.

04.0 Demonstrate basic skills in natural resources--The student will be able to:

- 04.01 Determine the major sources of air pollution and identify procedures for maintaining and improving air quality.
- 04.02 Determine the relationships between water and soil in our environment and determine practices for conserving these resources.
- 04.03 Determine the origin and classification of soils, and identify effective procedures for soils and hydroponics management.
- 04.04 Compare the relationship of forests to our environment and select practices for utilizing forest resources.
- 04.05 Describe the relationship between wildlife and the environment and identify approved practices in managing wildlife enterprises.

- 04.06 Identify the biological requirements necessary for the production of aquatic plants and animals.
- 05.0 Demonstrate basic skills in pest management--The student will be able to:
  - 05.01 Identify the major pest groups and the importance of effective pest management programs.
  - 05.02 Classify the nature of chemicals used to control pests.
  - 05.03 Define terms regarding chemical safety.
  - 05.04 Demonstrate safety in the use of chemicals.
- 06.0 Demonstrate the fundamental skills in plant science--The student will be able to:
  - 06.01 Identify the major parts of plants and state the important functions of each.
  - 06.02 State how plants make food.
  - 06.03 Describe the relationships among air, soil, water, and essential plant nutrients.
  - 06.04 Identify the methods used by plants to reproduce themselves and demonstrate propagation technology.
  - 06.05 Plan, plant and manage a garden.
  - 06.06 Identify the basic principles of fruit and nut production.
  - 06.07 Identify the basic principles of vegetable production.
  - 06.08 Identify the major crops grown for grain, oil, and special purposes.
  - 06.09 Identify the major crops grown for forage and pasture.
- 07.0 Demonstrate the aesthetic and environmental uses of plants--The student will be able to:
  - 07.01 Identify and maintain indoor plants.
  - 07.02 State the basic cultural practices for turfgrass production and maintenance.
  - 07.03 Identify and maintain trees and shrubs.
- 08.0 Demonstrate the basic skills in animal science--The student will be able to:
  - 08.01 Determine the basic nutritional requirements of animals.
  - 08.02 Identify the factors promoting and maintaining animal health.
  - 08.03 Define terms associated with animal genetics and reproduction, and describe the principles of genetics.
  - 08.04 Identify the types, uses, care, and management of small animals.
  - 08.05 Identify major types and classes of livestock and horses.
- 09.0 Demonstrate the fundamental skills in food science and technology--The student will be able to:
  - 09.01 Compare procedures for marketing plants and animal products.
  - 09.02 Describe the elements, trends, and career opportunities in the food industry.
  - 09.03 Describe the nutrient requirements for human health.
  - 09.04 Identify the processes used in food science.
- 10.0 Demonstrate the basic skills in agricultural business management--The student will be able to:
  - 10.01 Define management terms and determine how decisions are made.

- 10.02 Define and describe entrepreneurship.
- 10.03 Solve basic arithmetic problems associated with agribusiness management.
  
- 11.0 Demonstrate the basic mechanical skills--The student will be able to:
  - 11.01 Identify basic hardware and fasteners.
  - 11.02 State the safety precautions and demonstrate appropriate behavior while working in the shop area.
  - 11.03 Identify the basic principles and use of electricity.
  - 11.04 Identify and correctly use hand and power tools common to the agricultural shop.
  - 11.05 Identify the controls and safely operate a farm tractor.
  - 11.06 Describe the basic operation of internal combustion engines.
  - 11.07 Service and operate small gasoline engines.
  - 11.08 Plan and construct a small woodworking project.
  - 11.09 Solve basic arithmetic problems associated with agriculture mechanics.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Course Title:**            **Advanced Concepts of Agriscience**  
**Course Type:**           **Career Preparatory**  
**Career Cluster:**       **Agriculture, Food and Natural Resources**

<b>Secondary – Career Preparatory</b>	
Course Number	8100330
CIP Number	0101999902
Grade Level	11-12, 30, 31
Standard Length	1 credit
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA

### **Purpose**

The purpose of this course is to provide students who have completed or are currently completing an OCP 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

### **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.

### **Laboratory Activities**

A workstation is provided as required to support the training activities of the student.

### **Special Notes**

#### **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.

## **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.



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:**           **Advanced Concepts of Agriscience**  
**Course Number:**       **8100330**  
**Course Credit:**       **1**

All programs offering this course will provide instruction in standards 01.0, 02.0, and 03.0.

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.

**Optional Standards:** 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.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Course Title:** Agriculture Cooperative OJT  
**Course Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

	<b>Secondary</b>	<b>PSAV</b>
Course Number	8100410	A019999
CIP Number	01019999CP	01019999CP
Grade Level	9-12, 30, 31	30, 31
Standard Length	Multiple credits	Multiple hours
Teacher Certification	AGRICULTUR 1 @2 ‡ANY AG ED G	AGRICULTUR 1 @2 AGRI @2 ‡ANY AG ED G
CTSO	FFA	N/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 Cooperative 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.

### **Special Notes**

There is a **Cooperative Education Manual** available online that 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/workforce/programs/doc/coopm.doc>.

### **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.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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).

### **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.

**2011 - 2012**

**Florida Department of Education  
Student Performance Standards**

**Program Title:       Agriculture Cooperative OJT**  
**Secondary Number: 8100410**  
**PSAV Number:       A020019**

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.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Agricultural Machinery Operations  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
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	45-2091
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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.

### **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
	8106810	Agriscience Foundations 1	1 credit		2
	8103120	Agricultural Mechanics 2	1 credit		2
A	8103130	Agricultural Mechanics 3	1 credit	45-2091	2
B	8103210	Agricultural Machinery Operations 4	1 credit	45-2091	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

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

FFA (secondary programs) 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.

- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Practice personal, equipment, and shop safety.
- 11.0 Select and use hand and power tools.
- 12.0 Install simple electrical circuits.
- 13.0 Demonstrate electric and gas welding.
- 14.0 Service and maintain small gasoline engines.
- 15.0 Perform preventive maintenance, checks, and services for tractors.
- 16.0 Perform minor repairs on an irrigation system.
- 17.0 Apply basic financial-management skills.
- 18.0 Demonstrate employability skills.
- 19.0 Demonstrate language arts knowledge and skills.
- 20.0 Demonstrate mathematics knowledge and skills.
- 21.0 Demonstrate science knowledge and skills.
- 22.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 23.0 Solve problems using critical thinking skills, creativity and innovation.
- 24.0 Use information technology tools.
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 26.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 28.0 Describe the importance of professional ethics and legal responsibilities.
- 29.0 Explain the importance of employability skill and entrepreneurship skills.
- 30.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 31.0 Keep records.
- 32.0 Practice soil conservation.
- 33.0 Operate, service, and maintain agricultural machinery and equipment.
- 34.0 Apply business-management skills and identify appropriate legal documents.
- 35.0 Demonstrate positive customer-relations skills.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills --The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103120  
**Course Number:** Agricultural Mechanics 2  
**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.

10.0 Practice personal, equipment, and shop safety--The student will be able to:

- 10.01 Identify and eliminate hazards in agricultural mechanics settings.
- 10.02 Observe color-coded warnings in work areas and on equipment and machinery.
- 10.03 Describe appropriate actions in case of fire, accident, or other emergencies.
- 10.04 Describe personal protective equipment (PPE) and appropriate clothing.
- 10.05 Demonstrate safety procedures and workplace "housekeeping" practices.
- 10.06 Safely handle and store flammable and non-restricted chemicals.
- 10.07 Operate machinery and equipment according to the safety recommendations of the manufacturers.
- 10.08 Comply with the Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) rules and regulations.
- 10.09 Describe the Florida "Right-to-Know" law (as recorded in Florida Statutes, Chapter 442).

11.0 Select and use hand and power tools--The student will be able to:

- 11.01 Identify the capabilities and limitations of hand and power tools.
- 11.02 Select and safely use hand and power tools.
- 11.03 Select and use proper PPE for hand and power tools.
- 11.04 Identify worn, damaged, or abused tools.
- 11.05 Select and demonstrate the appropriate procedures for sharpening tools.

12.0 Install simple electrical circuits--The student will be able to:

- 12.01 Demonstrate the principles of AC and DC circuitry.
- 12.02 Demonstrate series and parallel circuitry.
- 12.03 Explain the scientific principles of electrical systems.
- 12.04 Plan and install a simple wiring system.
- 12.05 Test electrical circuits.

18.0 Demonstrate employability skills--The student will be able to:

- 18.01 Conduct group meetings, using parliamentary procedures and public-speaking skills.
- 18.02 Identify the documents that are required for a job application.
- 18.03 Complete a job application form.
- 18.04 Demonstrate competencies in job-interview techniques.



- 19.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 19.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 20.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 20.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 20.02 Construct charts/tables/graphs using functions and data. AF3.5
- 21.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 21.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 22.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 22.01 Locate, organize and reference written information from various sources. CM 3.0
  - 22.02 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 22.03 Apply active listening skills to obtain and clarify information. CM 7.0
- 23.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 23.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 23.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 24.0 Use information technology tools--The students will be able to:
  - 24.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 24.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 25.01 Explain the impact of the global economy on business organizations
- 26.0 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:
  - 26.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 26.02 Explain emergency procedures to follow in response to workplace accidents.
  - 26.03 Create a disaster and/or emergency response plan. SHE 2.0

27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 27.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 27.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0

28.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- 28.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0

29.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 29.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 29.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 29.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 29.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 29.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

30.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 30.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 30.02 Describe the effect of money management on personal and career goals. FL 3.0
- 30.03 Develop a personal budget and financial goals. FL3.1

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103130  
**Course Number:** Agricultural Mechanics 3  
**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.

13.0 Demonstrate electric and gas welding--The student will be able to:

- 13.01 Select and use gas-welding equipment.
- 13.02 Select and use electric arc-welding equipment and materials.

14.0 Service and maintain small gasoline engines--The student will be able to:

- 14.01 Explain the scientific principles of small engines.
- 14.02 Identify major parts and describe the general operation of small gasoline engines (2- and 4-stroke cycle).
- 14.03 Practice appropriate safety precautions.
- 14.04 Troubleshoot and perform minor repairs on small gasoline engines.

15.0 Perform preventive maintenance, checks, and services for tractors--The student will be able to:

- 15.01 Explain the scientific principles of hydraulic and transmission systems.
- 15.02 Perform daily operator maintenance checks for tractors.
- 15.03 Determine the preventive-maintenance procedures, using the tractor operator's manual.
- 15.04 Perform scheduled preventive-maintenance procedures.
- 15.05 Interpret and perform operator's trouble-shooting procedures as described in the manual.
- 15.06 Keep records of tractor maintenance and services.

16.0 Perform minor repair on an irrigation system--The student will be able to:

- 16.01 Identify the basic components of irrigation systems.
- 16.02 Differentiate various types of irrigation systems.
- 16.03 Identify state and local regulatory agencies for water management.
- 16.04 Perform minor repair on an irrigation system.

17.0 Apply basic financial-management skills--The student will be able to:

- 17.01 Complete basic financial records.
- 17.02 Demonstrate the use of banking procedures.
- 17.03 Calculate interest on loans.

- 17.04 Complete selected income-tax-return forms.
- 18.0 Demonstrate employability skills--The student will be able to:
- 18.05 Demonstrate knowledge of how to make job changes appropriately.
  - 18.06 Demonstrate acceptable personal hygiene and a professional appearance.
  - 18.07 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.
  - 18.08 Describe the importance of a drug-free workplace and the industry policies regarding alcohol and drug use.
  - 18.09 Demonstrate appropriate responses to performance evaluation from employer, supervisor, or other persons in the workplace.
- 19.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
- 19.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 19.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 20.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 20.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 21.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 21.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 22.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 22.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 22.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 22.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 22.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 23.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 23.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 23.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 24.0 Use information technology tools--The students will be able to:

- 24.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 24.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 25.01 Describe the nature and types of business organizations. SY 1.0
  - 25.02 Explain the effect of key organizational systems on performance and quality.
  - 25.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 27.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 27.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 28.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 28.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 28.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 28.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 29.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
  - 29.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 29.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 29.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 29.08 Research the benefits of ongoing professional development. ECD 9.0
- 30.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
  - 30.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 30.05 Maintain financial records. FL3.3
  - 30.06 Read and reconcile financial statements. FL3.4
  - 30.07 Research, compare and contrast investment opportunities.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103210  
**Course Number:** Agricultural Machinery Operations 4  
**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.

31.0 Keep records--The student will be able to:

- 31.01 Explain the purpose and importance of keeping records.
- 31.02 Demonstrate procedures for keeping records of equipment operation, maintenance, and services using computers to process information.
- 31.03 Keep records on each job or project assignment.

32.0 Practice soil conservation--The student will be able to:

- 32.01 Determine soil conditions such as texture, moisture, and structure.
- 32.02 Identify the proper conditions of soil for machine operations.
- 32.03 Practice soil conservation according to a farm plan.

33.0 Operate, service, and maintain agricultural machinery and equipment--The student will be able to:

- 33.01 Follow safety precautions when operating, servicing, and maintaining machinery and equipment.
- 33.02 Operate and adjust agricultural machinery and equipment used in the local area such as the following, according to the operator's manuals:
  - agricultural wheel-type tractors
  - planting equipment
  - primary and secondary tillage equipment
  - pesticide-application equipment
  - harvesting equipment
  - fertilization equipment
- 33.03 Service machinery, using service manuals.

34.0 Apply business-management skills and identify appropriate legal documents--The student will be able to:

- 34.01 Identify personal/business liability and the use of liability insurance.
- 34.02 Identify applicable insurance requirements.
- 34.03 Identify and complete basic business-tax liability forms.
- 34.04 Identify the requirements of eligibility for greenbelt, bluebelt, and homestead tax exemptions.

- 34.05 Interpret enterprise budgets and amortization tables.
  - 34.06 Identify characteristics of legal documents (such as contracts, deeds, and leases).
  - 34.07 Identify applicable land-use and zoning regulations, including a comprehensive plan.
- 35.0 Demonstrate positive customer-relations skills--The student will be able to:
- 35.01 Exercise self-control.
  - 35.02 Identify and demonstrate appropriate responses to criticism.
  - 35.03 Explain the effects of positive human-relations skills on success in the business.
  - 35.04 Demonstrate respect for people and property.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Diversified Agricultural Mechanics  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

Secondary – Career Preparatory	
Program Number	8103300
CIP Number	0101020310
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	AGRICULTUR 1 @2 AGRI MECH #7
CTSO	FFA
SOC Codes	9-3041, 45-2091
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)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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.

### 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
	8106810	Agriscience Foundations 1	1 credit		2
	8103120	Agricultural Mechanics 2	1 credit		2
A	8103130	Agricultural Mechanics 3	1 credit	45-2091	2
B	8103310	Diversified Agricultural Mechanics 4	1 credit	49-3041	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

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

FFA (secondary programs) 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.

- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Practice personal, equipment, and shop safety.
- 11.0 Select and use hand and power tools.
- 12.0 Install simple electrical circuits.
- 13.0 Demonstrate electric and gas welding.
- 14.0 Service and maintain small gasoline engines.
- 15.0 Perform preventive maintenance, checks, and services for tractors.
- 16.0 Perform minor repairs on an irrigation system.
- 17.0 Apply basic financial-management skills.
- 18.0 Demonstrate employability skills.
- 19.0 Demonstrate language arts knowledge and skills.
- 20.0 Demonstrate mathematics knowledge and skills.
- 21.0 Demonstrate science knowledge and skills.
- 22.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 23.0 Solve problems using critical thinking skills, creativity and innovation.
- 24.0 Use information technology tools.
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 26.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 28.0 Describe the importance of professional ethics and legal responsibilities.
- 29.0 Explain the importance of employability skill and entrepreneurship skills.
- 30.0 Demonstrate personal money-management concepts, procedures, and strategies
- 31.0 Operate and maintain agricultural tools and equipment.
- 32.0 Plan, draw, and construct a project.
- 33.0 Prepare and finish surfaces.
- 34.0 Replace simple electric motors, controls, and sensing devices.
- 35.0 Plan, repair, and maintain a basic irrigation system.
- 36.0 Perform basic plumbing procedures.
- 37.0 Mix and pour concrete and use masonry materials.
- 38.0 Weld, braze, and cut, using appropriate equipment.
- 39.0 Construct and maintain agricultural structures.
- 40.0 Apply business-management skills and identify appropriate legal documents.
- 41.0 Demonstrate positive customer-relations skills.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills--The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103120  
**Course Number:** Agricultural Mechanics 2  
**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.

10.0 Practice personal, equipment, and shop safety--The student will be able to:

- 10.01 Identify and eliminate hazards in agricultural mechanics settings.
- 10.02 Observe color-coded warnings in work areas and on equipment and machinery.
- 10.03 Describe appropriate actions in case of fire, accident, or other emergencies.
- 10.04 Describe personal protective equipment (PPE) and appropriate clothing.
- 10.05 Demonstrate safety procedures and workplace "housekeeping" practices.
- 10.06 Safely handle and store flammable and non-restricted chemicals.
- 10.07 Operate machinery and equipment according to the safety recommendations of the manufacturers.
- 10.08 Comply with the Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) rules and regulations.
- 10.09 Describe the Florida "Right-to-Know" law (as recorded in Florida Statutes, Chapter 442).

11.0 Select and use hand and power tools--The student will be able to:

- 11.01 Identify the capabilities and limitations of hand and power tools.
- 11.02 Select and safely use hand and power tools.
- 11.03 Select and use proper PPE for hand and power tools.
- 11.04 Identify worn, damaged, or abused tools.
- 11.05 Select and demonstrate the appropriate procedures for sharpening tools.

12.0 Install simple electrical circuits--The student will be able to:

- 12.01 Demonstrate the principles of AC and DC circuitry.
- 12.02 Demonstrate series and parallel circuitry.
- 12.03 Explain the scientific principles of electrical systems.
- 12.04 Plan and install a simple wiring system.
- 12.05 Test electrical circuits.

18.0 Demonstrate employability skills--The student will be able to:

- 18.01 Conduct group meetings, using parliamentary procedures and public-speaking skills.
- 18.02 Identify the documents that are required for a job application.
- 18.03 Complete a job application form.
- 18.04 Demonstrate competencies in job-interview techniques.



- 19.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 19.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 20.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 20.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 20.02 Construct charts/tables/graphs using functions and data. AF3.5
- 21.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 21.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 22.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 22.01 Locate, organize and reference written information from various sources. CM 3.0
  - 22.02 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 22.03 Apply active listening skills to obtain and clarify information. CM 7.0
- 23.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 23.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 23.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 24.0 Use information technology tools--The students will be able to:
  - 24.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 24.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 25.01 Explain the impact of the global economy on business organizations
- 26.0 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:
  - 26.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 26.02 Explain emergency procedures to follow in response to workplace accidents.
  - 26.03 Create a disaster and/or emergency response plan. SHE 2.0

27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 27.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 27.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0

28.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- 28.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0

29.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 29.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 29.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 29.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 29.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 29.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

30.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 30.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 30.02 Describe the effect of money management on personal and career goals. FL 3.0
- 30.03 Develop a personal budget and financial goals. FL3.1

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103130  
**Course Number:** Agricultural Mechanics 3  
**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.

13.0 Demonstrate electric and gas welding--The student will be able to:

- 13.01 Select and use gas-welding equipment.
- 13.02 Select and use electric arc-welding equipment and materials.

14.0 Service and maintain small gasoline engines--The student will be able to:

- 14.01 Explain the scientific principles of small engines.
- 14.02 Identify major parts and describe the general operation of small gasoline engines (2- and 4-stroke cycle).
- 14.03 Practice appropriate safety precautions.
- 14.04 Troubleshoot and perform minor repairs on small gasoline engines.

15.0 Perform preventive maintenance, checks, and services for tractors--The student will be able to:

- 15.01 Explain the scientific principles of hydraulic and transmission systems.
- 15.02 Perform daily operator maintenance checks for tractors.
- 15.03 Determine the preventive-maintenance procedures, using the tractor operator's manual.
- 15.04 Perform scheduled preventive-maintenance procedures.
- 15.05 Interpret and perform operator's trouble-shooting procedures as described in the manual.
- 15.06 Keep records of tractor maintenance and services.

16.0 Perform minor repair on an irrigation system--The student will be able to:

- 16.01 Identify the basic components of irrigation systems.
- 16.02 Differentiate various types of irrigation systems.
- 16.03 Identify state and local regulatory agencies for water management.
- 16.04 Perform minor repair on an irrigation system.

17.0 Apply basic financial-management skills--The student will be able to:

- 17.01 Complete basic financial records.
- 17.02 Demonstrate the use of banking procedures.
- 17.03 Calculate interest on loans.

- 17.04 Complete selected income-tax-return forms.
- 18.0 Demonstrate employability skills--The student will be able to:
  - 18.05 Demonstrate knowledge of how to make job changes appropriately.
  - 18.06 Demonstrate acceptable personal hygiene and a professional appearance.
  - 18.07 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.
  - 18.08 Describe the importance of a drug-free workplace and the industry policies regarding alcohol and drug use.
  - 18.09 Demonstrate appropriate responses to performance evaluation from employer, supervisor, or other persons in the workplace.
- 19.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 19.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 19.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 20.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 20.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 21.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 21.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 22.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 22.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 22.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 22.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 22.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 23.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 23.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 23.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 24.0 Use information technology tools--The students will be able to:

- 24.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 24.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 25.01 Describe the nature and types of business organizations. SY 1.0
  - 25.02 Explain the effect of key organizational systems on performance and quality.
  - 25.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 27.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 27.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 28.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 28.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 28.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 28.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 29.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
  - 29.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 29.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 29.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 29.08 Research the benefits of ongoing professional development. ECD 9.0
- 30.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
  - 30.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 30.05 Maintain financial records. FL3.3
  - 30.06 Read and reconcile financial statements. FL3.4
  - 30.07 Research, compare and contrast investment opportunities.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103310  
**Course Number:** A Diversified Agricultural Mechanics 4  
**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.

- 31.0 Operate and maintain agricultural tools and equipment--The student will be able to:
- 31.01 Set up, adjust, and operate selected agricultural equipment according to the operator's manual.
  - 31.02 Maintain and repair selected agricultural tools and equipment, using repair manuals.
  - 31.03 Prepare equipment for storage.
  - 31.04 Keep records of equipment maintenance and services using computers to process information.
- 32.0 Plan, draw, and construct a project--The student will be able to:
- 32.01 Plan and sketch a project.
  - 32.02 Design and draw a project using drawing instruments and/or computer-assisted design (CAD) software.
  - 32.03 Calculate a bill of materials.
  - 32.04 Construct a project.
- 33.0 Prepare and finish surfaces--The student will be able to:
- 33.01 Identify and select appropriate finishes (such as paint, varnish, and stain).
  - 33.02 Repair worn or damaged surfaces using fillers, caulking, and sealers.
  - 33.03 Prepare surfaces and apply finishes.
- 34.0 Replace simple electric motors, controls, and sensing devices--The student will be able to:
- 34.01 Identify different types of electric motors.
  - 34.02 Differentiate various types of controls.
  - 34.03 Replace electric motors, controls, and sensing devices.
- 35.0 Plan, repair, and maintain a basic irrigation system--The student will be able to:
- 35.01 Determine irrigation requirements.
  - 35.02 Plan and lay out an irrigation system, using computer applications.
  - 35.03 Repair and maintain an irrigation system.

- 36.0 Perform basic plumbing procedures--The student will be able to:
- 36.01 Identify and select plumbing materials and tools.
  - 36.02 Plan and construct a simple water-delivery system.
  - 36.03 Troubleshoot and perform minor plumbing repairs.
  - 36.04 Locate the state and local codes and standards and describe the importance of complying with them.
- 37.0 Mix and pour concrete and use masonry materials--The student will be able to:
- 37.01 Calculate concrete and other materials for a masonry project.
  - 37.02 Prepare forms; mix and pour concrete.
  - 37.03 Lay concrete blocks and/or bricks.
- 38.0 Weld, braze, and cut, using appropriate equipment--The student will be able to:
- 38.01 Set up, adjust, operate, and maintain MIG (middle inert gas) and TIG (tungsten inert gas) welding equipment.
  - 38.02 Set up, adjust, and operate plasma cutting equipment.
  - 38.03 Select recommended operational procedures and supplies for specific jobs.
  - 38.04 Practice all recommended safety precautions.
  - 38.05 Demonstrate the different welding positions.
  - 38.06 Cut and pierce metals, using oxyacetylene and plasma.
  - 38.07 Braze metals.
  - 38.08 Apply hard-surface alloys.
  - 38.09 Store welding equipment and supplies according to the recommended storage procedures.
  - 38.10 Locate the state and local codes and standards and describe the importance of complying with them.
- 39.0 Construct and maintain agricultural structures--The student will be able to:
- 39.01 Read and interpret basic construction plans.
  - 39.02 Lay out an agricultural structure for construction with the use of a transit.
  - 39.03 Demonstrate basic carpentry construction and procedures.
  - 39.04 Construct a fence.
  - 39.05 Maintain and repair agricultural structures.
- 40.0 Apply business-management skills and identify appropriate legal documents--The student will be able to:
- 40.01 Identify personal/business liability and the use of liability insurance.
  - 40.02 Identify applicable insurance requirements.
  - 40.03 Identify and complete basic business-tax-liability forms.
  - 40.04 Identify requirements of eligibility for greenbelt, bluebelt, and homestead tax exemptions.
  - 40.05 Interpret enterprise budgets and amortization tables.
  - 40.06 Identify characteristics of legal documents (such as contracts, deeds, legal land descriptions, and leases).
  - 40.07 Identify applicable land-use and zoning regulations, including a comprehensive plan.

41.0 Demonstrate positive customer-relations skills--The student will be able to:

41.01 Exercise self-control.

41.02 Identify and demonstrate appropriate responses to criticism.

41.03 Explain the effects of positive human-relations skills on success in the business.

41.04 Demonstrate respect for people and property.



2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Agricultural Machinery Mechanics  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

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	49-3041, 45-2091
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)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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.

### 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
A	8106810	Agriscience Foundations 1	1 credit	45-2091	2
	8103120	Agricultural Mechanics 2	1 credit		2
	8103130	Agricultural Mechanics 3	1 credit		2
B	8103410	Agricultural Machinery Mechanics 4	1 credit	45-2091	2
C	8103420	Agricultural Machinery Mechanics 5	1 credit	49-3041	2
	8103430	Agricultural Machinery Mechanics 6	1 credit		2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

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

FFA (secondary programs) 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fl DOE.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.

- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Practice personal, equipment, and shop safety.
- 11.0 Select and use hand and power tools.
- 12.0 Install simple electrical circuits.
- 13.0 Demonstrate electric and gas welding.
- 14.0 Service and maintain small gasoline engines.
- 15.0 Perform preventive maintenance, checks, and services for tractors.
- 16.0 Perform minor repairs on an irrigation system.
- 17.0 Apply basic financial-management skills.
- 18.0 Demonstrate employability skills.
- 19.0 Demonstrate language arts knowledge and skills.
- 20.0 Demonstrate mathematics knowledge and skills.
- 21.0 Demonstrate science knowledge and skills.
- 22.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 23.0 Solve problems using critical thinking skills, creativity and innovation.
- 24.0 Use information technology tools.
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 26.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 28.0 Describe the importance of professional ethics and legal responsibilities.
- 29.0 Explain the importance of employability skill and entrepreneurship skills.
- 30.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 31.0 Keep records.
- 32.0 Weld, braze, and cut, using appropriate equipment.
- 33.0 Operate, service, test, and maintain agricultural machinery and equipment.
- 34.0 Demonstrate positive customer-relations skills.
- 35.0 Diagnose, service, and repair the lubrication system.
- 36.0 Test, repair and/or replace, and maintain the cooling system.
- 37.0 Test, repair and/or replace the intake, exhaust, and turbo-charged systems.
- 38.0 Test, repair and/or replace the fuel-delivery system.
- 39.0 Test, repair and/or replace, and maintain the brake system.
- 40.0 Test, repair and/or replace internal-combustion engines.
- 41.0 Test, repair and/or replace the electrical system, using service manuals.
- 42.0 Diagnose, service, and repair transmission systems.
- 43.0 Service and repair transfer case.
- 44.0 Diagnose, service, repair, and maintain the hydraulic system.
- 45.0 Diagnose, service, and repair the final drive systems.
- 46.0 Apply business-management skills and identify appropriate legal documents.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills --The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103120  
**Course Number:** Agricultural Mechanics 2  
**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.

10.0 Practice personal, equipment, and shop safety--The student will be able to:

- 10.01 Identify and eliminate hazards in agricultural mechanics settings.
- 10.02 Observe color-coded warnings in work areas and on equipment and machinery.
- 10.03 Describe appropriate actions in case of fire, accident, or other emergencies.
- 10.04 Describe personal protective equipment (PPE) and appropriate clothing.
- 10.05 Demonstrate safety procedures and workplace "housekeeping" practices.
- 10.06 Safely handle and store flammable and non-restricted chemicals.
- 10.07 Operate machinery and equipment according to the safety recommendations of the manufacturers.
- 10.08 Comply with the Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) rules and regulations.
- 10.09 Describe the Florida "Right-to-Know" law (as recorded in Florida Statutes, Chapter 442).

11.0 Select and use hand and power tools--The student will be able to:

- 11.01 Identify the capabilities and limitations of hand and power tools.
- 11.02 Select and safely use hand and power tools.
- 11.03 Select and use proper PPE for hand and power tools.
- 11.04 Identify worn, damaged, or abused tools.
- 11.05 Select and demonstrate the appropriate procedures for sharpening tools.

12.0 Install simple electrical circuits--The student will be able to:

- 12.01 Demonstrate the principles of AC and DC circuitry.
- 12.02 Demonstrate series and parallel circuitry.
- 12.03 Explain the scientific principles of electrical systems.
- 12.04 Plan and install a simple wiring system.
- 12.05 Test electrical circuits.

18.0 Demonstrate employability skills--The student will be able to:

- 18.01 Conduct group meetings, using parliamentary procedures and public-speaking skills.
- 18.02 Identify the documents that are required for a job application.
- 18.03 Complete a job application form.
- 18.04 Demonstrate competencies in job-interview techniques.

- 19.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 19.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 20.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 20.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 20.02 Construct charts/tables/graphs using functions and data. AF3.5
- 21.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 21.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 22.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 22.01 Locate, organize and reference written information from various sources. CM 3.0
  - 22.02 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 22.03 Apply active listening skills to obtain and clarify information. CM 7.0
- 23.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 23.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 23.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 24.0 Use information technology tools--The students will be able to:
  - 24.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 24.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 25.01 Explain the impact of the global economy on business organizations
- 26.0 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:
  - 26.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 26.02 Explain emergency procedures to follow in response to workplace accidents.
  - 26.03 Create a disaster and/or emergency response plan. SHE 2.0

27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 27.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 27.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0

28.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- 28.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0

29.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 29.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 29.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 29.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 29.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 29.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

30.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 30.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 30.02 Describe the effect of money management on personal and career goals. FL 3.0
- 30.03 Develop a personal budget and financial goals. FL3.1

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103130  
**Course Number:** Agricultural Mechanics 3  
**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.

13.0 Demonstrate electric and gas welding--The student will be able to:

- 13.01 Select and use gas-welding equipment.
- 13.02 Select and use electric arc-welding equipment and materials.

14.0 Service and maintain small gasoline engines--The student will be able to:

- 14.01 Explain the scientific principles of small engines.
- 14.02 Identify major parts and describe the general operation of small gasoline engines (2- and 4-stroke cycle).
- 14.03 Practice appropriate safety precautions.
- 14.04 Troubleshoot and perform minor repairs on small gasoline engines.

15.0 Perform preventive maintenance, checks, and services for tractors--The student will be able to:

- 15.01 Explain the scientific principles of hydraulic and transmission systems.
- 15.02 Perform daily operator maintenance checks for tractors.
- 15.03 Determine the preventive-maintenance procedures, using the tractor operator's manual.
- 15.04 Perform scheduled preventive-maintenance procedures.
- 15.05 Interpret and perform operator's trouble-shooting procedures as described in the manual.
- 15.06 Keep records of tractor maintenance and services.

16.0 Perform minor repair on an irrigation system--The student will be able to:

- 16.01 Identify the basic components of irrigation systems.
- 16.02 Differentiate various types of irrigation systems.
- 16.03 Identify state and local regulatory agencies for water management.
- 16.04 Perform minor repair on an irrigation system.

17.0 Apply basic financial-management skills--The student will be able to:

- 17.01 Complete basic financial records.
- 17.02 Demonstrate the use of banking procedures.
- 17.03 Calculate interest on loans.

- 17.04 Complete selected income-tax-return forms.
- 18.0 Demonstrate employability skills--The student will be able to:
  - 18.05 Demonstrate knowledge of how to make job changes appropriately.
  - 18.06 Demonstrate acceptable personal hygiene and a professional appearance.
  - 18.07 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.
  - 18.08 Describe the importance of a drug-free workplace and the industry policies regarding alcohol and drug use.
  - 18.09 Demonstrate appropriate responses to performance evaluation from employer, supervisor, or other persons in the workplace.
- 19.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 19.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 19.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 20.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 20.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 21.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 21.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 22.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 22.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 22.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 22.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 22.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 23.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 23.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 23.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 24.0 Use information technology tools--The students will be able to:

- 24.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 24.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 25.01 Describe the nature and types of business organizations. SY 1.0
  - 25.02 Explain the effect of key organizational systems on performance and quality.
  - 25.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 27.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 27.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 27.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 28.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 28.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 28.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 28.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 29.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
  - 29.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 29.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 29.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 29.08 Research the benefits of ongoing professional development. ECD 9.0
- 30.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
  - 30.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 30.05 Maintain financial records. FL3.3
  - 30.06 Read and reconcile financial statements. FL3.4
  - 30.07 Research, compare and contrast investment opportunities.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103410  
**Course Number:** Agricultural Machinery Mechanics 4  
**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.

31.0 Keep records--The student will be able to:

- 31.01 Explain the purpose and importance of keeping records.
- 31.02 Demonstrate procedures for keeping records of equipment maintenance and services.
- 31.03 Keep records on each job or project assignment.
- 31.04 Complete work orders, service invoices, and requisitions.
- 31.05 Prepare a written cost estimate of repair work and warranty claims.

32.0 Weld, braze, and cut, using appropriate equipment--The student will be able to:

- 32.01 Set up, adjust, operate, and maintain MIG (middle inert gas) and TIG (tungsten inert gas) welding equipment.
- 32.02 Set up, adjust, and operate plasma cutting equipment.
- 32.03 Select recommended operational procedures and supplies for specific jobs.
- 32.04 Practice all recommended safety precautions.
- 32.05 Demonstrate the different welding positions.
- 32.06 Cut and pierce metals, using oxyacetylene and plasma.
- 32.07 Braze metals.
- 32.08 Apply hard-surface alloys.
- 32.09 Store welding equipment and supplies according to the recommended storage procedures.

33.0 Operate, service, test, and maintain agricultural machinery and equipment--The student will be able to:

- 33.01 Operate and adjust agricultural machinery and equipment that are used in the local area, according to the operator's manuals, such as the following:
  - agricultural wheel-type tractors
  - planting equipment
  - primary and secondary tillage equipment
  - pesticide-application equipment
  - harvesting equipment
  - fertilization equipment
- 33.02 Remove, clean, test, repair, and reinstall parts of machinery and equipment, using repair manuals.
- 33.03 Service machinery, using service manuals.

- 33.04 Follow safety precautions when operating, servicing, and maintaining machines and equipment.
- 34.0 Demonstrate positive customer-relations skills--The student will be able to:
  - 34.01 Exercise self-control.
  - 34.02 Identify and demonstrate appropriate responses to criticism.
  - 34.03 Explain the effects of positive human-relations skills on success in the business.
  - 34.04 Demonstrate respect for people and property.



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103420  
**Course Number:** Agricultural Machinery Mechanics 5  
**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.

35.0 Diagnose, service, and repair the lubrication system--The student will be able to:

- 35.01 Change oil filters.
- 35.02 Check and change oils and other lubricants in engines.
- 35.03 Diagnose and replace damaged or worn components of the system.

36.0 Test, repair and/or replace, and maintain the cooling system--The student will be able to:

- 36.01 Test coolant.
- 36.02 Flush and clean the system.
- 36.03 Test, repair and/or replace parts of the system.
- 36.04 Adjust parts of the system for proper operation.

37.0 Test, repair and/or replace the intake, exhaust, and turbo-charged systems--The student will be able to:

- 37.01 Troubleshoot the intake, exhaust, and turbo-charged systems, using recommended diagnostic equipment.
- 37.02 Repair and replace parts of the systems.
- 37.03 Service and adjust the systems for proper operation.

38.0 Test, repair and/or replace the fuel-delivery system, using service manuals--The student will be able to:

- 38.01 Remove, clean, rebuild, and reinstall carburetors.
- 38.02 Bleed the diesel-fuel system.
- 38.03 Remove and reinstall a diesel-fuel-injection pump, according to the manufacturer's specifications.
- 38.04 Replace components of the fuel system.
- 38.05 Service and adjust parts of the fuel system for proper operation.

39.0 Test, repair and/or replace, and maintain the brake system--The student will be able to:

- 39.01 Drain, refill, and adjust the brake system.
- 39.02 Test brake-system components, using recommended diagnostic equipment.
- 39.03 Repair and replace parts of the system.
- 39.04 Service and adjust the system for proper operation.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8103430  
**Course Number:** Agricultural Machinery Mechanics 6  
**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.

40.0 Test, repair and/or replace internal-combustion engines--The student will be able to:

- 40.01 Troubleshoot components of the engine, using recommended diagnostic equipment.
- 40.02 Repair and replace components of the basic engine, using repair manuals.
- 40.03 Service and adjust all parts of the engine for proper operation.

41.0 Test, repair and/or replace the electrical system, using service manuals--The student will be able to:

- 41.01 Troubleshoot the electrical system, using recommended diagnostic equipment.
- 41.02 Repair and replace components of the electrical system.
- 41.03 Service and adjust all parts of the system for proper operation.

42.0 Diagnose, service, and repair transmission systems--The student will be able to:

- 42.01 Troubleshoot transmission components, using recommended diagnostic equipment.
- 42.02 Repair and replace parts of transmission systems.
- 42.03 Service and adjust parts of different transmission systems for proper operation.

43.0 Service and repair transfer case--The student will be able to:

- 43.01 Troubleshoot transfer case components.
- 43.02 Service and adjust system components.
- 43.03 Repair and replace system components.
- 43.04 Change filters and drain, flush, and refill the transfer case system.

44.0 Diagnose, service, repair, and maintain the hydraulic system--The student will be able to:

- 44.01 Change filters and drain, flush, and refill the hydraulic system.
- 44.02 Troubleshoot hydraulic-system components, using recommended diagnostic equipment.
- 44.03 Repair and replace parts of the system.
- 44.04 Service and adjust the system for proper operation.

45.0 Diagnose, service, and repair the final-drive systems--The student will be able to:

- 45.01 Diagnose the final-drive systems, using recommended diagnostic equipment.
- 45.02 Repair and replace parts of the systems.
- 45.03 Service and adjust the systems for proper operation.

46.0 Apply business-management skills and identify appropriate legal documents--The student will be able to:

- 46.01 Identify personal/business liability and the use of liability insurance.
- 46.02 Identify applicable insurance requirements.
- 46.03 Identify and complete basic business-tax-liability forms.
- 46.04 Identify the requirements of greenbelt, bluebelt, and homestead tax exemptions.
- 46.05 Interpret enterprise budgets and amortization tables.
- 46.06 Identify characteristics of legal documents (such as contracts, deeds, and leases).
- 46.07 Identify applicable land-use and zoning regulations, including a comprehensive plan.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Animal Biotechnology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	<b>8106100</b>
CIP Number	0102020100
Grade Level	9-12 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	19-4021
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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.

**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
	8106810	Agriscience Foundations 1	1 credit		2
	8106850	Agricultural Biotechnology 2	1 credit		3
A	8106120	Animal Biotechnology 3	1 credit	19-4021	3

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

## **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

## **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

## **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

## Standards

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Identify the historical, social, cultural and potential applications of biotechnology.
- 11.0 Conduct scientific investigation and apply results.
- 12.0 Demonstrate leadership, employability, communication and human relation skills.
- 13.0 Practice agricultural laboratory safety.
- 14.0 Demonstrate laboratory skills as applied to biotechnology.
- 15.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR).
- 16.0 Demonstrate language arts knowledge and skills.
- 17.0 Demonstrate mathematics knowledge and skills.
- 18.0 Demonstrate science knowledge and skills.
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 20.0 Solve problems using critical thinking skills, creativity and innovation.
- 21.0 Use information technology tools.
- 22.0 Apply genetic principles to animal science.
- 23.0 Interpret the relationship between total digestible nutrients (TDN) in feeds and its utilization.
- 24.0 Examine the developmental processes that determine animal growth.
- 25.0 Investigate the reproduction system of animals.
- 26.0 Describe animal science and the role of animals in society.
- 27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 28.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 30.0 Describe the importance of professional ethics and legal responsibilities.
- 31.0 Explain the importance of employability skill and entrepreneurship skills.
- 32.0 Demonstrate personal money-management concepts, procedures, and strategies.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.



03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills--The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

**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.

10.0 Identify the historical, social, cultural and potential applications of biotechnology--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.1, 2, 3, 5, 8, 14; SC.912.L.16.10; SC.912.L17.13; SC.912.N.2.1, 2

- 10.01 Define biotechnology and explore the historical impact on agriculture.
- 10.02 Explain the developmental progression of biotechnology.
- 10.03 Investigate current applications of biotechnology in agriculture.
- 10.04 Investigate current research in agricultural biotechnology.
- 10.05 Examine potential applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture.
- 10.06 Research emerging problems and issues associated with agricultural biotechnology.
- 10.07 Describe the role of agencies that regulate biotechnology.
- 10.08 Interpret the major regulatory issues related to biotechnology.
- 10.09 Explore ethical, legal and social biotechnology issues.
- 10.10 Evaluate the benefits and risks associated with biotechnology.
- 10.11 Investigate the emergence and evolution of biological organisms and their use in biotechnology.
- 10.12 Examine intellectual properties associated with biotechnology by defining their components.
- 10.13 Examine an ethical dilemma associated with biotechnology by identifying its components.

11.0 Conduct scientific investigation and apply results--The student will be able to:

This standard supports the following Sunshine State Standards: LA.912.2.23; LA.912.4.22; MA.912.S.1.2; MA.912.S.3.2; SC.912.N.3.1,4

- 11.01 Discuss the differences between scientific laws and scientific theories.
- 11.02 Explain the process of scientific inquiry.
- 11.03 Analyze research being conducted in agricultural biotechnology.
- 11.04 Design an agricultural experiment using appropriate control measures.
- 11.05 Devise a system for recording data.
- 11.06 Collect and record data using SI units.

- 11.07 Summarize data and draw defensible conclusions.
  - 11.08 Prepare a report on the experiment conducted.
  - 11.09 Plan and conduct follow-up experiments using the scientific method.
- 12.0 Demonstrate leadership, employability, communication and human relation skills--The student will be able to:
- 12.01 Conduct group meetings using parliamentary procedure and public speaking skills.
  - 12.02 Follow acceptable work habits, personal characteristics and hygiene habits for the biotechnology workplace.
  - 12.03 Identify or demonstrate appropriate responses to criticism and coaching from employer, supervisor, or other persons.
  - 12.04 Conduct a job search and identify advanced training opportunities and the requirements.
  - 12.05 Prepare a resume.
- 13.0 Practice agricultural laboratory safety--The student will be able to:
- 13.01 Identify first aid supplies, personnel and emergency protection areas.
  - 13.02 Monitor, use, store and dispose of hazardous materials properly.
  - 13.03 Document safety training and practices using Material Safety Data Sheets (MSDS) and Occupational Safety and Health Administration (OSHA) standards.
  - 13.04 Demonstrate and utilize safety equipment.
  - 13.05 Identify safety symbols and signs.
  - 13.06 Demonstrate appropriate safety procedures and guidelines, and discuss implications of safety violations.
- 14.0 Demonstrate laboratory skills as applied to biotechnology--The student will be able to:
- This standard supports the following Sunshine State Standards: SC.912.F.14.4, 52; SC.912.L.16.1, 2, 3, 5, 9, 15, 16; SC.912.L.18. 4, 12; SC.912.P.8.7
- 14.01 Maintain and interpret biotechnology laboratory records.
  - 14.02 Operate laboratory equipment and measurement devices.
  - 14.03 Demonstrate aseptic techniques in the biotechnology laboratory.
  - 14.04 Select an appropriate standard operating procedure for working with biological materials.
  - 14.05 Prepare buffers, reagents, solutions and media.
  - 14.06 Inventory biological and chemical materials, and maintain accurate records of supplies and expiration dates.
  - 14.07 Isolate, maintain, quantify and store cell cultures.
  - 14.08 Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.
  - 14.09 Extract and purify DNA.
  - 14.10 Perform protein separation techniques and interpret the results.
  - 14.11 Describe how antibodies are formed and how they can be used in biotechnology applications.
  - 14.12 Research and describe the use of biotechnology to detect microbes.

15.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR) --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2; SC.912.L.15.13, 14, 15; SC.912.L.16.10; SC.912.L.17.2, 8, 11, 20; SC.912.L.18.1, 2, 3, 4, 6, 8, 7, 11; SC.912.P.8.12

- 15.01 Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes.
- 15.02 Differentiate the roles of carbohydrates, fats, and proteins in biotechnology applications.
- 15.03 Diagram the processes used to produce transgenic eukaryotes.
- 15.04 Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.
- 15.05 Describe processes by which enzymes are produced through biotechnology.
- 15.06 Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.
- 15.07 Diagram the process by which organisms are genetically engineered for waste treatment.
- 15.08 Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of agricultural products.
- 15.09 Investigate-and report on-genetic engineering procedures used in the production of agricultural products.
- 15.10 Explain the functions of hormones in animals.
- 15.11 Describe the processes used to produce animal hormones from transgenic organisms.
- 15.12 Identify foods produced through fermentation.
- 15.13 Compare and contrast bioengineering and conventional pathways used in food processing.
- 15.14 Explain biomass and sources of biomass.
- 15.15 Assess the characteristics of biomass that make it useful for biofuels production.
- 15.16 Describe the process used in producing alcohol from biomass.
- 15.17 Diagram the process used in producing biodiesel from biomass.
- 15.18 Illustrate the process used in producing methane from biomass.
- 15.19 Describe the selective plant breeding process.
- 15.20 Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.
- 15.21 Describe the use of biotechnology in bioremediation.
- ~~15.22~~ Describe the processes involved in biotreatment of biological and chemical wastes.
- ~~15.23~~ Explain the global importance of biodiversity.
- ~~15.24~~ Explain the positive and negative impacts of agricultural practices on wild populations.
- ~~15.25~~ Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.
- 15.26 Describe the processes used in the production of molecules for use in industrial applications.

16.0 Demonstrate language arts knowledge and skills. The students will be able to: AF 2.0

- 16.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 16.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 16.03 Present information formally and informally for specific purposes and audiences. AF2.9
  
- 17.0 Demonstrate mathematics knowledge and skills. The students will be able to: AF3.0
  - 17.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 17.02 Construct charts/tables/graphs using functions and data. AF3.5
  - 17.03 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  
- 18.0 Demonstrate science knowledge and skills. The students will be able to: AF4.0
  - 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
  
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. The students will be able to:
  - 19.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 19.02 Locate, organize and reference written information from various sources. CM 3.0
  - 19.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 19.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 19.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 19.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 19.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
  
- 20.0 Solve problems using critical thinking skills, creativity and innovation. The students will be able to:
  - 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 20.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
  
- 21.0 Use information technology tools. The students will be able to:

- 21.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 21.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0



**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.

22.0 Apply genetic principles to animal science--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.15; SC.912.L.16.1, 2, 3, 4, 9, 16; SC.912.N.1.1, 3, 4, 6, 7

- 22.01 Describe how the concept of heritability is used in the selection of livestock.
- 22.02 Chart the difference between phenotypic and genotypic characteristics and determine probabilities.
- 22.03 Analyze performance data used in the selection process of livestock.
- 22.04 Use computer data to assist in the selection process of livestock.
- 22.05 Differentiate between dominant and recessive traits.
- 22.06 Describe the chemical and physical properties of DNA.
- 22.07 Extract a visible mass of DNA from animal or plant tissue.
- 22.08 Develop a hypothetical species using genetic engineering.
- 22.09 Debate the safeguards used in research in genetic engineering.

23.0 Interpret the relationship between total digestible nutrients (TDN) in feeds and its utilization--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.18.1; 2, 3, 4, 6, 9, 10, 11; SC.912.P.8.7, 12; SC.912.P.10.1

- 23.01 Determine nutritional requirements of selected animals.
- 23.02 Select appropriate feed samples for analysis of nutritional values and develop a balanced ration.
- 23.03 Conduct experiments comparing growth rates using selected rations.
- 23.04 Obtain information from a feed label and determine which nutrients are derived from which component.
- 23.05 Demonstrate the effects digestive agents have in the digestive process.
- 23.06 Compare how the body's cells metabolize fats, carbohydrates and proteins.
- 23.07 Analyze the effect of diseases on nutritional utilization.

24.0 Examine the developmental processes that determine animal growth--The student will be able to:

- 24.01 Develop a growth curve using selected animal species.
- 24.02 Differentiate between muscle, fat, and bone development.
- 24.03 Evaluate the effects of hormones in animal production.

- 24.04 Compare morphology of developing embryos.
- 24.05 Analyze the diseases that effect development growth.

25.0 Investigate the reproduction system of animals--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.16.10; 13

- 25.01 Analyze the quality of semen of selected animals.
- 25.02 Compare and contract sperm anatomy of selected animal species.
- 25.03 Analyze the factors that affect sperm mobility and development.
- 25.04 Compare and contrast the reproductive cycles of selected animal species.
- 25.05 Compare and contrast the breeding time and conception rates of selected animal species.
- 25.06 Describe the functions of hormones that control reproduction.
- 25.07 Discuss the use of hormone therapy to manipulate ovarian activity.
- 25.08 Describe and compare the different pathogens that cause animal diseases.
- 25.09 Analyze the mating process of selected animal species.

26.0 Describe animal science and the role of animals in society--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.16.10; SC.912.L.17.13, 20; SC.912.N.1.1, 3, 4, 6, 7; SC.912.N.2.1, 2; SC.912.P.8.7, 12; SC.912.P.10.1, 10

- 26.01 Differentiate between animal welfare and animal rights.
- 26.02 Debate current events concerning animal welfare and animal rights.
- 26.03 Demonstrate safe procedures when working with animal related equipment in laboratory settings.
- 26.04 Practice safety precautions around animals.
- 26.05 Develop a research project related to biotechnology and animal science.
- 26.06 Discuss the benefits of biotechnology in producing and marketing animals and animal products.
- 26.07 Research how biotechnology affects the consumer.

27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

- 27.01 Describe the nature and types of business organizations. SY 1.0
- 27.02 Explain the effect of key organizational systems on performance and quality.
- 27.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 27.04 Explain the impact of the global economy on business organizations

28.0 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:

- 28.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 28.02 Explain emergency procedures to follow in response to workplace accidents.
- 28.03 Create a disaster and/or emergency response plan. SHE 2.0

- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 29.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 29.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 30.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 30.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 30.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 30.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 30.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 31.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 31.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 31.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 31.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 31.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 31.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 31.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 31.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 31.08 Research the benefits of ongoing professional development. ECD 9.0
  - 31.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 32.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 32.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 32.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 32.03 Develop a personal budget and financial goals. FL3.1
  - 32.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 32.05 Maintain financial records. FL3.3
  - 32.06 Read and reconcile financial statements. FL3.4

Revised: 3/11/2011

32.07 Research, compare and contrast investment opportunities.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Animal Science and Services  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	8106200
CIP Number	0101030210
Grade Level	9-12, 30, 31
Standard Length	6 credits
Teacher Certification	AGRICULTUR 1 @2 AG PROD #7
CTSO	FFA
SOC Codes (all applicable)	45-1011.08, 45-2093
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 animal science 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, health, safety and environmental issues, and the use and care of animal health-care instruments, animal grooming equipment, animal restraining equipment, and laboratory equipment.

### **Program Structure**

This program is a planned sequence of instruction consisting of six courses and three occupational 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
A	8106810	Agriscience Foundations 1	1 credit		2
	8106210	Animal Science and Services 2	1 credit		2
	8106220	Animal Science and Services 3	1 credit	45-2093	2
B	8106230	Animal Science and Services 4	1 credit		2
	8106240	Animal Science and Services 5	1 credit	45-1011.08	2
C	8106250	Animal Science and Services 6	1 credit	45-1011.08	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be

able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

## Standards

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Describe animal science and the role of animals in society.
- 11.0 Identify careers in the animal industry.
- 12.0 Practice animal and human first aid and laboratory safety.
- 13.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 14.0 Identify parts and functions of various systems of selected animals.
- 15.0 Recognize normal and abnormal animal behaviors.
- 16.0 Differentiate between animal welfare and animal rights.
- 17.0 Demonstrate knowledge of animal control and humane societies.
- 18.0 Demonstrate employability and interpersonal skills.
- 19.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 20.0 Demonstrate language arts knowledge and skills (AF 2.0).
- 21.0 Demonstrate mathematics knowledge and skills (AF3.0).
- 22.0 Demonstrate science knowledge and skills (AF4.0).
- 23.0 Identify the different digestive systems of animals and the nutritional requirements of selected species.
- 24.0 Explain the reproductive system and breeding of selected animals.
- 25.0 Demonstrate knowledge of preventive medicine and disease control.
- 26.0 Describe internal and external parasites and control methods.
- 27.0 Groom, exhibit and market animals.
- 28.0 Maintain and analyze records.
- 29.0 Use information technology tools.
- 30.0 Discuss animal marketing techniques.
- 31.0 Use information technology tools.
- 32.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 33.0 Apply animal health practices.
- 34.0 Maintain equipment and facilities.
- 35.0 Operate, maintain, and repair machinery and equipment.
- 36.0 Emerging technologies in Animal Science.
- 37.0 Apply animal health practices.
- 38.0 Perform emergency first aid on animals.



- 39.0 Identify, select, and breed food-producing animals.
- 40.0 Assess county, state and federal agencies that support the animal industry.
- 41.0 Explain the importance of employability skill and entrepreneurship skills.
- 42.0 Plan routine management of food-producing animals and facilities.
- 43.0 Grow and maintain pasture and forage crops.
- 44.0 Maintain and analyze records.
- 45.0 Solve problems using critical thinking skills, creativity and innovation.
- 46.0 Identify and interpret rules, policy, and regulations affecting the livestock industry.
- 47.0 Describe the importance of professional ethics and legal responsibilities.
- 48.0 Identify and interpret environmental issues and regulations pertaining to animal industry.
- 49.0 Demonstrate personal money-management concepts, procedures, and strategies.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills --The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

**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.

10.0 Describe animal science and the role of animals in society – The student will be able to:

This standard supports the following Sunshine State Standards: LA.912.2.2.3

10.01 Describe animal science and the role of animals in society.

10.02 Locate and obtain informational materials on animal-related topics or issues.

11.0 Identify careers in the animal industry – The student will be able to:

This standard supports the following Sunshine State Standards: LA.912.2.2.3

11.01 Locate and obtain information on animal-industry careers and career opportunities.

11.02 Compare and contrast various careers in the animal industry including training requirements for entry and advancement in animal-industry careers.

11.03 Examine professional organizations and trade journals in the animal industry.

12.0 Practice animal and human first aid and laboratory safety – The student will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.3;  
SC.912.L.14.6, 36, 52; SC.912.L.15.13;

12.01 Practice safe procedures when working with animal-related equipment and in laboratory settings.

12.02 Practice safety precautions around animals.

12.03 Discuss the impact of unsafe procedures.

12.04 Define zoonosis and investigate selected zoonotic diseases.

12.05 Discuss OSHA as it relates to the animal industry.

12.06 Recognize signs of aggressive animal behaviors.

12.07 Develop and use a first aid kit.

12.08 Recognize allergic reactions.

12.09 Describe proper use of eye wash solution.

12.10 Control minor hemorrhage and/or trauma.

12.11 Practice emergency procedures.

13.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance – The student will be able to:

- 13.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. (SHE 1.0)
- 13.02 Explain emergency procedures to follow in response to workplace accidents.
- 13.03 Create a disaster and/or emergency response plan. (SHE 2.0)

14.0 Identify parts and functions of various systems of selected animals – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2, 3, 11, 12, 13, 14, 15, 24, 25, 33, 36, 40, 41, 43, 44, 45, 46, 47, 48, 49, 50

- 14.01 Identify parts of the skeletal system of selected animals.
- 14.02 Compare human skeletal system to that of other animals.
- 14.03 Identify parts and functions of the following systems of selected animals:
  - respiratory system
  - urinary system
  - digestive system
  - cardiovascular system
  - reproductive system
  - nervous system
- 14.04 Employ correct terminologies for the variety of animal species and conditions within those species.

15.0 Recognize normal and abnormal animal behaviors –The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L15.1, 2,14; SC.912.L.17.8; SC.912.N.1.6

- 15.01 Distinguish between instinctive and learned behaviors.
- 15.02 Recognize normal and abnormal behavioral characteristics of animals through observations.
- 15.03 Identify behavioral problems.

16.0 Differentiate between animal welfare and animal rights – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.16.10; SC.912.N.2.2; SC.912.N.4.1

- 16.01 Define animal welfare and animal rights.
- 16.02 Explain the differences between animal welfare and animal rights.
- 16.03 Identify and examine animal welfare and animal rights advocate groups.
- 16.04 Debate current events concerning animal welfare and animal rights.
- 16.05 Describe animal cruelty and the consequences of cruel treatment of animals.

17.0 Demonstrate knowledge of animal control and humane societies – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13; SC.912.N.1.4; SC.912.N.2.2; SC.912.N.4.2

- 17.01 Differentiate between animal control agencies and humane societies.

- 17.02 Describe the responsibilities and goals of animal control agencies and humane societies.
- 17.03 Explain the laws governing each organization.
- 17.04 Identify and locate local animal control agencies and humane societies.
  
- 18.0 Demonstrate employability and interpersonal skills – The student will be able to:
  - 18.01 Demonstrate appropriate responses to criticisms from employer, supervisor, and peers.
  - 18.02 Complete pertinent forms for employment, such as resume, job applications, W-4 forms.
  - 18.03 Demonstrate job interview techniques.
  
- 19.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives – The student will be able to:
  - 19.01 Employ leadership skills to accomplish organizational goals and objectives. (LT1.0)
  - 19.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. (LT3.0)
  - 19.03 Conduct and participate in meetings to accomplish work tasks. (LT 4.0)
  - 19.04 Employ mentoring skills to inspire and teach others. (LT 5.0)
  
- 20.0 Demonstrate language arts knowledge and skills (AF 2.0) – The student will be able to:
  - 20.01 Locate, comprehend and evaluate key elements of oral and written information. (AF2.4)
  - 20.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. (AF2.5)
  - 20.03 Present information formally and informally for specific purposes and audiences. (AF2.9)
  
- 21.0 Demonstrate mathematics knowledge and skills (AF3.0) – The student will be able to:
  - 21.01 Demonstrate knowledge of arithmetic operations. (AF3.2)
  - 21.02 Analyze and apply data and measurements to solve problems and interpret documents. (AF3.4)
  - 21.03 Construct charts/tables/graphs using functions and data. (AF3.5)
  
- 22.0 Demonstrate science knowledge and skills (AF4.0) – The student will be able to:
  - 22.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. (AF4.1)
  - 22.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. (AF4.3)



**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.

23.0 Identify the different digestive systems of animals and the nutritional requirements of selected species – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2, 33, 46; SC.912.L.18.2, 3; SC.912.L.18.2; MA.912.A.3.15, MA.912.A.5.7

- 23.01 Differentiate between ruminants and non-ruminants.
- 23.02 Differentiate between omnivorous, carnivores, and herbivores.
- 23.03 Describe the basic nutritional requirements of selected species.
- 23.04 Analyze different feed labels and apply feed label regulations.
- 23.05 Balance a feed ration.
- 23.06 Schedule feeding times for selected animals.
- 23.07 Evaluate animal feed and feeding systems.
- 23.08 Measure and add medication to feed as prescribed.
- 23.09 Formulate amount to feed individual animals.

24.0 Explain the reproductive system and breeding of selected animals – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.31, 33, 41; SC.912.L.15.9, 14, 15; SC.912.L.16.1, 13, 2l; SC.912.L.17.13

- 24.01 Describe the male and female reproductive systems.
- 24.02 Determine sex of animals.
- 24.03 Determine appropriate age for breeding.
- 24.04 Identify gestation length.
- 24.05 Describe estrous cycle.
- 24.06 Describe breeding techniques.
- 24.07 Select male and female for breeding.
- 24.08 Recognize the proper care for breeding stock.
- 24.09 Recognize the proper care for newborn.
- 24.10 Compare and Contrast between reproduction in animal species.

25.0 Demonstrate knowledge of preventive medicine and disease control – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.6, 52; MA.912.A.1.5; MA.912.A.5.2

- 25.01 Describe the importance of preventive medicine for animal health.
- 25.02 Recognize healthy animals.
- 25.03 Research common diseases of animals.
- 25.04 Describe vaccinations available for disease prevention and vaccination procedures.
- 25.05 Evaluate and report health conditions of animals.
- 25.06 Evaluate and report common ailments of animals (diseases, disorders associated with feeding, stress, internal and external parasites).
- 25.07 Administer prescribed oral medications.
- 25.08 Describe the process for administering medications by injection.
- 25.09 Describe the procedure for safe disposal of medications.
- 25.10 Discuss the term immunology and active and passive immunity.
- 25.11 Describe procedures for periodic health check-up.

26.0 Describe internal and external parasites and control methods – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.L.17.6; HE.912.C.1.8

- 26.01 Compare and contrast internal and external parasites of selected animals and use a microscope for selected practices.
- 26.02 Research methods of parasite prevention and control.
- 26.03 Describe the process for fecal sample collection, slide preparation, and examination.

27.0 Groom, exhibit and market animals – The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.2.1 MA.912.A.5.2

- 27.01 Groom selected animals for exhibition.
- 27.02 Train animals for show and/or exhibition.
- 27.03 Demonstrate proper techniques for exhibiting and animals.
- 27.04 Demonstrate knowledge required to train selected animals to halter.
- 27.05 Measure animal growth using a scale.
- 27.06 Prepare animals for transport.
- 27.07 Identify market outlets.
- 27.08 Describe methods of restraining, loading, handling, and transporting animals safely.
- 27.09 Determine market grades of animals and animal products.
- 27.10 Analyze shipping and health certificates.

28.0 Maintain and analyze records --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.5.2

- 28.01 Maintain and analyze animal records.

- 28.02 Discuss the legal requirements of maintaining animal health records, and maintain and analyze animal health records.
  - 28.03 Maintain and analyze basic business records (inventory, depreciation, receipts, and expenses) using computer applications.
  - 28.04 Prepare and maintain supervised agricultural experience (SAE) records.
- 29.0 Use information technology tools – The student will be able to:
- 29.01 Use personal information management (PIM) applications to increase workplace efficiency. (IT 1.0)
  - 29.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. (IT 2.0)
  - 29.03 Employ computer operations applications to access, create, manage, integrate, and store information. (IT 3.0)
  - 29.04 Employ collaborative/groupware applications to facilitate group work. (IT 4.0)

**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.

30.0 Discuss animal marketing techniques – The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.2.2;  
MA.912.S.3.9

30.01 Demonstrate procedures for preparing, maintaining, and exhibiting animals..

30.02 Collect and interpret market reports and identify market outlets for companion and food-producing animals.

30.03 Determine market grades of animal and animal products.

30.04 Examine the impacts of industry promotion campaigns.

31.0 Use information technology tools – The student will be able to:

31.01 Use personal information management (PIM) applications to increase workplace efficiency. (IT 1.0)

31.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. (IT 2.0)

31.03 Employ computer operations applications to access, create, manage, integrate, and store information. (IT 3.0)

31.04 Employ collaborative/groupware applications to facilitate group work. (IT 4.0)

32.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas – The student will be able to:

32.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. (CM 1.0)

32.02 Locate, organize and reference written information from various sources. (CM 3.0)

32.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. (CM 5.0)

32.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. (CM 6.0)

32.05 Apply active listening skills to obtain and clarify information. (CM 7.0)

32.06 Develop and interpret tables and charts to support written and oral communications. (CM 8.0)

32.07 Exhibit public relations skills that aid in achieving customer satisfaction. (CM 10.0)

33.0 Apply animal health practices – The student will be able to:

- 33.01 Administer prescribed oral medications.
- 33.02 Locate injection points of selected animals.
- 33.03 Sterilize instruments and supplies.
- 33.04 Interpret and follow directions on medications and animal health aids, including withdrawal periods.
- 33.05 Dip, spray, or dust animals for external parasites (under supervision).
- 33.06 Dispose of empty chemical and medical containers as prescribed.
- 33.07 Store medications and chemicals safely and securely.
- 33.08 Dispose of biomedical waste and by products (needles, scalpel blades, medicines, etc.)

34.0 Maintain equipment and facilities – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.14

- 34.01 Clean and disinfect pens, cages, feeders, waterers, trailers and other equipment.
- 34.02 Dispose of animal residue and waste.
- 34.03 Prepare and maintain equipment and instruments.
- 34.04 Repair and maintain pens, cages and other facilities and structures.
- 34.05 Perform maintenance and minor repair of electrical and plumbing fixtures and equipment.
- 34.06 Create a clean, sanitary and healthy environment for animals.

35.0 Operate, maintain, and repair machinery and equipment – The student will be able to:

- 35.01 Use equipment-operator and repair manuals.
- 35.02 Service and maintain small gasoline engines.
- 35.03 Operate, service, and maintain tractors and equipment.
- 35.04 Maintain records of equipment maintenance and repair.
- 35.05 Prepare equipment for storage.
- 35.06 Demonstrate proper use of shop and lab equipment.
- 35.07 Demonstrate safety practices in operating machinery and equipment.

36.0 Emerging technologies in Animal Science – The student will be able to:

This standard supports the following Sunshine State Standards:  
SC.912.L.15.14, SC.912.L.16.3, 4, 5, 8, 9, 10; SC.912.L.17.15, 17

- 36.01 Investigate genetic advancements and their affect on animal industry.
- 36.02 Identify new technologies in animal science.
- 36.03 Research emerging technologies and determine their impact on animal industry and society.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Animal Science and Services 5  
**Course Number:** 8106240  
**Course Credit:** 1

**Course Description:**

37.0 Apply advanced animal health practices – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.14;  
SC.912.N.4.1, 2

- 37.01 Administer prescribed injections. (under supervision)
- 37.02 Discuss proper disposal of deceased animals.
- 37.03 Select and administer growth stimulants and implants (under supervision).
- 37.04 Discuss castration, dehorning, docking, and debeaking.

38.0 Perform emergency first aid on animals – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.36

- 38.01 Evaluate the health status of the animals.
- 38.02 Isolate injured animals.
- 38.03 Demonstrate how to properly cleanse wounds and apply antiseptic.
- 38.04 Immobilize fractured limbs.
- 38.05 Identify and stop external bleeding.
- 38.06 Seek additional medical attention for animals when required.

39.0 Identify, select, and breed food-producing animals – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.31, 33;  
SC.912.L.15.4, 5, 6, 14; SC.912.L.16.1, 2, 3, 4, 5, 8, 9, 10

- 39.01 Appraise animal conformation and desirable characteristics and breeds.
- 39.02 Determine age to breed selected animals.
- 39.03 Describe estrous cycle of food-producing animals.
- 39.04 Describe breeding techniques, including artificial insemination.
- 39.05 Justify offspring that should be culled.
- 39.06 Describe basic animal genetics.
- 39.07 Identify signs of parturition.
- 39.08 Identify common disorders of parturition.
- 39.09 Prepare animals and facilities for parturition.
- 39.10 Assist in the delivery of newborn animals.

40.0 Analyze county, state and federal agencies that support the animal industry – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.18

- 40.01 Identify the agencies that support the animal industry.
  - 40.02 Research the technical assistance, disaster relief, grants and other programs available.
  - 40.03 Inquire about career opportunities within these agencies.
- 41.0 Explain the importance of employability skill and entrepreneurship skills – The student will be able to:
- 41.01 Identify and demonstrate positive work behaviors needed to be employable. (ECD 1.0)
  - 41.02 Develop personal career plan that includes goals, objectives, and strategies. (ECD 2.0)
  - 41.03 Examine licensing, certification, and industry credentialing requirements. (ECD 3.0)
  - 41.04 Maintain a career portfolio to document knowledge, skills, and experience. (ECD 5.0)
  - 41.05 Evaluate and compare employment opportunities that match career goals. (ECD 6.0)
  - 41.06 Identify and exhibit traits for retaining employment. (ECD 7.0)
  - 41.07 Identify opportunities and research requirements for career advancement. (ECD 8.0)
  - 41.08 Research the benefits of ongoing professional development. (ECD 9.0)
  - 41.09 Examine and describe entrepreneurship opportunities as a career planning option. (ECD 10.0)

**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 identifying, selecting and breeding food-producing animals; management; growing and maintaining pasture and forage crops; and interpreting rules and regulations affecting the livestock industry.

42.0 Plan routine management of food-producing animals and facilities – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.6, 36, 38, 41; SC.912.L.17.3, 4, 11, 13; SC.912.N.2.2

- 42.01 Schedule feeding and care of animals.
- 42.02 Order supplies and animal feeds.
- 42.03 Develop training and exercise schedule for animal.
- 42.04 Plan for routine maintenance of equipment and facilities.
- 42.05 Assist in the planning of a routine animal health and preventative medication program.
- 42.06 Implement and maintain sanitary conditions for animals, including young.
- 42.07 Separate non-compatible animals.
- 42.08 Observe animals on a regular basis for problems or stress.
- 42.09 Develop a calendar of operations for a selected animal operation.

43.0 Grow and maintain pasture and forage crops – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2; SC.912.L.16.10; SC.912.L.17.4, 5, 9, 11, 13, 14, 15, 16, 17, 19; SC.912.P.8.11; SC.912.N.1.4

- 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.
- 43.04 Describe soil and water conservation practices.
- 43.05 Determine range and pasture quality.
- 43.06 Prepare soil for feed, pasture and forage crops.
- 43.07 Plant and grow feed, pasture and forage crops.
- 43.08 Fertilize feed, pasture and forage crops.
- 43.09 Control noxious weeds and pests in crops.
- 43.10 Harvest forage and feed crops.
- 43.11 Store harvested feed and forage crops.
- 43.12 Assist in the development of a plan for the rotation of fields, pens and pastures.

44.0 Maintain and analyze records – The student will be able to:



This standard supports the following Sunshine State Standards: SC.912.L.16.1, 2, 7, 10; SC.912.L.17.13; MA.912.F.1.1; MA.912.F.3.1, 3, 4

- 44.01 Maintain and analyze production, performance and breeding records, using computer applications.
- 44.02 Identify major sources of credit.
- 44.03 Evaluate leasing and renting agreements.
- 44.04 Evaluate need for liability and other insurance.
- 44.05 Analyze records to determine efficiency of operation.
- 44.06 Maintain machinery, equipment and facilities inventory records.
- 44.07 Maintain breeding records.
- 44.08 Prepare an annual budget.
- 44.09 Maintain and analyze basic business records (inventory, depreciation, receipts, and expenses) using computer applications.
- 44.10 Plan a work schedule.
- 44.11 Maintain personnel and labor records.
- 44.12 Maintain supervised agricultural experience records.
- 44.13 Discuss the legal requirements of maintaining animal health records, and maintain and analyze health records.
- 44.14 Maintain chemical-use and water-use records, etc

45.0 Solve problems using critical thinking skills, creativity and innovation – The student will be able to:

- 45.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. (PS1.0)
- 45.02 Employ critical thinking and interpersonal skills to resolve conflicts. (PS 2.0)
- 45.03 Identify and document workplace performance goals and monitor progress toward those goals. (PS 3.0)
- 45.04 Conduct technical research to gather information necessary for decision-making. (PS 4.0)

46.0 Identify and interpret rules, policy, and regulations affecting the animal industry – The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.16.10; SC.912.L.17.1, 8, 11, 12, 3, 14, 15, 16, 17, 18, 19, 20; SC.912.N.2.2; SC.912.N.4.1, 2

- 46.01 Maintain a file of current animal rules and regulations.
- 46.02 Secure professional services and information.
- 46.03 Observe EPA pesticide use regulations.
- 46.04 Identify the procedures and requirements for obtaining a restricted use pesticide applicator's license.
- 46.05 Observe regulations regarding the use of medications and growth stimulants.
- 46.06 Observe state and federal regulations regarding disease testing/eradication programs and other programs.
- 46.07 Identify applicable land-use and zoning regulations.
- 46.08 Identify agencies affecting natural resource utilization (e.g., DNR, DEP, EPA).
- 46.09 Identify agencies regulating employee/employer relations (e.g., OSHA).

- 46.10 Investigate opportunities to impact policy making at the local, state, and national level.
- 47.0 Describe the importance of professional ethics and legal responsibilities – The student will be able to:
- 47.01 Evaluate and justify decisions based on ethical reasoning. (ELR 1.0)
  - 47.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. (ELR1.1)
  - 47.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. (ELR1.2)
  - 47.04 Interpret and explain written organizational policies and procedures. (ELR 2.0)
- 48.0 Identify and interpret environmental issues and regulations pertaining to animal industry – The student will be able to :
- This standard supports the following Sunshine State Standards: SC.912.L.16.10; SC.912.L.17.1, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; SC.912.L.18.12; SC.912.N.1.4; SC.912.N.2.2; SC.912.N.4.1, 2
- 48.01 Determine environmental issues pertinent to your area.
  - 48.02 Calculate the impact of environmental regulations on the industry.
  - 48.03 Examine differing environmental views.
  - 48.04 Assess the need for adequate waste management strategies in animal production.
  - 48.05 Discuss emerging technologies and determine their effectiveness as related to environmental quality.
- 49.0 Demonstrate personal money-management concepts, procedures, and strategies – The student will be able to:
- 49.01 Identify and describe the services and legal responsibilities of financial institutions. (FL 2.0)
  - 49.02 Describe the effect of money management on personal and career goals. (FL 3.0)
  - 49.03 Develop a personal budget and financial goals. (FL3.1)
  - 49.04 Complete financial instruments for making deposits and withdrawals. (FL3.2)
  - 49.05 Maintain financial records. (FL3.3)
  - 49.06 Read and reconcile financial statements. (FL3.4)
  - 49.07 Research, compare and contrast investment opportunities.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Plant Biotechnology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	<b>8106500</b>
CIP Number	0102040100
Grade Level	9-12 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	19-4021
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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.

**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
	8106810	Agriscience Foundations 1	1 credit		2
	8106850	Agricultural Biotechnology 2	1 credit		3
A	8106510	Plant Biotechnology 3	1 credit	19-4021	3

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

## **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

## **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

## **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

## Standards

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Identify the historical, social, cultural and potential applications of biotechnology.
- 11.0 Conduct scientific investigation and apply results.
- 12.0 Demonstrate leadership, employability, communication and human relation skills.
- 13.0 Practice agricultural laboratory safety.
- 14.0 Demonstrate laboratory skills as applied to biotechnology.
- 15.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR).
- 16.0 Demonstrate language arts knowledge and skills.
- 17.0 Demonstrate mathematics knowledge and skills.
- 18.0 Demonstrate science knowledge and skills.
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 20.0 Solve problems using critical thinking skills, creativity and innovation.
- 21.0 Use information technology tools.
- 22.0 Describe plant classifications and the economic impact to your region.
- 23.0 Apply genetic principles to plant production.
- 24.0 Perform propagation.
- 25.0 Use plants to show nutrient absorption and the translocation process in plants.
- 26.0 Demonstrate alternate methods of plant production.
- 27.0 Identify the historical, social, cultural and potential applications of plant biotechnology.
- 28.0 Demonstrate the application of plant biotechnology to Agriculture, Food and Natural Resources (AFNR).
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 30.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 31.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 32.0 Describe the importance of professional ethics and legal responsibilities.
- 33.0 Explain the importance of employability skill and entrepreneurship skills.
- 34.0 Demonstrate personal money-management concepts, procedures, and strategies.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.



05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills--The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

**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.

10.0 Identify the historical, social, cultural and potential applications of biotechnology--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.1, 2, 3, 5, 8, 14; SC.912.L.16.10; SC.912.L17.13; SC.912.N.2.1, 2

- 10.01 Define biotechnology and explore the historical impact on agriculture.
- 10.02 Explain the developmental progression of biotechnology.
- 10.03 Investigate current applications of biotechnology in agriculture.
- 10.04 Investigate current research in agricultural biotechnology.
- 10.05 Examine potential applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture.
- 10.06 Research emerging problems and issues associated with agricultural biotechnology.
- 10.07 Describe the role of agencies that regulate biotechnology.
- 10.08 Interpret the major regulatory issues related to biotechnology.
- 10.09 Explore ethical, legal and social biotechnology issues.
- 10.10 Evaluate the benefits and risks associated with biotechnology.
- 10.11 Investigate the emergence and evolution of biological organisms and their use in biotechnology.
- 10.12 Examine intellectual properties associated with biotechnology by defining their components.
- 10.13 Examine an ethical dilemma associated with biotechnology by identifying its components.

11.0 Conduct scientific investigation and apply results--The student will be able to:

This standard supports the following Sunshine State Standards: LA.912.2.23; LA.912.4.22; MA.912.S.1.2; MA.912.S.3.2; SC.912.N.3.1,4

- 11.01 Discuss the differences between scientific laws and scientific theories.
- 11.02 Explain the process of scientific inquiry.
- 11.03 Analyze research being conducted in agricultural biotechnology.
- 11.04 Design an agricultural experiment using appropriate control measures.
- 11.05 Devise a system for recording data.
- 11.06 Collect and record data using SI units.

- 11.07 Summarize data and draw defensible conclusions.
  - 11.08 Prepare a report on the experiment conducted.
  - 11.09 Plan and conduct follow-up experiments using the scientific method.
- 12.0 Demonstrate leadership, employability, communication and human relation skills--The student will be able to:
- 12.01 Conduct group meetings using parliamentary procedure and public speaking skills.
  - 12.02 Follow acceptable work habits, personal characteristics and hygiene habits for the biotechnology workplace.
  - 12.03 Identify or demonstrate appropriate responses to criticism and coaching from employer, supervisor, or other persons.
  - 12.04 Conduct a job search and identify advanced training opportunities and the requirements.
  - 12.05 Prepare a resume.
- 13.0 Practice agricultural laboratory safety--The student will be able to:
- 13.01 Identify first aid supplies, personnel and emergency protection areas.
  - 13.02 Monitor, use, store and dispose of hazardous materials properly.
  - 13.03 Document safety training and practices using Material Safety Data Sheets (MSDS) and Occupational Safety and Health Administration (OSHA) standards.
  - 13.04 Demonstrate and utilize safety equipment.
  - 13.05 Identify safety symbols and signs.
  - 13.06 Demonstrate appropriate safety procedures and guidelines, and discuss implications of safety violations.
- 14.0 Demonstrate laboratory skills as applied to biotechnology--The student will be able to:
- This standard supports the following Sunshine State Standards: SC.912.F.14.4, 52; SC.912.L.16.1, 2, 3, 5, 9, 15, 16; SC.912.L.18. 4, 12; SC.912.P.8.7
- 14.01 Maintain and interpret biotechnology laboratory records.
  - 14.02 Operate laboratory equipment and measurement devices.
  - 14.03 Demonstrate aseptic techniques in the biotechnology laboratory.
  - 14.04 Select an appropriate standard operating procedure for working with biological materials.
  - 14.05 Prepare buffers, reagents, solutions and media.
  - 14.06 Inventory biological and chemical materials, and maintain accurate records of supplies and expiration dates.
  - 14.07 Isolate, maintain, quantify and store cell cultures.
  - 14.08 Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.
  - 14.09 Extract and purify DNA.
  - 14.10 Perform protein separation techniques and interpret the results.
  - 14.11 Describe how antibodies are formed and how they can be used in biotechnology applications.
  - 14.12 Research and describe the use of biotechnology to detect microbes.

15.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR) --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2; SC.912.L.15.13, 14, 15; SC.912.L.16.10; SC.912.L.17.2, 8, 11, 20; SC.912.L.18.1, 2, 3, 4, 6, 8, 7, 11; SC.912.P.8.12

- 15.01 Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes.
- 15.02 Differentiate the roles of carbohydrates, fats, and proteins in biotechnology applications.
- 15.03 Diagram the processes used to produce transgenic eukaryotes.
- 15.04 Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.
- 15.05 Describe processes by which enzymes are produced through biotechnology.
- 15.06 Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.
- 15.07 Diagram the process by which organisms are genetically engineered for waste treatment.
- 15.08 Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of agricultural products.
- 15.09 Investigate-and report on-genetic engineering procedures used in the production of agricultural products.
- 15.10 Explain the functions of hormones in animals.
- 15.11 Describe the processes used to produce animal hormones from transgenic organisms.
- 15.12 Identify foods produced through fermentation.
- 15.13 Compare and contrast bioengineering and conventional pathways used in food processing.
- 15.14 Explain biomass and sources of biomass.
- 15.15 Assess the characteristics of biomass that make it useful for biofuels production.
- 15.16 Describe the process used in producing alcohol from biomass.
- 15.17 Diagram the process used in producing biodiesel from biomass.
- 15.18 Illustrate the process used in producing methane from biomass.
- 15.19 Describe the selective plant breeding process.
- 15.20 Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.
- 15.21 Describe the use of biotechnology in bioremediation.
- 15.22 Describe the processes involved in biotreatment of biological and chemical wastes.
- 15.23 Explain the global importance of biodiversity.
- 15.24 Explain the positive and negative impacts of agricultural practices on wild populations.
- 15.25 Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.
- 15.26 Describe the processes used in the production of molecules for use in industrial applications.

16.0 Demonstrate language arts knowledge and skills. The students will be able to: AF 2.0

- 16.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 16.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 16.03 Present information formally and informally for specific purposes and audiences. AF2.9
  
- 17.0 Demonstrate mathematics knowledge and skills. The students will be able to: AF3.0
  - 17.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 17.02 Construct charts/tables/graphs using functions and data. AF3.5
  - 17.03 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  
- 18.0 Demonstrate science knowledge and skills. The students will be able to: AF4.0
  - 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
  
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. The students will be able to:
  - 19.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 19.02 Locate, organize and reference written information from various sources. CM 3.0
  - 19.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 19.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 19.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 19.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 19.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
  
- 20.0 Solve problems using critical thinking skills, creativity and innovation. The students will be able to:
  - 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 20.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
  
- 21.0 Use information technology tools. The students will be able to:

- 21.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 21.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Plant Biotechnology 3  
**Course Number:** 8106510  
**Course Credit:** 1

**Course Description:**

22.0 Describe plant classifications and the economic impact to your region--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7;  
SC.912.L.15.5, 6

- 22.01 Classify plants based upon their regional use and importance.
- 22.02 Describe the economic impact of regionally produced products.
- 22.03 Describe the regional growing conditions that impact the feasibility of producing particular plant products.
- 22.04 Identify economically significant plant families.
- 22.05 Identify at least thirty plants by common and scientific names.

23.0 Apply genetic principles to plant improvement --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7;  
SC.912.L.15.15; SC.912.L.16.1, 2, 3

- 23.01 Describe the relationship between reproduction and plant improvement.
- 23.02 Demonstrate the reproductive cycle in seed plants.
- 23.03 Describe how genetic processes and structures control inheritance in plants.
- 23.04 Explain polyploidy in both natural settings and in commercial plant production.
- 23.05 Differentiate phenotypic versus genotypic expression in plant crosses.
- 23.06 Describe the processes used for mutation induction.

24.0 Demonstrate methods of micropropagating plants --The student will be able to:

This standard supports the following Sunshine State Standards: LA.910.2.2.3;  
LA.910.4.2.2; MA.912.S.1.2; MA.912.S.3.2; SC.912.N.1.1

- 24.01 Evaluate the advantages and disadvantages of using micropropagation techniques.
- 24.02 Describe the factors (light, temperature, plant growth regulators) affecting growth in plant tissue culture.
- 24.03 Prepare a lab for use as a plant tissue culture facility.
- 24.04 Demonstrate aseptic/sterile technique.
- 24.05 Produce a crop using tissue culture methods and prepare a written report of results.

25.0 Demonstrate methods of plant production--The student will be able to:



This standard supports the following Sunshine State Standards: LA.910.2.2.3; LA.910.4.2.2; MA.912.S.1.2; MA.912.S.3.2; SC.912.N.1.1

- 25.01 Evaluate the advantages and disadvantages of non-traditional crop production techniques (hydroponic/substrate, greenhouse, tunnel/hoop, etc.).
- 25.02 Demonstrate different means of hydroponics production.
- 25.03 Determine the cultural needs in hydroponics production.
- 25.04 Describe crops grown commercially by non-traditional techniques in your region.

26.0 Use plants to demonstrate growth disorders (nutrients, pathogens, pests --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2; SC.912.L.18.12; SC.912.P.8.7; SC.912.P.8.12

- 26.01 Identify plant nutrient-related disorders.
- 26.02 Identify pathogen-related disorders in plants.
- 26.03 Identify pest-related disorders in plants.
- 26.04 Discuss how IPM and biotechnology are used to solve plant disorders.
- 26.05 Prepare plant tissue samples for submission to determine nutrient levels.
- 26.06 Demonstrate factors that affect the nutrient levels in plant tissue.

27.0 Identify the historical, social, cultural and potential applications of plant biotechnology.  
The student will be able to:

This standard supports the following Sunshine State Standards: LA.910.2.2.3; LA.910.4.2.2; SC.912.L.16.10; SC.912.N.1.3, 4, 6, 7; SC.912.N.2.1, 2

- 27.01 Research and report on the major innovators and milestones in the development of biotechnology.
- 27.02 Analyze the scope and impact of plant biotechnology in today's global society.
- 27.03 Assess the future impact plant biotechnology could have on world populations.
- 27.04 Research, evaluate, and articulate a major regulatory issue pertaining to plant biotechnology.
- 27.05 Research, evaluate, and articulate the implications of an ethical, legal, social, or cultural biotechnology issue in plant production.
- 27.06 Research and debate an ethical issue associated with plant biotechnology.
- 27.07 Analyze an intellectual/genetic property issue associated with bioethics in plant production.

28.0 Demonstrate the application of plant biotechnology to Agriculture, Food and Natural Resources (AFNR). The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.52; SC.912.L.16.3, 4, 5; SC.912.L.18.8; SC.912.N.1.1, 3, 4, 6, 7; SC.912.P.8.7

- 28.01 Utilize external reviews and compare them to research conducted in plant production.
- 28.02 Develop a standard operating procedure for a biological process in plant production.
- 28.03 Verify the physical properties of buffers, reagents, solutions and media.

- 28.04 Simulate ordering, stocking, and maintaining supplies of biological and chemical materials.
  - 28.05 Devise a management plan to reduce laboratory waste.
  - 28.06 Analyze factors that influence gene expression.
  - 28.07 Perform DNA manipulations, such as cloning/subcloning, blotting, sequencing and amplification.
  - 28.08 Characterize the biochemical properties of proteins.
  - 28.09 Use antibodies to detect and quantify antigens.
  - 28.10 Conduct an Enzyme-Linked Immunosorbent Assay (ELISA).
  - 28.11 Produce alcohol and co-products from biomass.
  - 28.12 Produce biodiesel and co-products from biomass.
  - 28.13 Produce methane and co-products from biomass.
  - 28.14 Evaluate the technologies used to create biofuels from biomass.
  - 28.15 Design and conduct an experiment using biotechnology tools to evaluate selectively bred plants.
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The students will be able to:
- 29.01 Describe the nature and types of business organizations. SY 1.0
  - 29.02 Explain the effect of key organizational systems on performance and quality.
  - 29.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 29.04 Explain the impact of the global economy on business organizations
- 30.0 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:
- 30.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 30.02 Explain emergency procedures to follow in response to workplace accidents.
  - 30.03 Create a disaster and/or emergency response plan. SHE 2.0
- 31.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. The students will be able to:
- 31.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 31.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 31.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 31.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 32.0 Describe the importance of professional ethics and legal responsibilities. The students will be able to:
- 32.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 32.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1

- 32.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 32.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 33.0 Explain the importance of employability skill and entrepreneurship skills. The students will be able to:
  - 33.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 33.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 33.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 33.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 33.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 33.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 33.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 33.08 Research the benefits of ongoing professional development. ECD 9.0
  - 33.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 34.0 Demonstrate personal money-management concepts, procedures, and strategies. The students will be able to:
  - 34.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 34.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 34.03 Develop a personal budget and financial goals. FL3.1
  - 34.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 34.05 Maintain financial records. FL3.3
  - 34.06 Read and reconcile financial statements. FL3.4
  - 34.07 Research, compare and contrast investment opportunities.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Agricultural Biotechnology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
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
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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.

**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
	8106810	Agriscience Foundations 1	1 credit		2
	8106850	Agricultural Biotechnology 2	1 credit		3
A	8106860	Agricultural Biotechnology 3	1 credit	19-4021	3

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

## **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

## **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

## **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

## Standards

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Identify the historical, social, cultural and potential applications of biotechnology.
- 11.0 Conduct scientific investigation and apply results.
- 12.0 Demonstrate leadership, employability, communication and human relation skills.
- 13.0 Practice agricultural laboratory safety.
- 14.0 Demonstrate laboratory skills as applied to biotechnology.
- 15.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR).
- 16.0 Demonstrate language arts knowledge and skills.
- 17.0 Demonstrate mathematics knowledge and skills.
- 18.0 Demonstrate science knowledge and skills.
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 20.0 Solve problems using critical thinking skills, creativity and innovation.
- 21.0 Use information technology tools.
- 22.0 Identify the historical, social, cultural and potential applications of plant biotechnology.
- 23.0 Apply genetic principles to agricultural production.
- 24.0 Demonstrate proper tissue/cell culture techniques.
- 25.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR).
- 26.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 27.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 28.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 29.0 Describe the importance of professional ethics and legal responsibilities.
- 30.0 Explain the importance of employability skill and entrepreneurship skills.
- 31.0 Demonstrate personal money-management concepts, procedures, and strategies.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.



03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills--The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

**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.

10.0 Identify the historical, social, cultural and potential applications of biotechnology--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.1, 2, 3, 5, 8, 14; SC.912.L.16.10; SC.912.L.17.13; SC.912.N.2.1, 2

- 10.01 Define biotechnology and explore the historical impact on agriculture.
- 10.02 Explain the developmental progression of biotechnology.
- 10.03 Investigate current applications of biotechnology in agriculture.
- 10.04 Investigate current research in agricultural biotechnology.
- 10.05 Examine potential applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture.
- 10.06 Research emerging problems and issues associated with agricultural biotechnology.
- 10.07 Describe the role of agencies that regulate biotechnology.
- 10.08 Interpret the major regulatory issues related to biotechnology.
- 10.09 Explore ethical, legal and social biotechnology issues.
- 10.10 Evaluate the benefits and risks associated with biotechnology.
- 10.11 Investigate the emergence and evolution of biological organisms and their use in biotechnology.
- 10.12 Examine intellectual properties associated with biotechnology by defining their components.
- 10.13 Examine an ethical dilemma associated with biotechnology by identifying its components.

11.0 Conduct scientific investigation and apply results--The student will be able to:

This standard supports the following Sunshine State Standards: LA.912.2.23; LA.912.4.22; MA.912.S.1.2; MA.912.S.3.2; SC.912.N.3.1,4

- 11.01 Discuss the differences between scientific laws and scientific theories.
- 11.02 Explain the process of scientific inquiry.
- 11.03 Analyze research being conducted in agricultural biotechnology.
- 11.04 Design an agricultural experiment using appropriate control measures.
- 11.05 Devise a system for recording data.
- 11.06 Collect and record data using SI units.

- 11.07 Summarize data and draw defensible conclusions.
  - 11.08 Prepare a report on the experiment conducted.
  - 11.09 Plan and conduct follow-up experiments using the scientific method.
- 12.0 Demonstrate leadership, employability, communication and human relation skills--The student will be able to:
- 12.01 Conduct group meetings using parliamentary procedure and public speaking skills.
  - 12.02 Follow acceptable work habits, personal characteristics and hygiene habits for the biotechnology workplace.
  - 12.03 Identify or demonstrate appropriate responses to criticism and coaching from employer, supervisor, or other persons.
  - 12.04 Conduct a job search and identify advanced training opportunities and the requirements.
  - 12.05 Prepare a resume.
- 13.0 Practice agricultural laboratory safety--The student will be able to:
- 13.01 Identify first aid supplies, personnel and emergency protection areas.
  - 13.02 Monitor, use, store and dispose of hazardous materials properly.
  - 13.03 Document safety training and practices using Material Safety Data Sheets (MSDS) and Occupational Safety and Health Administration (OSHA) standards.
  - 13.04 Demonstrate and utilize safety equipment.
  - 13.05 Identify safety symbols and signs.
  - 13.06 Demonstrate appropriate safety procedures and guidelines, and discuss implications of safety violations.
- 14.0 Demonstrate laboratory skills as applied to biotechnology--The student will be able to:
- This standard supports the following Sunshine State Standards: SC.912.F.14.4, 52; SC.912.L.16.1, 2, 3, 5, 9, 15, 16; SC.912.L.18. 4, 12; SC.912.P.8.7
- 14.01 Maintain and interpret biotechnology laboratory records.
  - 14.02 Operate laboratory equipment and measurement devices.
  - 14.03 Demonstrate aseptic techniques in the biotechnology laboratory.
  - 14.04 Select an appropriate standard operating procedure for working with biological materials.
  - 14.05 Prepare buffers, reagents, solutions and media.
  - 14.06 Inventory biological and chemical materials, and maintain accurate records of supplies and expiration dates.
  - 14.07 Isolate, maintain, quantify and store cell cultures.
  - 14.08 Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.
  - 14.09 Extract and purify DNA.
  - 14.10 Perform protein separation techniques and interpret the results.
  - 14.11 Describe how antibodies are formed and how they can be used in biotechnology applications.
  - 14.12 Research and describe the use of biotechnology to detect microbes.

15.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR) --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2; SC.912.L.15.13, 14, 15; SC.912.L.16.10; SC.912.L.17.2, 8, 11, 20; SC.912.L.18.1, 2, 3, 4, 6, 8, 7, 11; SC.912.P.8.12

- 15.01 Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes.
- 15.02 Differentiate the roles of carbohydrates, fats, and proteins in biotechnology applications.
- 15.03 Diagram the processes used to produce transgenic eukaryotes.
- 15.04 Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.
- 15.05 Describe processes by which enzymes are produced through biotechnology.
- 15.06 Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.
- 15.07 Diagram the process by which organisms are genetically engineered for waste treatment.
- 15.08 Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of agricultural products.
- 15.09 Investigate-and report on-genetic engineering procedures used in the production of agricultural products.
- 15.10 Explain the functions of hormones in animals.
- 15.11 Describe the processes used to produce animal hormones from transgenic organisms.
- 15.12 Identify foods produced through fermentation.
- 15.13 Compare and contrast bioengineering and conventional pathways used in food processing.
- 15.14 Explain biomass and sources of biomass.
- 15.15 Assess the characteristics of biomass that make it useful for biofuels production.
- 15.16 Describe the process used in producing alcohol from biomass.
- 15.17 Diagram the process used in producing biodiesel from biomass.
- 15.18 Illustrate the process used in producing methane from biomass.
- 15.19 Describe the selective plant breeding process.
- 15.20 Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.
- 15.21 Describe the use of biotechnology in bioremediation.
- 15.22 Describe the processes involved in biotreatment of biological and chemical wastes.
- 15.23 Explain the global importance of biodiversity.
- 15.24 Explain the positive and negative impacts of agricultural practices on wild populations.
- 15.25 Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.
- 15.26 Describe the processes used in the production of molecules for use in industrial applications.

16.0 Demonstrate language arts knowledge and skills. The students will be able to: AF 2.0

- 16.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 16.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 16.03 Present information formally and informally for specific purposes and audiences. AF2.9
  
- 17.0 Demonstrate mathematics knowledge and skills. The students will be able to: AF3.0
  - 17.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 17.02 Construct charts/tables/graphs using functions and data. AF3.5
  - 17.03 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  
- 18.0 Demonstrate science knowledge and skills. The students will be able to: AF4.0
  - 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
  
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. The students will be able to:
  - 19.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 19.02 Locate, organize and reference written information from various sources. CM 3.0
  - 19.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 19.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 19.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 19.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 19.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
  
- 20.0 Solve problems using critical thinking skills, creativity and innovation. The students will be able to:
  - 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 20.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
  
- 21.0 Use information technology tools. The students will be able to:

- 21.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 21.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0



**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Biotechnology 3  
**Course Number:** 8106850  
**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.

22.0 Identify the historical, social, cultural and potential applications of agricultural biotechnology. The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.1.2; MA.912.S.3.2; SC.912.L.16.10; SC.912.L.17.1, 11, 13, 15, 16, 20; SC.912.N.1.4, 5, 6, 7; SC.912.N.3.1, 2, 4, 5; SC.912.N.4.1

- 22.01 Research and report on the major innovators and milestones in the development of biotechnology.
- 22.02 Identify animal, plant, and environmental applications of biotechnology and the economic impact.
- 22.03 Assess the future impact biotechnology could have on world populations.
- 22.04 Research, evaluate and articulate a major regulatory issue pertaining to biotechnology.
- 22.05 Research, evaluate and articulate the implications of an ethical, legal, social or cultural biotechnology issue in agricultural production.
- 22.06 Debate an ethical issue associated with biotechnology.
- 22.07 Analyze an intellectual property issue associated with bioethics in agricultural production.
- 22.08 Identify and discuss emerging technologies in agriculture production (transgenics, biologics, biosecurity, food safety, sustainability, etc.).

23.0 Apply genetic principles to agricultural production--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.1.2; MA.912.S.3.2; SC.912.L.15.5, 9, 13, 15; SC.912.L.16.1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17; SC.912.L.17.13, 20; SC.912.N.1.2, 4, 6; SC.912.P.8.3, 4, 5, 6, 7; SC.912.P.8.12, 13

- 23.01 Describe the relationship between reproduction and genetic improvement.
- 23.02 Demonstrate how traits are inherited.
- 23.03 Describe how genetic processes and structures control inheritance.
- 23.04 Predict probable results of single or multiple trait crosses.
- 23.05 Differentiate between dominant and recessive traits.
- 23.06 Describe the chemical and physical properties of DNA.
- 23.07 Develop a hypothetical species using genetic engineering.

- 23.08 Debate the safeguards used in research in genetic engineering.
- 23.09 Describe the process of genetic marker assisted selection.
- 23.10 Analyze factors that influence gene expression.

24.0 Demonstrate proper tissue/cell culture techniques--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.1.2; MA.912.S.3.2; SC.912.L.14.1, 2, 7, 32; SC.912.L.16.1, 2, 3, 4, 5, 6, 7, 8, 9, 14; SC.912.L.17.13, 20; SC.912.N.1.2; SC.912.P.8.8, 9, 10, 11; SC.912.P.10.7; SC.912.P.12.12, 13

- 24.01 Prepare a lab for use as a tissue culture facility.
- 24.02 Describe the effects of growth hormones on tissue/cell culture.
- 24.03 Demonstrate the use of sterile instruments and materials.
- 24.04 Produce plants using tissue culture methods and prepare a written report of results.

25.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR). The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.1.2; MA.912.S.3.2; SC.912.E.6.6; SC.912.L.14.4, 52; SC.912.L.16.3, 4, 5, 7, 11, 12, 13, 20; SC.912.L.17.13, 14, 15, 18, 19; SC.912.L.18.1, 4, 11; SC.912.N.1.2; SC.912.N.3.5; SC.912.P.8.1, 2, 4, 8, 9, 10, 11, 12, 13; SC.912.P.10.1, 2, 7; SC.912.P.12.12, 13

- 25.01 Develop a standard operating procedure for a biological process in agriculture.
- 25.02 Calibrate laboratory equipment and conduct instrument qualification tests.
- 25.03 Verify the physical properties of buffers, reagents, solutions and media.
- 25.04 Simulate the process needed to order, stock, and maintain supplies of biological and chemical materials.
- 25.05 Devise a management plan to reduce laboratory waste.
- 25.06 Perform DNA manipulations, such as cloning/subcloning, blotting, sequencing and amplification.
- 25.07 Characterize the biochemical properties of proteins.
- 25.08 Use antibodies to detect and quantify antigens
- 25.09 Conduct an Enzyme-Linked Immunosorbent Assay (ELISA).
- 25.10 Produce alcohol and co-products from biomass.
- 25.11 Produce biodiesel and co-products from biomass.
- 25.12 Produce methane and co-products from biomass.
- 25.13 Evaluate the technologies used to create biofuels from biomass.
- 25.14 Design and conduct an experiment using biotechnology tools to evaluate selectively bred organisms.

26.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The students will be able to:

- 26.01 Describe the nature and types of business organizations. SY 1.0
- 26.02 Explain the effect of key organizational systems on performance and quality.
- 26.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 26.04 Explain the impact of the global economy on business organizations

- 27.0 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:
- 27.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 27.02 Explain emergency procedures to follow in response to workplace accidents.
  - 27.03 Create a disaster and/or emergency response plan. SHE 2.0
- 28.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. The students will be able to:
- 28.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 28.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 28.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 28.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 29.0 Describe the importance of professional ethics and legal responsibilities. The students will be able to:
- 29.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 29.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 29.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 29.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 30.0 Explain the importance of employability skill and entrepreneurship skills. The students will be able to:
- 30.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 30.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 30.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 30.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 30.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 30.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 30.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 30.08 Research the benefits of ongoing professional development. ECD 9.0
  - 30.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

31.0 Demonstrate personal money-management concepts, procedures, and strategies. The students will be able to:

- 31.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 31.02 Describe the effect of money management on personal and career goals. FL 3.0
- 31.03 Develop a personal budget and financial goals. FL3.1
- 31.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 31.05 Maintain financial records. FL3.3
- 31.06 Read and reconcile financial statements. FL3.4
- 31.07 Research, compare and contrast investment opportunities.

2011 - 2012

**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	<b>8106800</b>
CIP Number	0101039901
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2 AGRI PROD #7
CTSO	FFA
SOC Codes	19-4011.01
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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.

### Program Structure

This program is a planned sequence of instruction consisting of three courses. 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
	8106810	Agriscience Foundations 1	1 credit		2
	8106820	Agritechnology 1	1 credit		2
A	8106830	Agritechnology 2	1 credit	19-4011.01	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

## **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

## **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

## **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

## **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Explore the scope of the agriscience industry.
- 11.0 Provide for proper animal health and nutrition.
- 12.0 Identify procedures in animal production and reproduction.
- 13.0 Develop procedures for exhibiting animals.
- 14.0 Compare, select, and use plant production systems.
- 15.0 Fertilize plants and crops.
- 16.0 Irrigate plants and crops.
- 17.0 Control plant pests.
- 18.0 Operate, maintain, and service facilities, tools, and equipment.
- 19.0 Describe procedures for harvesting and marketing agricultural products.
- 20.0 Apply principles of agribusiness finance.
- 21.0 Demonstrate leadership, employability, communication, and human-relations skills.
- 22.0 Demonstrate language arts knowledge and skills.
- 23.0 Demonstrate mathematics knowledge and skills.
- 24.0 Demonstrate science knowledge and skills.
- 25.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 26.0 Solve problems using critical thinking skills, creativity and innovation.
- 27.0 Use information technology tools.
- 28.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 29.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 31.0 Describe the importance of professional ethics and legal responsibilities.
- 32.0 Explain the importance of employability skill and entrepreneurship skills.
- 33.0 Demonstrate personal money-management concepts, procedures, and strategies.



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills--The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

2011 - 2012

**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.

10.0 Explore the scope of the agriscience industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, 4, 5; SC.912.N.4.1

- 10.01 Investigate career opportunities in agriscience industries.
- 10.02 Describe training requirements for entry and advancement in agriscience careers.

11.0 Provide for proper animal health and nutrition--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.1.1, 2, 4, 5, 6; M MA.912.A.4.1, 4, 7; A.912.A.5.1.4, 7; MA.912.A.10.1, 2; MA.912.G.8.2; MA.912.S.1.1, 2

- 11.01 Demonstrate proper methods to clean and disinfect animal equipment and facilities.
- 11.02 Explain proper disposal of animal waste with regards to sanitation, economics, and environmental implications.

12.0 Identify procedures in animal production and reproduction--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.1.1, 2, 4, 5; MA.912.A.2.1, 4; MA.912.F.3, 12, 14, 17; MA.912.P.1.1, 2

- 12.01 Examine livestock and poultry anatomy.
- 12.02 Identify commercially important breeds of animals.
- 12.03 Assemble desirable characteristics of breeding and market animals.
- 12.04 Evaluate wholesale cuts of beef, pork, lamb, and poultry.
- 12.05 Compare and select appropriate breeding methods for different agricultural enterprises.
- 12.06 Explain the reproductive cycles of commercially important animals.
- 12.07 Identify signs of animal pregnancy, parturition, and infertility.

- 12.08 Describe approved care for newborn animals.
- 12.09 Describe methods of animal identification.
- 12.10 Describe methods of restraining, loading, handling, and transporting animals safely.

13.0 Develop procedures for exhibiting animals--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.16.10; MA.912.A.1.1, 2, 3, 4, 5; MA.912.A.2.1; MA.912.F.3.12, 14; MA.912.F.5.21; MA.912.S.1.1, 2; MA.912.S.3.1

- 13.01 Demonstrate the procedures for preparing, maintaining, and handling commercially important animals.
- 13.02 Compare and contrast appropriate evaluation criteria for animals.
- 13.03 Prepare appropriate shipping and health certificates required for exhibiting or marketing animals.

14.0 Compare, select, and use plant production systems--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.1.1, 2, 4, 6; MA.912.G.1.1, 2, 4; MA.912.S.3.1, 2

- 14.01 Compare different plant production systems.
- 14.02 Propagate, transplant and grow plants.
- 14.03 Select and prepare a site and/or a seedbed for planting.
- 14.04 Identify methods of pruning plants to achieve desired growth and to maintain health.

15.0 Fertilize plants and crops--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.10, 16; SC.912.P.8.8, 11; MA.912.A.1.2, 4, 5; MA.912.A.5.1, 4, 7; MA.912.A.10.1, 2; MA.912.G.1.1, 2, 4; MA.912.G.2.7; MA.912.G.4.1, 4, 5; MA.912.G.5.1, 3, MA.912.G.8.2; 4; MA.912.S.1.1, 2; MA.912.S.2.2; MA.912.S.3.6

- 15.01 Interpret information on a fertilizer label.
- 15.02 Compare sources and forms of nutrients.
- 15.03 Determine methods of applying fertilizer materials.

18.0 Operate, maintain, and service facilities, tools, and equipment--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.10.3, 14,15, 16, 18; MA.912.A.1.1, 2, 3, 4, 5; MA.912.A.5.14; MA.912.A.10.1; MA.912.G.2.7; MA.912.G.4.1, 4, 5; MA.912.G.8.1

- 18.01 Use and maintain hand tools and power equipment (e.g., power saws, welders).
- 18.02 Maintain and service small gasoline engines.

20.0 Apply principles of agribusiness finance--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.4.2; MA.912.A.1.1, 2, 3, 4, 5, 6, 8; MA.912.A.2.1, 2, 3, 7; MA.912.F.4.3; MA.912.S.3.2, 3

- 20.01 Identify major sources of credit for agribusiness.
  - 20.02 Complete a business loan application.
  - 20.03 Maintain and interpret agribusiness financial records including depreciation, inventory, and budgets.
- 21.0 Demonstrate leadership, employability, communication, and human-relations skills--The student will be able to:
- 21.01 Conduct group meetings using parliamentary procedure and public speaking skills.
  - 21.02 Identify appropriate work and personal habits.
- 22.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
- 22.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 23.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 23.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 23.02 Construct charts/tables/graphs using functions and data. AF3.5
- 24.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 24.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 25.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 26.01 Locate, organize and reference written information from various sources. CM 3.0
  - 26.02 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 26.03 Apply active listening skills to obtain and clarify information. CM 7.0
- 26.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 26.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 26.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 27.0 Use information technology tools--The students will be able to:
- 27.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 27.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

- 28.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 28.01 Explain the impact of the global economy on business organizations
- 29.0 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:
- 29.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 29.02 Explain emergency procedures to follow in response to workplace accidents.
- 29.03 Create a disaster and/or emergency response plan. SHE 2.0
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 30.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 31.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 31.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 32.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 32.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 32.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 32.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 32.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 32.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 33.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 33.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 33.02 Describe the effect of money management on personal and career goals. FL 3.0
- 33.03 Develop a personal budget and financial goals. FL3.1



2011 - 2012

**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 job and training requirements; professional organizations; crop identification; planting crops; fertilizer calculations and application; irrigation; pest control; harvesting, packing, and grading crops, safe equipment operation; finance; and employability skills.

10.0 Explore the scope of the agriscience industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, 4, 5; SC.912.N.4.1

10.03 Identify and describe the importance of professional and trade organizations.

10.04 Examine and interpret trade journals, and academic research in the agriscience industry.

11.0 Provide for proper animal health and nutrition--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.1.1, 2, 4, 5, 6; M MA.912.A.4.1, 4, 7; A.912.A.5.1.4, 7; MA.912.A.10.1, 2; MA.912.G.8.2; MA.912.S.1.1, 2

11.03 Recognize, describe and demonstrate prevention and treatment of common animal diseases, disorders, and pests.

11.04 Read, interpret, and demonstrate correct uses of pesticides, medication, and other additives according to their labels.

11.05 Describe nutritional requirements of animals.

11.06 Formulate and compute least-cost feed rations.

11.07 Select and apply growth stimulators and implants.

11.08 Determine feeding rates and methods of feeding animals.

14.0 Compare, select, and use plant production systems--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.1.1, 2, 4, 6; MA.912.G.1.1, 2, 4; MA.912.S.3.1, 2

14.05 Recommend varieties of local commercial plants and field crops.

14.06 Calculate planting rate and spacing.

14.07 Operate and adjust planting equipment.

15.0 Fertilize plants and crops--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.10, 16; SC.912.P.8.8, 11; MA.912.A.1.2, 4, 5; MA.912.A.5.1, 4, 7; MA.912.A.10.1, 2; MA.912.G.1.1, 2, 4; MA.912.G.2.7; MA.912.G.4.1, 4, 5; MA.912.G.5.1, 3, MA.912.G.8.2; 4; MA.912.S.1.1, 2; MA.912.S.2.2; MA.912.S.3.6

- 15.04 Access why the resources soil provides supports life.
- 15.05 Demonstrate how the importance of soil characteristics affects agriculture.
- 15.06 Develop fertilization schedules and calculate fertilizer rates for plants; solve time, distance, area, and volume problems in agriscience.
- 15.07 Identify common nutrient-deficiency symptoms in plants.
- 15.08 Calibrate fertilization equipment and fertilize plants.

16.0 Irrigate plants and crops--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.7.5,6, 7, 8, 9; SC.912.L.17.10; MA.912.A.1.1, 2, 4, 5; MA.912.A.5.1, 4, 7; MA.912.A.10.1, 2; MA.912.G.1.1; MA.912.G.2.7; MA.912.G.4.1, 4, 5; MA.912.G.5.1, 3, 4; MA.912.G.6.1, 2, 4, 5; MA.912.G.8.2; MA.912.S.1.1, 2; MA.912.S.2.2; MA.912.S.3.1, 3, 6

- 16.01 Recognize soil and plant conditions indicating irrigation needs and develop an irrigation schedule.
- 16.02 Compare and select irrigation equipment and methods.
- 16.03 Install, operate, maintain, and repair irrigation equipment.

17.0 Control plant pests--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.6, 8, 9, 13, 17; MA.912.A.5.1, 4, 7; MA.912.A.10.1, 2; MA.912.G.5.1, 3, 4; MA.912.G.8.2; MA.912.S.1.1, 2, 4, 5; MA.912.S.2.2; MA.912.S.3.6;

- 17.01 Compare and contrast common plant pests and their damages.
- 17.02 Diagram life cycles of insects, pests, and diseases.
- 17.03 Interpret the procedures and requirements for obtaining a restricted-use-pesticide operator's license.
- 17.04 Select, mix, and apply a no restricted chemical according to the label and local, state, federal and EPA regulations.
- 17.05 Describe biological, chemical and cultural methods of controlling plant pests.

18.0 Operate, maintain, and service facilities, tools, and equipment--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.10.3, 14,15, 16, 18; MA.912.A.1.1, 2, 3, 4, 5; MA.912.A.5.14; MA.912.A.10.1; MA.912.G.2.7; MA.912.G.4.1, 4, 5; MA.912.G.8.1

- 18.03 Demonstrate basic facility maintenance, installation, or repair. (e.g., welding, electricity, plumbing, fencing, construction)
- 18.04 Safely operate, maintain, service, and repair equipment.

- 19.0 Describe procedures for harvesting and marketing agricultural products--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.8.10; MA.912.A.1.1, 2, 4, 5; MA912.A.2.1, 2, 4, 5; MA.912.A.3.5; MA.912.A.10.1, 2; MA.912.G.2.7; MA.912.S.3.1, 2, 3

- 19.01 Determine maturity, condition, quality, and volume of products to be harvested.
- 19.02 Describe procedures for harvesting products.
- 19.03 Collect and interpret market reports and identify market outlets for agricultural products.
- 19.04 Organize a marketing program for agricultural products.
- 19.05 Assess kinds and types of storage facilities for agricultural products.
- 19.06 Grade, treat, pack, and/or store harvested products.

- 20.0 Apply principles of agribusiness finance--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.4.2; MA.912.A.1.1, 2, 3, 4, 5, 6, 8; MA.912.A.2.1, 2, 3, 7; MA.912.A.5.1, 4, 7; MA.912.A.10.1, 2; MA.912.F.3.4,5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17; MA.912.F.4.4, 6, 7

- 20.04 Explain the purposes and structures of contracts, leases, deeds, and insurance policies.
- 20.05 Maintain and interpret agribusiness financial records including depreciation, inventory, and budgets.

- 21.0 Demonstrate leadership, employability, communications, and human-relations skills--The student will be able to:

- 21.03 Complete a job application.

- 22.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0

- 22.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 22.03 Present information formally and informally for specific purposes and audiences. AF2.9

- 23.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 23.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4

- 24.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

- 24.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

- 25.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 25.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 25.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 25.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 25.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 26.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 26.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 26.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 27.0 Use information technology tools--The students will be able to:
- 27.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 27.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 28.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 28.01 Describe the nature and types of business organizations. SY 1.0
  - 28.02 Explain the effect of key organizational systems on performance and quality.
  - 28.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 30.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 30.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 31.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 31.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 31.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 31.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 32.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 32.03 Examine licensing, certification, and industry credentialing requirements.  
ECD 3.0
- 32.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 32.07 Identify opportunities and research requirements for career advancement.  
ECD 8.0
- 32.08 Research the benefits of ongoing professional development. ECD 9.0
- 33.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
  - 33.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 33.05 Maintain financial records. FL3.3
  - 33.06 Read and reconcile financial statements. FL3.4
  - 33.07 Research, compare and contrast investment opportunities.

**This is the first course in most secondary Agriculture, Food and Natural Resources programs.  
It satisfies a graduation requirement of a science with a laboratory component.**

**2011 - 2012**

**Florida Department of Education  
Student Performance Standards**

**Course Title: Agriscience Foundations I  
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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.

02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.

- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.
- 05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.



- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills --The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

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

<b>Secondary – Career Preparatory</b>	
Program Number	<b>8112000</b>
CIP Number	0101030300
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	11-9011.03
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 aquaculture sector 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.

### **Program Structure**

This program is a planned sequence of instruction consisting of three courses and 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
	8106810	Agriscience Foundations 1	1 credit		2
	8112010	Aquaculture 2	1 credit		2
A	8112020	Aquaculture 3	1 credit	11-9011.03	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.

- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Describe the nature and origin of and career opportunities in aquaculture and mariculture.
- 11.0 Apply biological principles to the reproduction, identification and growth of aquaculture and mariculture species.
- 12.0 Safely operate, maintain and repair machinery, equipment and facilities used in aquaculture and/or mariculture
- 13.0 Demonstrate the management and environmentally sound use of water and land resources.
- 14.0 Assist in the propagation and rearing of seed.
- 15.0 Assist in producing aquaculture or mariculture species in one or more of the following: ponds, cages, tanks, raceways, saltwater containment facilities.
- 16.0 Control disease, pest and water quality problems.
- 17.0 Assist in harvesting and processing aquaculture or mariculture species.
- 18.0 Describe procedures used in locating markets and marketing aquaculture products and/or mariculture products.
- 19.0 Apply business management skills in managing an aquaculture and/or mariculture operation.
- 20.0 Identify applicable local, state, and federal rules and regulations and assistance programs.
- 21.0 Identify technological advances in the industry.
- 22.0 Demonstrate leadership, employability, communications and human relations skills.
- 23.0 Demonstrate language arts knowledge and skills.
- 24.0 Demonstrate mathematics knowledge and skills.
- 25.0 Demonstrate science knowledge and skills.
- 26.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 27.0 Solve problems using critical thinking skills, creativity and innovation.
- 28.0 Use information technology tools.
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 30.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 31.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 32.0 Describe the importance of professional ethics and legal responsibilities.
- 33.0 Explain the importance of employability skill and entrepreneurship skills.
- 34.0 Demonstrate personal money-management concepts, procedures, and strategies.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.



09.0 Apply leadership and citizenship skills--The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

2011 - 2012

**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.

10.0 Describe the nature and origin of and career opportunities in aquaculture and mariculture—The students will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.1.2, MA.912.S.3.2; SC.912.L.17.7,9 10, 13, 14, 15, 16; SC.912.L.15.6, 7

- 10.01 List two definitions of aquaculture and explain their differences.
- 10.02 Compare and contrast aquaculture with agriculture and aquaculture with fisheries.
- 10.03 List examples of aquatic crops and animals.
- 10.04 Trace the development of aquaculture.
- 10.05 List and describe the nature of five areas of aquaculture occupations.
- 10.06 Determine the educational requirements and experience needed to enter and advance in aquaculture/mariculture occupations.

11.0 Apply biological principles to the reproduction, identification and growth of aquaculture and mariculture species—The students will be able to:

This standard supports the following Sunshine State Standards MA.912.S.1.2, MA.912.S.3.2, HE.912.C.1.3, HE.912.C.1.8, LA.1112.2.2.3, LA.1112.4.2.2; SC.912.L.14.11, 13, 14, 16, 17, 18, 19, 28, 29, 30, 31, 32, 33, 36, 42, 43, 44, 46, 48, 49, 50, 51, 53; SC.912.L.15.4, 5, 6, 7; SC.912.L.17.13; SC.912.L.18.7, 8, 9, 12

- 11.01 List and explain the meaning of morphology, anatomy and physiology.
- 11.02 List and describe the physiology of aquatic animals.
- 11.03 Identify and describe the anatomy and physiology of crustaceans.
- 11.04 Identify and describe the basic structure and internal anatomy of mollusksl.
- 11.05 Identify and describe the anatomy and physiology of fish.
- 11.06 Identify and describe the basic morphorology of aquatic macroalgae and mircoalgae.
- 11.07 Discuss the growth and impact of aquactic crops versus terrestrial crops.
- 11.08 List and describe important characteristics in choosing a species.
- 11.09 Develop an information file in aquaculture species.
- 11.10 List and describe the major factors in the growth of aquatic fauna and flora.
- 11.11 Identify aquaculture/mariculture species of commercial importance in your area.

- 12.0 Safely operate, maintain and repair machinery, equipment and facilities used in aquaculture and/or mariculture—The student will be able to:  
This standard supports the following Sunshine State Standards: MA.912.S.1.2, MA.912.S.3.2, HE.912.C.1.3, HE.912.C.1.8, LA.1112.2.2.3, LA.1112.4.2.2; SC.912.P.10.14, 15; SC.912.P.8.2
- 12.01 Recognize and observe safety practices necessary in carrying out aquaculture activities.
  - 12.02 Maintain and perform basic repairs on aquaculture machinery, equipment and facilities.
  - 12.03 Safely operate aquaculture machinery and equipment.
  - 12.04 Discuss the difference in biological, chemical and mechanical filtration.
- 13.0 Demonstrate the management and environmentally sound use of water and land resources—The student will be able to:  
This standard supports the following Sunshine State Standards: MA.912.S.1.2, MA.912.S.3.2, HE.912.C.1.3, HE.912.C.1.8, LA.1112.2.2.3, LA.1112.4.2.2, SC.912.E.6.5, SC.912.E.7.1, 4, 9; SC.912.L.17. 2, 3, 7, 13, 14, 15, 16; SC.912.L.18.12; SC.912.P.8.10, 11, 12; SC.912.P.12.12
- 13.01 Identify and describe the qualities water should possess for use in aquaculture.
  - 13.02 Explain how changes in water affect aquatic life.
  - 13.03 Explain, monitor and maintain freshwater/salt water quality standards for the production of desirable species.
- 14.0 Assist in the propagation and rearing of seed—The student will be able to:  
This standard supports the following Sunshine State Standards: HE.912.C.1.3; HE.912.C.1.8; LA.1112.2.2.3; LA.1112.4.2.2; MA.912.S.1.2; MA.912.S.3.2, SC.912.L.14.1, 33; SC.912.L.17.4.5, 6, 7, 11, 14, 15, 17
- 14.01 Identify factors to consider in determining whether to grow an aquaculture species.
  - 14.02 Identify/describe facilities used in a grow-out operation.
  - 14.03 List sources of seed and how they are produced.
  - 14.04 Determine the purpose and functions of a hatchery.
- 18.0 Describe procedures used in locating markets and marketing aquaculture and/or mariculture products—The student will be able to:
- 18.01 Identify possible market outlets for aquaculture/mariculture products.
  - 18.02 Perform steps in securing a specific market outlet for a given species.
- 19.0 Apply business management skills in managing an aquaculture and/or mariculture operation—The student will be able to:
- 19.01 Identify and list functions in the management process.
  - 19.02 Demonstrate basic bookkeeping skills.
  - 19.08 Complete supervised agricultural experience (SAE) records.

20.0 Identify applicable local, state and federal rules and regulations and assistance programs—The student will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.3; HE.912.C.1.8' LA.1112.2.2.3; LA.1112.4.2.2; MA.912.S.1.2; MA.912.S.3.2; SC.912.L.17.11, 12, 13, 17; SC.912.N.4.1, 4.2

- 20.01 Identify and observe laws and regulations affecting the industry in the local area.
- 20.02 Obtain required permits, licenses, leases, etc. for production and harvesting.
- 20.03 Identify and list agencies regulating the industry and their functions.
- 20.04 Identify and list government assistance programs available to the industry.
- 20.05 Perform necessary biosecurity measures for various aquaculture/mariculture facilities.

21.0 Identify technological advances in the industry—The student will be able to:

- 21.01 Identify and use basic computer programs.
- 21.02 Identify and analyze the economic feasibility of high technology machinery, equipment and systems available to the industry.
- 21.03 Visit the latest technology displays and field days available in the area.
- 21.04 Prepare a list of recent technological advances in the production/harvesting of aquaculture/mariculture products.

22.0 Demonstrate leadership, employability, communication, and human relations skills—The student will be able to:

- 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 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0

- 23.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 23.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 23.03 Present information formally and informally for specific purposes and audiences. AF2.9

24.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 24.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 24.02 Construct charts/tables/graphs using functions and data. AF3.5
- 24.03 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4

25.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

- 25.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 25.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 26.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 26.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 26.02 Locate, organize and reference written information from various sources. CM 3.0
  - 26.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 26.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 26.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 26.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 26.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 27.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 27.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 27.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 27.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 27.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 28.0 Use information technology tools--The students will be able to:
- 28.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 28.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 28.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 28.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

2011 - 2012

**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 or mariculture 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.

13.0 Demonstrate the management and environmentally sound use of water and land resources—The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.5, 7, 8, 13, 14, 15, 16, 17, 20; SC.912.L.18.12; SC.912.N.4.1, 2; SC.912.P.8.11, 12; SC.912.P.12.12

- 13.05 Calculate volume in circular, rectangular and irregular shaped water structures.
- 13.06 List and explain sources of aquaculture pollution and methods of preventing and/or correcting these pollution problems.
- 13.07 Determine soil types, land slope and other factors to consider in choosing a location for a man made pond or other aquaculture operation.
- 13.08 Identify/explain environmentally safe methods of aquaculture wastewater disposal.
- 13.09 Identify and consult agencies regulating water quality standards in order to prevent compliance problems.
- 13.10 Observe different stages of construction of ponds and/or other aquaculture production facilities.
- 13.11 Compare growth difference between hydroponics, aquaponics, and traditional farming and the environmental impacts.

14.0 Assist in the propagation and rearing of seed—The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.33; SC.912.L.15.6, 7, 9; SC.912.L.16.1, 2; SC.912.L.17.1, 2, 7, 19; SC.912.L.18.1, 2, 3, 4; SC.912.N.1.1

- 14.05 Identify and describe the sexual reproductive process and methods of reproducing aquaculture organisms.
- 14.06 Identify and describe the hatchery facilities used in aquaculture.
- 14.07 Select a method of producing seed for a selected species.
- 14.08 List and explain the process for hatching seed in different breeding systems.
- 14.09 Determine kinds of feed to use in growing seed, fry and juveniles for a given species.
- 14.10 Feed, grade and transport seed, fry and juveniles.

- 15.0 Assist in producing aquaculture or mariculture species in one or more of the following: ponds, cages, tanks, raceways, saltwater containment facilities—The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.6.4; SC.912.E.7.1; SC.912.E.7.4, 5, 6, 9; SC.912.L.14.46; SC.912.L.17.2, 3, 5, 6, 7, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19; SC.912.L.18.1, 2, 3, 4; SC.912.N.4.1; SC.912.P.10.2, 4

- 15.01 Identify the types of growing systems and important factors in their selection, design and use.
- 15.02 Determine economic factors to consider in choosing a system for commercial production.
- 15.03 Identify and describe important growing facility construction and site requirements.
- 15.04 Select species for specific growth facilities.
- 15.05 Determine feeding methods and feed calculations to feed an aquaculture species.
- 15.06 Assist in managing water quality in different production systems.
- 15.07 Develop an aquaculture production problem that will outline the financial requirements for startup, production, harvesting, processing and marketing an aquaculture species and expected economic returns.

- 16.0 Control disease, pest and water quality problems—The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.6; SC.912.L.16. 7, 10, 11; SC.912.L.17.2, 13, 14, 15, 16, 17, 18; SC.912.L.18.12; SC.912.P.8.9

- 16.01 Identify major diseases of several locally important commercial species and list different methods of prevention and treatment.
- 16.02 Identify major pests of several locally important commercial species and list recommended control methods.
- 16.03 Perform methods of prevention, treatment and control of the major diseases and pests previously identified.
- 16.04 Identify water quality problems.
- 16.05 Determine quality of water and practice recommended solutions where needed.
- 16.06 Apply the latest economically feasible technology in prevention, treatment and control of production problems.

- 17.0 Assist in harvesting and processing aquaculture or mariculture species—The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13, 14, 15, 16, 17; SC.912.N.1.1, 4

- 17.01 Recognize and observe safety and sanitary practices including biosecurity in harvesting and processing aquaculture/mariculture species.
- 17.02 Determine harvesting practices recommended for commercially desirable aquaculture/mariculture species.
- 17.03 Determine equipment, labor, financial and legal requirements for harvesting.

- 17.04 Harvest commercially important aquaculture and/or mariculture species using recommended practices.
  - 17.05 Determine processing practices recommended for commercially important species.
  - 17.06 Determine equipment, labor, financial and legal requirements for processing.
  - 17.07 Process commercially important species using recommended practices.
- 18.0 Describe procedures used in locating markets and marketing aquaculture and/or mariculture products—The student will be able to:
- 18.03 Develop a marketing plan for an aquaculture product commonly produced in the area.
  - 18.04 Package and transport products as live, fresh, etc.
  - 18.05 Determine legal and commercially important methods of transporting and marketing.
  - 18.06 Market aquaculture and/or mariculture products.
- 19.0 Apply business management skills in managing an aquaculture and/or mariculture operation—The student will be able to:
- 19.03 Determine cost of production/harvesting and profitability of different systems.
  - 19.04 Determine procedures and costs for acquiring the land/water, machinery, equipment structures, etc., needed for an operation specified by the instructor.
  - 19.05 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.
  - 19.06 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.
  - 19.07 Operate a production/harvesting system.
  - 19.08 Complete supervised occupational experienced (SAE) records.
- 22.0 Demonstrate leadership, employability, communication, and human relations skills—The student will be able to:
- 22.06 Demonstrate competence in job-interview techniques.
  - 22.07 Demonstrate proper office procedures.
  - 22.08 Demonstrate appropriate response to criticism from employer, supervisor, or other persons in the workplace.
  - 22.09 Demonstrate knowledge of how to appropriately make a career change, including resigning from a job.
  - 22.10 Write a resume.
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 29.01 Describe the nature and types of business organizations. SY 1.0
  - 29.02 Explain the effect of key organizational systems on performance and quality.
  - 29.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 29.04 Explain the impact of the global economy on business organizations



- 30.0 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:
- 30.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 30.02 Explain emergency procedures to follow in response to workplace accidents.
  - 30.03 Create a disaster and/or emergency response plan. SHE 2.0
- 31.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 31.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 31.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 31.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 31.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 32.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 32.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 32.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 32.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 32.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 33.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 33.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 33.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 33.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 33.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 33.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 33.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 33.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 33.08 Research the benefits of ongoing professional development. ECD 9.0
  - 33.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

34.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 34.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 34.02 Describe the effect of money management on personal and career goals. FL 3.0
- 34.03 Develop a personal budget and financial goals. FL3.1
- 34.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 34.05 Maintain financial records. FL3.3
- 34.06 Read and reconcile financial statements. FL3.4
- 34.07 Research, compare and contrast investment opportunities.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Environmental Resources  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	<b>8113000</b>
CIP Number	0103010101
Grade Level	9-12 30, 31
Standard Length	4 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	19-4091
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 environmental resources 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.

**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
	8106810	Agriscience Foundations 1	1 credit		2
	8106850	Agricultural Biotechnology 2	1 credit		3
	8113010	Environmental Resources 3	1 credit		3
A	8113020	Environmental Resources 4	1 credit	19-4091	3

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on

the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

## Standards

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Identify the historical, social, cultural and potential applications of biotechnology.
- 11.0 Conduct scientific investigation and apply results.
- 12.0 Demonstrate leadership, employability, communication and human relation skills.
- 13.0 Practice agricultural laboratory safety.
- 14.0 Demonstrate laboratory skills as applied to biotechnology.
- 15.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR).
- 16.0 Demonstrate language arts knowledge and skills.
- 17.0 Demonstrate mathematics knowledge and skills.
- 18.0 Demonstrate science knowledge and skills.
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 20.0 Solve problems using critical thinking skills, creativity and innovation.
- 21.0 Use information technology tools.
- 22.0 Collect and test samples used to determine soil characteristics.
- 23.0 Determine the quality and quantity of water resources.
- 24.0 Identify, classify and preserve samples and specimens of native flora and fauna.
- 25.0 Identify major ecosystems in Florida.
- 26.0 Collect, record and analyze data.
- 27.0 Demonstrate orienteering and map reading skills.
- 28.0 Research environmental issues.
- 29.0 Understand the management of lands.
- 30.0 Investigate the application of weather systems in the agricultural industry.
- 31.0 Practice sustainable agriculture.
- 32.0 Explain the relationship between agriculture and regulatory processes.
- 33.0 Identify environmental detriments to agriculture..
- 34.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 35.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 36.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 37.0 Describe the importance of professional ethics and legal responsibilities.
- 38.0 Explain the importance of employability skill and entrepreneurship skills.
- 39.0 Demonstrate personal money-management concepts, procedures, and strategies.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.



05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills--The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

**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.

10.0 Identify the historical, social, cultural and potential applications of biotechnology--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.1, 2, 3, 5, 8, 14; SC.912.L.16.10; SC.912.L17.13; SC.912.N.2.1, 2

- 10.01 Define biotechnology and explore the historical impact on agriculture.
- 10.02 Explain the developmental progression of biotechnology.
- 10.03 Investigate current applications of biotechnology in agriculture.
- 10.04 Investigate current research in agricultural biotechnology.
- 10.05 Examine potential applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture.
- 10.06 Research emerging problems and issues associated with agricultural biotechnology.
- 10.07 Describe the role of agencies that regulate biotechnology.
- 10.08 Interpret the major regulatory issues related to biotechnology.
- 10.09 Explore ethical, legal and social biotechnology issues.
- 10.10 Evaluate the benefits and risks associated with biotechnology.
- 10.11 Investigate the emergence and evolution of biological organisms and their use in biotechnology.
- 10.12 Examine intellectual properties associated with biotechnology by defining their components.
- 10.13 Examine an ethical dilemma associated with biotechnology by identifying its components.

11.0 Conduct scientific investigation and apply results--The student will be able to:

This standard supports the following Sunshine State Standards: LA.912.2.23; LA.912.4.22; MA.912.S.1.2; MA.912.S.3.2; SC.912.N.3.1,4

- 11.01 Discuss the differences between scientific laws and scientific theories.
- 11.02 Explain the process of scientific inquiry.
- 11.03 Analyze research being conducted in agricultural biotechnology.
- 11.04 Design an agricultural experiment using appropriate control measures.
- 11.05 Devise a system for recording data.
- 11.06 Collect and record data using SI units.

- 11.07 Summarize data and draw defensible conclusions.
  - 11.08 Prepare a report on the experiment conducted.
  - 11.09 Plan and conduct follow-up experiments using the scientific method.
- 12.0 Demonstrate leadership, employability, communication and human relation skills--The student will be able to:
- 12.01 Conduct group meetings using parliamentary procedure and public speaking skills.
  - 12.02 Follow acceptable work habits, personal characteristics and hygiene habits for the biotechnology workplace.
  - 12.03 Identify or demonstrate appropriate responses to criticism and coaching from employer, supervisor, or other persons.
  - 12.04 Conduct a job search and identify advanced training opportunities and the requirements.
  - 12.05 Prepare a resume.
- 13.0 Practice agricultural laboratory safety--The student will be able to:
- 13.01 Identify first aid supplies, personnel and emergency protection areas.
  - 13.02 Monitor, use, store and dispose of hazardous materials properly.
  - 13.03 Document safety training and practices using Material Safety Data Sheets (MSDS) and Occupational Safety and Health Administration (OSHA) standards.
  - 13.04 Demonstrate and utilize safety equipment.
  - 13.05 Identify safety symbols and signs.
  - 13.06 Demonstrate appropriate safety procedures and guidelines, and discuss implications of safety violations.
- 14.0 Demonstrate laboratory skills as applied to biotechnology--The student will be able to:
- This standard supports the following Sunshine State Standards: SC.912.F.14.4, 52; SC.912.L.16.1, 2, 3, 5, 9, 15, 16; SC.912.L.18. 4, 12; SC.912.P.8.7
- 14.01 Maintain and interpret biotechnology laboratory records.
  - 14.02 Operate laboratory equipment and measurement devices.
  - 14.03 Demonstrate aseptic techniques in the biotechnology laboratory.
  - 14.04 Select an appropriate standard operating procedure for working with biological materials.
  - 14.05 Prepare buffers, reagents, solutions and media.
  - 14.06 Inventory biological and chemical materials, and maintain accurate records of supplies and expiration dates.
  - 14.07 Isolate, maintain, quantify and store cell cultures.
  - 14.08 Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.
  - 14.09 Extract and purify DNA.
  - 14.10 Perform protein separation techniques and interpret the results.
  - 14.11 Describe how antibodies are formed and how they can be used in biotechnology applications.
  - 14.12 Research and describe the use of biotechnology to detect microbes.

15.0 Demonstrate the application of biotechnology to Agriculture, Food and Natural Resources (AFNR) --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2; SC.912.L.15.13, 14, 15; SC.912.L.16.10; SC.912.L.17.2, 8, 11, 20; SC.912.L.18.1, 2, 3, 4, 6, 8, 7, 11; SC.912.P.8.12

- 15.01 Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes.
- 15.02 Differentiate the roles of carbohydrates, fats, and proteins in biotechnology applications.
- 15.03 Diagram the processes used to produce transgenic eukaryotes.
- 15.04 Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.
- 15.05 Describe processes by which enzymes are produced through biotechnology.
- 15.06 Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.
- 15.07 Diagram the process by which organisms are genetically engineered for waste treatment.
- 15.08 Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of agricultural products.
- 15.09 Investigate-and report on-genetic engineering procedures used in the production of agricultural products.
- 15.10 Explain the functions of hormones in animals.
- 15.11 Describe the processes used to produce animal hormones from transgenic organisms.
- 15.12 Identify foods produced through fermentation.
- 15.13 Compare and contrast bioengineering and conventional pathways used in food processing.
- 15.14 Explain biomass and sources of biomass.
- 15.15 Assess the characteristics of biomass that make it useful for biofuels production.
- 15.16 Describe the process used in producing alcohol from biomass.
- 15.17 Diagram the process used in producing biodiesel from biomass.
- 15.18 Illustrate the process used in producing methane from biomass.
- 15.19 Describe the selective plant breeding process.
- 15.20 Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.
- 15.21 Describe the use of biotechnology in bioremediation.
- 15.22 Describe the processes involved in biotreatment of biological and chemical wastes.
- 15.23 Explain the global importance of biodiversity.
- 15.24 Explain the positive and negative impacts of agricultural practices on wild populations.
- 15.25 Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.
- 15.26 Describe the processes used in the production of molecules for use in industrial applications.

16.0 Demonstrate language arts knowledge and skills. The students will be able to: AF 2.0

- 16.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 16.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 16.03 Present information formally and informally for specific purposes and audiences. AF2.9
  
- 17.0 Demonstrate mathematics knowledge and skills. The students will be able to: AF3.0
  - 17.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 17.02 Construct charts/tables/graphs using functions and data. AF3.5
  - 17.03 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  
- 18.0 Demonstrate science knowledge and skills. The students will be able to: AF4.0
  - 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
  
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. The students will be able to:
  - 19.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 19.02 Locate, organize and reference written information from various sources. CM 3.0
  - 19.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 19.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 19.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 19.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 19.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
  
- 20.0 Solve problems using critical thinking skills, creativity and innovation. The students will be able to:
  - 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 20.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
  
- 21.0 Use information technology tools. The students will be able to:

- 21.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 21.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Environmental Resources 3  
**Course Number:** 8113010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of water resources, native flora and fauna, Florida ecosystems, soil characteristics, and collecting, recording and analyzing data.

22.0 Collect and test samples used to determine soil characteristics -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.10;  
SC.912.N.1.1, 3, 4, 5, 6

- 22.01 Collect soil samples from test area and complete soil data forms.
- 22.02 Determine soil pH using pH test kit.
- 22.03 Conduct soil, mineral and elemental analysis using soil test kit.
- 22.04 Determine and record texture, structure, temperature and color of each soil layer.
- 22.05 Construct a soil profile or soil pit.
- 22.06 Analyze soil data and write lab report.
- 22.07 Determine the effect of texture, density, and porosity on permeability/infiltration rates and seasonal high groundwater table.
- 22.08 Examine the relationship between soil texture, water movement and water holding capacity.
- 22.09 Determine land class capability utilizing resources, such as: NRCS County Soil Survey, using Geographic Information Systems or other resources.

23.0 Determine the quality and quantity of water resources -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.16;  
SC.912.N.1.1

- 23.01 Determine water quality of groundwater, rivers, lakes, and spring water.
- 23.02 Determine stream flow.
- 23.03 Collect, store and label water samples from a representative test site.
- 23.04 Determine the quality of water samples by measuring for pH, turbidity, dissolved solids and dissolved oxygen.
- 23.05 Investigate water shed boundaries and drainage patterns.
- 23.06 Monitor water levels of rivers, streams, ponds and lakes.

24.0 Identify, classify and preserve samples and specimens of flora and fauna -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.7, 11, 12;  
SC.912.N.1.1



- 24.01 Identify invasive species and their impact on the environment.
- 24.02 Perform a comprehensive ecological study of a forest.
- 24.03 Identify native species and their range, habitat, and functions.
- 24.04 Identify threatened and endangered upland species, range, and habitat.
- 24.05 Demonstrate sample collection and preservation methods.

25.0 Identify major ecosystems in Florida -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.3;  
SC.912.L.17.1, 6, 7, 8, 9, 15, 16

- 25.01 Identify common plant and animal species of the major ecosystems.
- 25.02 Identify the boundary between uplands and wetlands using resources such as: aerial photographs, soils, plants, and/or hydrology.
- 25.03 Identify environmental factors affecting Florida's major ecosystems.
- 25.04 Identify threatened and endangered plant and animal species of specific habitats.
- 25.05 Analyze political, biological, economical, and sociological impacts on managing ecosystems.
- 25.06 Trace the effects of pollution through an ecosystem.
- 25.07 Demonstrate knowledge of biodegradable and non-biodegradable products.
- 25.08 Explain how lack of predation contributes to uncontrollable exotic populations.
- 25.09 Explain how exotic populations stress native.

26.0 Collect, record and analyze data -- The student will be able to:

This standard supports the following Sunshine State Standards: LA.910.2.2.3;  
LA.910.4.2.2; MA.912.S.1.2; MA.912.S.3.2; SC.912.N.1.1, 2, 3, 6

- 26.01 Maintain lab journal.
- 26.02 Construct data tables.
- 26.03 Compile data.
- 26.04 Make inferences from data.
- 26.05 Use word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, and Geographic Information Systems (GIS).

27.0 Demonstrate orienteering and map reading skills--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.1.2;  
MA.912.S.3.2

- 27.01 Interpret legal land descriptions.
- 27.02 Interpret current and historical aerial photography for land cover and land use applications.
- 27.03 Explain topographic map symbols and legends.
- 27.04 Measure acreage on maps.
- 27.05 Determine location and other information from maps, using technology such as Global Positioning System (GPS) and compass.
- 27.06 Measure elevation in the field using survey equipment.

28.0 Research environmental issues--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13, 14, 16; SC.912.N.1.1, 2, 3, 4, 5, 6, 7

- 28.01 Conduct an environmental issue investigation.
- 28.02 Develop an action plan based on investigation.
- 28.03 Prepare and present oral and written presentation.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Environmental Resources 4  
**Course Number:** 8113020  
**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.

29.0 Understand the management of lands--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13, 18

- 29.01 Describe the management of federal lands.
- 29.02 Describe the management of state lands.
- 29.03 Describe the management of local lands.
- 29.04 Describe the management of private lands.
- 29.05 Demonstrate how burning of vegetation releases nutrients into the soil.
- 29.06 Investigate the merits of growing season burns versus non-growing season burns.
- 29.07 Demonstrate safety precautions for controlled burns and legal ramifications.
- 29.08 Identify different types of buffers and riparian zones and their applications.
- 29.09 Determine the applications and benefits of buffers.
- 29.10 Develop and discuss theoretical strategies for managing/ eradicating exotic species.

30.0 Investigate the application of weather systems in the agricultural industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.8;  
SC.912.N.1.1

- 30.01 Interpret a weather map.
- 30.02 Obtain and record measurements of local rainfall, temperature, air pressure, relative humidity, cloud cover and type, and wind speed, using resources such as Florida Automated Weather Network.
- 30.03 Demonstrate the use of a hurricane-tracking chart.
- 30.04 Analyze the impact of weather in regards to risk management.

31.0 Practice sustainable agriculture -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.12, 13, 14, 20

- 31.01 Describe why it is important to sustain domestic agriculture.
- 31.02 Explain international issues affecting domestic agriculture.

- 31.03 Apply principles of nutrient, water, and waste management to environmental problems.
  - 31.04 Compare practices that either enhance or hinder the sustainability of agriculture.
  - 31.05 Analyze the benefit of recent technological advances on the agricultural industry.
  - 31.06 Identify and monitor erosion hazards and environmental quality.
  - 31.07 Differentiate between point and non-point sources of pollution.
  - 31.08 Describe Best Management Practices (BMP) and their significance.
  - 31.09 Identify Best Management Practices relevant in your area.
- 32.0 Explain the relationship between agriculture and regulatory processes. The student will be able to
- 32.01 Identify environmental regulations and their impacts to agriculture.
  - 32.02 Identify regulatory agencies that govern agriculture activities.
  - 32.03 Compare alternative programs to regulations (Examples: local partnerships, agricultural BMPs and others).
- 33.0 Identify environmental detriments to agriculture. The student will be able to:
- 33.01 Identify diseases and pests that impact agriculture production.
  - 33.02 Explain methods to control and eradicate diseases and pests.
  - 33.03 Describe isolation or quarantine methods to minimize spread of diseases and pests.
- 34.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The students will be able to:
- 34.01 Describe the nature and types of business organizations. SY 1.0
  - 34.02 Explain the effect of key organizational systems on performance and quality.
  - 34.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 34.04 Explain the impact of the global economy on business organizations
- 35.0 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:
- 35.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 35.02 Explain emergency procedures to follow in response to workplace accidents.
  - 35.03 Create a disaster and/or emergency response plan. SHE 2.0
- 36.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. The students will be able to:
- 36.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 36.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 36.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 36.04 Employ mentoring skills to inspire and teach others. LT 5.0

- 37.0 Describe the importance of professional ethics and legal responsibilities. The students will be able to:
- 37.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 37.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 37.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 37.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 38.0 Explain the importance of employability skill and entrepreneurship skills. The students will be able to:
- 38.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 38.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 38.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 38.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 38.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 38.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 38.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 38.08 Research the benefits of ongoing professional development. ECD 9.0
  - 38.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 39.0 Demonstrate personal money-management concepts, procedures, and strategies. The students will be able to:
- 39.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 39.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 39.03 Develop a personal budget and financial goals. FL3.1
  - 39.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 39.05 Maintain financial records. FL3.3
  - 39.06 Read and reconcile financial statements. FL3.4
  - 39.07 Research, compare and contrast investment opportunities.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Veterinary Assisting  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

	<b>Secondary</b>	<b>PSAV</b>
Program Number	<b>8115110</b>	<b>A010512</b>
CIP Number	0117051210	0117051210
Grade Level	9-12, 30, 31	30, 31
Standard Length	5 credits	750 hours
Teacher Certification	AGRICULTUR 1 @2 AG SUPPLI #7	AGRICULTUR 1 @2 AGRI @2 AG SUPPLI @7 G
CTSO	FFA	N/A
SOC Codes (all applicable)	31-9096	31-9096
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9 Language: 9 Reading: 9

### **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 veterinary assisting industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to broad, transferable skills and stresses understanding and demonstration of the following elements of the veterinary assisting industry: planning, management, finance, technical and production skills, underlying principles of technology, labor

issues, community issues and health, safety and environmental issues. The program also provides supplemental training for persons previously or currently employed as veterinary assistants.

### **Program Structure**

This program is a planned sequence of instruction consisting of five secondary courses or two postsecondary adult courses that comprise 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.

When offered at the post secondary level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ATE0006	Veterinary Assistants and Laboratory Animal Caretakers 1	450 hours	31-9096
B	ATE0070	Veterinary Assistants and Laboratory Animal Caretakers 2	150 hours	31-9096
C	ATE0072	Veterinary Assistant	150 hours	31-9096

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8111510	Veterinary Assisting 1	1 credit		2
	8111540	Veterinary Assisting 2	1 credit		2
	8111550	Veterinary Assisting 3	1 credit	31-9096	2
B	8111520	Veterinary Assisting 4	1 credit	31-9096	2
C	8111530	Veterinary Assisting 5	1 credit	31-9096	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 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 appropriate secondary 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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

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 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

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 pursuant to Section 1008.29, F.S.; 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.)

### **Accommodations**



Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe veterinary science and the role of animals in society.
- 02.0 Describe the socioeconomic role of veterinary sciences on the livestock industry.
- 03.0 Discuss the human-animal bond and its effects on human health.
- 04.0 Demonstrate the proper use of veterinary science terminologies.
- 05.0 Identify careers in the animal industry.
- 06.0 Practice safety.
- 07.0 Recognize normal and abnormal animal behaviors.
- 08.0 Restrain and control companion and livestock animals.
- 09.0 Identify common breeds of companion animals.
- 10.0 Investigate the common husbandry practices and daily care of several species of companion and livestock animals.
- 11.0 Demonstrate human-relations, communications and leadership through FFA activities.
- 12.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 13.0 Demonstrate basic first aid for humans.
- 14.0 Demonstrate basic first aid for companion and livestock animals.
- 15.0 Apply scientific and technological principles to the veterinary sciences and companion animal industry.
- 16.0 Demonstrate the use of tools, equipment and instruments in the veterinary science and companion animal industry.
- 17.0 Identify common breeds of livestock animals.
- 18.0 Identify parts and functions of various systems of selected animals.
- 19.0 Investigate the common husbandry practices and daily care of companion animals, exotic animals and fish.
- 20.0 Demonstrate knowledge of animal control and humane societies.
- 21.0 Describe the problems, causes, and solutions of animal overpopulation.
- 22.0 Locate and interpret animal-related laws.
- 23.0 Identify the different digestive systems of animals and the nutritional requirements of selected species.
- 24.0 Explain the reproductive system and breeding of selected animals.
- 25.0 Identify common breeds of small and exotic animals.
- 26.0 Demonstrate language arts knowledge and skills.
- 27.0 Describe the importance of professional ethics and legal responsibilities.
- 28.0 Differentiate between animal welfare and animal rights.
- 29.0 Explain the role of animals in research.
- 30.0 Demonstrate human-relations, communications, leadership and employability skills.
- 31.0 Maintain and analyze records.
- 32.0 Demonstrate knowledge of preventive medicine and disease control.
- 33.0 Describe internal and external parasites and control methods.
- 34.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 35.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 36.0 Use information technology tools.
- 37.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 38.0 Explain the importance of employability skills and entrepreneurship skills.
- 39.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 40.0 Demonstrate personal money-management concepts, procedures, and strategies.

- 41.0 Demonstrate science knowledge and skills.
- 42.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 43.0 Groom selected companion and livestock animals.
- 44.0 Describe exotic animals and the effects of captivity on them.
- 45.0 Describe the principles of genetics and biotechnology in reproduction.
- 46.0 Explain diagnostic and therapeutic testing.
- 47.0 Assess techniques used in surgical assisting and surgical preparation.
- 48.0 Demonstrate knowledge of pharmacology.
- 49.0 Demonstrate mathematics knowledge and skills.
- 50.0 Solve problems using critical thinking skills, creativity and innovation.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Veterinary Assistants and Laboratory Animal Caretakers 1**  
**PSAV Number: A010512**

**Course Number: ATE0006**  
**Occupational Completion Point: A**  
**Kennel Technician – 450 Hours – SOC Code 31-9096**

- 01.0 Describe veterinary science and the role of animals in society--The students will be able to:
- 01.01 Define veterinary science.
  - 01.02 Write a brief history of the domestication of animals.
  - 01.03 Choose the top three issues facing the animal industry today and describe the effect of each on society.
- 02.0 Describe the socioeconomic role of veterinary sciences on the livestock industry--The students will be able to:
- 02.01 Prepare a report on the history of the veterinary sciences, companion animal and livestock industry.
  - 02.02 Assess the impact of companion animals on the veterinary science industry.
  - 02.03 Discuss the role of the animal industry in the interaction of population, food, energy, and the environment.
- 03.0 Discuss the human-animal bond and its effects on human health--The students will be able to:
- This standard supports the following Sunshine State Standards:
- 03.01 Explain the human-animal bond.
  - 03.02 Discuss the positive health effects on people resulting from their interaction with animals.
  - 03.03 Discuss programs that use human-animal interaction as a therapy tool.
  - 03.04 Describe the characteristics of animals used in the animal-facilitated therapy programs.
  - 03.05 Describe national and local programs that use animal-facilitated therapy.
  - 03.06 Discuss grief-response and emotional impact of animal loss.
- 04.0 Demonstrate the proper use of veterinary science terminologies--The students will be able to:
- 04.01 Define common veterinary and medical terminology.
  - 04.02 Compile a list of prefixes and suffixes for veterinary medical terminology.
  - 04.03 Categorize gender and species-related terminology.
- 05.0 Identify careers in the animal industry--The students will be able to:
- 05.01 Compile a list of major animal-industry careers.

- 05.02 Describe training requirements for entry and advancement in animal-industry careers.
  - 05.03 Identify professional organizations and trade journals in the animal industry.
  - 05.04 Investigate career opportunities in the veterinary science, companion animal, and large animal industry, and identify educational experiences needed to prepare for those careers.
  - 05.05 Using American Veterinary Medical Association (AVMA) as a reference, distinguish between a Veterinary Assistant, Veterinary Technician, and Veterinary Technologist.
- 06.0 Practice safety--The students will be able to:
- 06.01 List the most common causes of animal related accidents.
  - 06.02 Discuss the importance of following proper safety precautions in the animal industry.
  - 06.03 Demonstrate safety procedures used in the classroom, laboratory, and workplace.
  - 06.04 Practice safe procedures when working with animal-related equipment in the laboratory setting.
  - 06.05 Practice safety precautions around animals.
  - 06.06 Discuss the impact of unsafe procedures.
- 07.0 Recognize normal and abnormal animal behaviors--The students will be able to:
- 07.01 Distinguish between instinctive and learned behaviors.
  - 07.02 Recognize normal and abnormal behavioral characteristics of animals through observations.
  - 07.03 Recognize signs of aggressive animal behaviors.
  - 07.04 Identify behavioral problems.
  - 07.05 Describe behavioral changes due to aging.
- 08.0 Restrain and control companion and livestock animals--The students will be able to:
- 08.01 Recognize signs of aggressive behaviors in animals.
  - 08.02 Explain the appropriate restraining methods for specified behaviors.
  - 08.03 Match the appropriate level of restraint needed for a given animal and situation.
  - 08.04 Demonstrate verbally and physically restraining animals, including:
    - Place, remove, and restrain a caged animal
    - Restraining a tabled small animal
    - Apply muzzle, E-collar and restraint pole
  - 08.05 Demonstrate the appropriate restraining methods for the following large animals:
    - Halter, tie and lead horses and cattle
    - Apply twitch, nose tongs
    - Restrain sheep and swine
    - Load large animals
  - 08.06 Discuss chemical restraints of animals.
  - 08.07 Describe complications encountered when restraining animals.
- 09.0 Identify common breeds of companion animals--The students will be able to:
- 09.01 Identify canine breeds and list breed characteristics.

- 09.02 Identify feline breeds and list breed characteristics.
- 09.03 Identify breeds of rabbits and list their primary use.
- 10.0 Investigate the common husbandry practices and daily care of several species of companion and livestock animals--The students will be able to:
  - 10.01 Describe techniques of caring for canine breeds.
  - 10.02 Describe techniques of caring for feline breeds.
  - 10.03 Describe techniques used in the care of rabbits.
  - 10.04 Describe techniques used in the care of hamsters.
  - 10.05 Describe techniques used in the care of gerbils.
  - 10.06 Describe techniques used in the care of rats and mice.
  - 10.07 Describe techniques used in the care of bovine.
  - 10.08 Describe techniques used in the care of ovine.
  - 10.09 Describe techniques used in the care of caprine.
  - 10.10 Describe techniques used in the care of porcine.
  - 10.11 Describe techniques used in the care of equine.
  - 10.12 Describe techniques used in the care of llamas (cameline).
  - 10.13 Describe techniques used in the care of poultry.
- 11.0 Demonstrate human-relations, communications and leadership through FFA activities--The students will be able to:
  - 11.01 Conduct formal and informal meetings using correct parliamentary procedure skills.
  - 11.02 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.
  - 11.03 Delineate the major events in the history of the FFA.
  - 11.04 Develop, implement, and maintain work-based learning through a Supervised Agricultural Experience (SAE) program.
  - 11.05 Collect, interpret, and analyze data using an organized record-keeping system
  - 11.06 Demonstrate procedures for preparing, maintaining and exhibiting animals.
  - 11.07 Cite requirements to show and exhibit selected animals.
- 12.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 12.01 Employ leadership skills to accomplish organizational goals and objectives. (LT1.0)
  - 12.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. (LT3.0)
  - 12.03 Conduct and participate in meetings to accomplish work tasks. (LT 4.0)
  - 12.04 Employ mentoring skills to inspire and teach others. (LT 5.0)
- 13.0 Demonstrate basic first aid for humans--The students will be able to:
  - 13.01 Locate and use a first aid kit.
  - 13.02 Recognize allergic reactions and toxicity.
  - 13.03 Describe proper use of eye wash solution.
  - 13.04 Control minor hemorrhage and/or trauma.
  - 13.05 Practice emergency procedures.

- 13.06 Discuss the proper procedures of basic first aid and cardiopulmonary resuscitation (CPR).
- 14.0 Demonstrate basic first aid for companion and livestock animals--The students will be able to:
- 14.01 Evaluate emergency health (physical and behavioral) status.
  - 14.02 Restrain and move injured animals.
  - 14.03 Demonstrate hemorrhage control.
  - 14.04 Dress wounds and punctures.
  - 14.05 Demonstrate the correct emergency procedures for shock, burns, heatstroke, and fractures.
  - 14.06 Describe and access up-to-date information on animal health.
  - 14.07 Demonstrate animal CPR.
- 15.0 Apply scientific and technological principles to the veterinary sciences and companion animal industry--The students will be able to:
- 15.01 Discuss the importance of scientific classification in veterinary science.
  - 15.02 Review taxonomy and nomenclature.
  - 15.03 Use the scientific method to solve problems in veterinary science.
- 16.0 Demonstrate the use of tools, equipment and instruments in the veterinary science and companion animal industry--The students will be able to:
- 16.01 Identify and select the proper tools, equipment, and instruments for a specific job.
  - 16.02 Describe the principles of selected mechanical applications as it relates to large animal restraint equipment (e.g., levers, pulleys, hydraulics).
  - 16.03 Demonstrate the ability to use an equipment or instrument manual.
  - 16.04 Demonstrate the use of selected tools, equipment, and instruments.
  - 16.05 Service, maintain, and store tools, equipment, instruments, and supplies.
- 17.0 Identify common breeds of livestock animals--The students will be able to:
- 17.01 Identify bovine breed characteristics.
  - 17.02 Identify ovine breed characteristics.
  - 17.03 Identify caprine breed characteristics.
  - 17.04 Identify porcine breed characteristics.
  - 17.05 Identify equine breed characteristics.
  - 17.06 Identify poultry breed characteristics.
- 18.0 Identify parts and functions of various systems of selected animals--The students will be able to:
- 18.01 Identify internal and external anatomy of selected animals.
  - 18.02 Identify parts of the skeletal system of selected animals.
  - 18.03 Compare the human skeletal system to that of other animals.
  - 18.04 Identify parts and functions of the following systems of selected animals:
    - respiratory system
    - urinary system
    - digestive system

- cardiovascular system
  - reproductive system
  - nervous system
  - immune system
  - endocrine system
- 18.05 Employ correct terminologies for the variety of animal species and conditions within those species.
- 19.0 Investigate the common husbandry practices and daily care of companion, exotic animals and fish—The students will be able to:
- 19.01 Describe techniques used in the care of guinea pigs.
  - 19.02 Describe techniques used in the care of chinchillas.
  - 19.03 Describe techniques used in the care of ferrets.
  - 19.04 Describe techniques used in the care of amphibians.
  - 19.05 Describe techniques used in the care of reptiles.
  - 19.06 Describe techniques used in the care of birds.
  - 19.07 Describe techniques used in the care of fish.
- 20.0 Demonstrate knowledge of animal control and humane societies--The students will be able to:
- 20.01 Differentiate between animal control agencies and humane societies.
  - 20.02 Describe the responsibilities and goals of animal control agencies and humane societies.
  - 20.03 Explain the laws governing each organization.
  - 20.04 Identify and locate local animal control agencies and humane societies.
- 21.0 Describe the problems, causes, and solutions of animal overpopulation--The students will be able to:
- 21.01 Explain the concept of overpopulation of companion animals.
  - 21.02 Describe the causes of animal overpopulation and the problems it creates.
  - 21.03 Define euthanasia and describe its role in animal overpopulation.
  - 21.04 Identify organizations involved in the public education of animal overpopulation.
  - 21.05 Explain the pet owner's and society's responsibilities concerning animal overpopulation.
  - 21.06 Discuss the medical benefits of spay and neutering.
- 22.0 Locate and interpret animal-related laws--The students will be able to:
- 22.01 Describe local animal control laws.
  - 22.02 Describe permitting requirements for exotic and wildlife animals.
  - 22.03 Demonstrate knowledge of local and state animal regulations.
  - 22.04 Determine the legal limitations of duties of an employee in the animal services industry.
  - 22.05 Identify when an animal health certificate is required.
  - 22.06 Explain the laws governing the sale of animals and the disposal of animals.



- 23.0 Identify the different digestive systems of animals and the nutritional requirements of selected species--The students will be able to:
- 23.01 Differentiate between ruminants and non-ruminants.
  - 23.02 Differentiate between omnivorous, carnivores, and herbivores.
  - 23.03 Describe the basic nutritional requirements of selected species.
  - 23.04 Analyze different feed labels and identify feed ingredients.
  - 23.05 Formulate animal food products for healthy and ill animals.
  - 23.06 Schedule feeding times for selected animals.
- 24.0 Explain the reproductive system and breeding of selected animals--The students will be able to:
- 24.01 Describe the male and female reproductive systems.
  - 24.02 Determine sex of animals.
  - 24.03 Determine appropriate age for breeding.
  - 24.04 Identify gestation length.
  - 24.05 Describe estrous cycle.
  - 24.06 Describe breeding techniques.
  - 24.07 Select male and female for breeding.
  - 24.08 Care of breeding stock.
  - 24.09 Care of newborn.
  - 24.10 Explain the differences and similarities between reproduction in animal species.
- 25.0 Identify common breeds of small and exotic animals--The students will be able to:
- 25.01 Identify characteristics of avian.
  - 25.02 Identify characteristics of reptiles.
  - 25.03 Identify characteristics of pocket pets.
  - 25.04 Identify characteristics of exotic species.
- 26.0 Demonstrate language arts knowledge and skills--The students will be able to: (AF 2.0)
- 26.01 Locate, comprehend and evaluate key elements of oral and written information. (AF2.4)
  - 26.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. (AF2.5)
  - 26.03 Present information formally and informally for specific purposes and audiences. (AF2.9)
- 27.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 27.01 Evaluate and justify decisions based on ethical reasoning. (ELR 1.0)
  - 27.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. (ELR1.1)
  - 27.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. (ELR1.2)
  - 27.04 Interpret and explain written organizational policies and procedures.

**Course Number: ATE0070**  
**Occupational Completion Point: B**  
**Animal Care Provider – 150 Hours – SOC Code 31-9096**

28.0 Differentiate between animal welfare and animal rights--The students will be able to:

- 28.01 Define animal welfare and animal rights.
- 28.02 Explain the differences between animal welfare and animal rights.
- 28.03 Identify animal welfare and animal rights advocate groups.
- 28.04 Debate current events concerning animal welfare and animal rights.
- 28.05 Describe animal cruelty and the consequences of cruel treatment of animals.

29.0 Explain the role of animals in research--The students will be able to:

- 29.01 Describe the history of the role of animals in research.
- 29.02 Discuss medical advances made possible through the use of animals in research.
- 29.03 Define USDA and explain its roles in using animals for research.
- 29.04 Describe the role of the Institute of Animal Care and Use Committee (IACUC) with regard to animal research facilities.
- 29.05 Explain the controversy over using animals in research.
- 29.06 Identify organizations that are in favor of and those that are against the use of animals in research.
- 29.07 Develop a personal position on the use of animals in research and support that position.

30.0 Demonstrate human-relations, communications, leadership and employability skills--The students will be able to:

- 30.01 Demonstrate acceptable work habits and attitudes.
- 30.02 Follow oral and written directions with understanding; ask questions that clarify directions, as needed.
- 30.03 Communicate effectively in verbal, written, and nonverbal modes; demonstrate effective telephone skills.
- 30.04 Recognize and demonstrate listening skills and assertive communications skills in the workplace.
- 30.05 Conduct small, informal, formal, and group meetings.
- 30.06 Identify the opportunities for leadership development available through an appropriate students and/or professional organization.
- 30.07 Demonstrate acceptable employee hygiene habits.
- 30.08 Demonstrate appropriate responses to criticism from employer, supervisor, and peers.
- 30.09 Complete pertinent forms for employment, such as a resume, a job application, a W-4 form.
- 30.10 Demonstrate job interview techniques.

31.0 Maintain and analyze records--The students will be able to:

- 31.01 Maintain and analyze animal records.
- 31.02 Discuss the legal requirements of maintaining animal health records, and maintain and analyze animal health records.

- 31.03 Maintain and analyze basic business records (inventory, depreciation, receipts, expenses), using computer applications.
- 31.04 Describe the duties of an office or hospital staff member as outlined by National Association of Veterinary Technicians of America (NAVTA) which includes:
- Greeting clients
  - Scheduling appointments
  - Admitting patients
  - Basic filing
  - Basic veterinary medical record keeping procedures
  - Basic invoicing, billing and payment on account procedures
  - Telephone etiquette
  - Inventory and restock supplies
  - Maintain laboratory logs
- 32.0 Demonstrate knowledge of preventive medicine and disease control--The students will be able to:
- 32.01 Describe the importance of preventive medicine for animal health.
- 32.02 Recognize healthy animals.
- 32.03 Describe common infectious and noninfectious diseases of animals to include bacterial, viral, fungal, prion and zoonotic.
- 32.04 Describe vaccinations available for disease prevention and vaccination procedures.
- 32.05 Recognize health conditions of animals.
- 32.06 Describe isolation procedures for new or sick animals.
- 32.07 Recognize normal and abnormal vital signs of livestock and companion animals.
- 32.08 Demonstrate and record temperature, pulse, respiration, mucous membrane color (MM) and capillary refill time (CRT) and weight of animal.
- 32.09 Collect urine and feces samples for analysis.
- 32.10 Describe the process for collecting blood samples for analysis.
- 32.11 Administer prescribed oral medications.
- 32.12 Describe the process for administering medications by injection, oral, nasal and topical.
- 32.13 Describe the procedure for safe disposal of medications.
- 32.14 Discuss the terms immunology and active and passive immunity.
- 32.15 Describe procedures for periodic health check-up.
- 32.16 Define zoonosis.
- 32.17 Describe selected zoonotic diseases.
- 32.18 Demonstrate proper sanitation techniques for a examination room, hospital facilities, surgical suites, kennel, cattery, paddock, rabbitry, and zoo.
- 32.19 Describe methods of preventive medicine and quarantine for disease control in a kennel, cattery, paddock, rabbitry, and zoo.
- 33.0 Describe internal and external parasites and control methods--The students will be able to:
- 33.01 Describe the internal and external parasites of selected animals.
- 33.02 Describe the methods of parasite prevention.
- 33.03 Describe the methods of parasite control.
- 33.04 Use a microscope for selected practices.

- 33.05 Describe the process for fecal sample collection, slide preparation, and examination.
- 34.0 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:
- 34.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. (SHE 1.0)
  - 34.02 Explain emergency procedures to follow in response to workplace accidents.
  - 34.03 Create a disaster and/or emergency response plan. (SHE 2.0)
  - 34.04 Discuss OSHA as it relates to the animal industry.
  - 34.05 Extract pertinent information from a pesticide label and Material Safety Data Sheet (MSDS).
  - 34.06 Explain the "Right-To-Know" law.
  - 34.07 Describe hazardous waste and sharps disposal.
  - 34.08 Select, mix, and apply a non-restricted chemical according to the label (including Environmental Protection Agency, MSDS, and Worker Protection Standard).
- 35.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 35.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. (CM 1.0)
  - 35.02 Locate, organize and reference written information from various sources. (CM 3.0)
  - 35.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. (CM 5.0)
  - 35.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. (CM 6.0)
  - 35.05 Apply active listening skills to obtain and clarify information. (CM 7.0)
  - 35.06 Develop and interpret tables and charts to support written and oral communications. (CM 8.0)
  - 35.07 Exhibit public relations skills that aid in achieving customer satisfaction. (CM 10.0)
- 36.0 Use information technology tools--The students will be able to:
- 36.01 Use personal information management (PIM) applications to increase workplace efficiency. (IT 1.0)
  - 36.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.(IT 2.0)
  - 36.03 Employ computer operations applications to access, create, manage, integrate, and store information. (IT 3.0)
  - 36.04 Employ collaborative/groupware applications to facilitate group work.
- 37.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 37.01 Employ leadership skills to accomplish organizational goals and objectives. (LT1.0)
  - 37.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. (LT3.0)
  - 37.03 Conduct and participate in meetings to accomplish work tasks. (LT 4.0)
  - 37.04 Employ mentoring skills to inspire and teach others.
- 38.0 Explain the importance of employability skills and entrepreneurship skills--The students will be able to:
- 38.01 Identify and demonstrate positive work behaviors needed to be employable. (ECD 1.0)
  - 38.02 Develop personal career plan that includes goals, objectives, and strategies. (ECD 2.0)
  - 38.03 Examine licensing, certification, and industry credentialing requirements. (ECD 3.0)
  - 38.04 Maintain a career portfolio to document knowledge, skills, and experience. (ECD 5.0)
  - 38.05 Evaluate and compare employment opportunities that match career goals. (ECD 6.0)
  - 38.06 Identify and exhibit traits for retaining employment. (ECD 7.0)
  - 38.07 Identify opportunities and research requirements for career advancement. (ECD 8.0)
  - 38.08 Research the benefits of ongoing professional development. (ECD 9.0)
  - 38.09 Examine and describe entrepreneurship opportunities as a career planning option. (ECD 10.0)
- 39.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 39.01 Describe the nature and types of business organizations. (SY 1.0)
  - 39.02 Explain the effect of key organizational systems on performance and quality.
  - 39.03 List and describe quality control systems and/or practices common to the workplace. (SY 2.0)
  - 39.04 Explain the impact of the global economy on business organizations.
- 40.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 40.01 Identify and describe the services and legal responsibilities of financial institutions. (FL 2.0)
  - 40.02 Describe the effect of money management on personal and career goals. (FL 3.0)
  - 40.03 Develop a personal budget and financial goals. (FL3.1)
  - 40.04 Complete financial instruments for making deposits and withdrawals. (FL3.2)
  - 40.05 Maintain financial records. (FL3.3)
  - 40.06 Read and reconcile financial statements. (FL3.4)
  - 40.07 Research, compare and contrast investment opportunities.
- 41.0 Demonstrate science knowledge and skills--The students will be able to: (AF4.0)

- 41.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. (AF4.1)
- 41.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. (AF4.3)
- 42.0 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:
  - 42.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. (SHE 1.0)
  - 42.02 Explain emergency procedures to follow in response to workplace accidents.
  - 42.03 Create a disaster and/or emergency response plan.

**Course Number: ATE0072**  
**Occupational Completion Point: C**  
**Veterinary Assistant – 150 Hours – SOC Code 31-9096**

- 43.0 Groom selected companion and livestock animals--The students will be able to:
  - 43.01 Select, maintain, and demonstrate safe use of the grooming equipment.
  - 43.02 Groom companion animals (include cosmetic or therapeutic bathing, dipping, ear care and nail trims.)
  - 43.03 Describe the steps in expressing anal sacs using the external method.
  - 43.04 Identify proper hoof care and hoof trimming needs.
  - 43.05 Clip animals.
  - 43.06 Read and interpret labels on grooming products.
- 44.0 Describe exotic animals and the effects of captivity on them--The students will be able to:
  - 44.01 Define exotic animal, zoo animal, invasive and native animals.
  - 44.02 Identify exotic animals native and invasive to Florida.
  - 44.03 Explain the effects of urbanization on the wildlife population.
  - 44.04 Describe the roles of the Florida Fish and Wildlife Conservation Commission in wildlife management.
  - 44.05 Explain the effects of state, national, and international laws on the domestication of the exotic animals.
- 45.0 Describe the principles of genetics and biotechnology in reproduction--The students will be able to:
  - 45.01 Define genetics and discuss genetic principles.
  - 45.02 Explain biotechnology.
  - 45.03 Discuss Mendelian genetics.
  - 45.04 Develop a Mendel chart.
  - 45.05 Define hereditary and environmental variation.
  - 45.06 Explain the differences between pure bred, inbred, line bred, selective breeding, line crossing, and out crossing.
  - 45.07 Describe dominant and recessive genes.
  - 45.08 Define and explain heritability estimates.

- 45.09 Explain the use of genetics in animals, including probability applications.
- 45.10 Analyze the impact of recent technology on the animal industry.
- 46.0 Explain diagnostic and therapeutic testing--The students will be able to:
  - 46.01 Discuss Urinalysis, complete blood count (CBC), Premature Ventricular Contraction (PCV), skin scrapings, cytology, gram stain, blood chemistry and radiographs.
  - 46.02 Assist or demonstrate in the following procedures: collect voided urine samples, determine physical properties of urine, collect blood samples, collect fecal samples, collect and set up fecal float, assist in necropsy and discuss disposal of dead animals, explain how to handle rabies suspect and samples safely.
  - 46.03 Observe radiology and ultrasound imaging and techniques.
- 47.0 Assess techniques used in surgical assisting and surgical preparation--The students will be able to:
  - 47.01 Prepare and sterilize surgical equipment and supplies.
  - 47.02 Identify common surgical instruments and suture materials.
  - 47.03 Perform aseptic technique and positioning for surgical preparation.
  - 47.04 Describe use of the autoclave.
  - 47.05 Describe medical asepsis.
  - 47.06 Assist with monitoring recovering patients.
  - 47.07 Perform post surgical clean up.
  - 47.08 Fold and prepare surgical gowns and drapes.
- 48.0 Demonstrate knowledge of pharmacology--The students will be able to:
  - 48.01 Recognize legal issues involving drugs in the work place. (controlled substances)
  - 48.02 Recognize general types and groups of drugs.
  - 48.03 Differentiate prescription drugs and over the counter drugs.
  - 48.04 Describe proper prescription label requirements.
  - 48.05 Describe how to label, pack and dispense drugs correctly.
  - 48.06 Reconstitute vaccines and be familiar with proper vaccine protocols.
  - 48.07 Describe routes and methods of drug and vaccine administration.
- 49.0 Demonstrate mathematics knowledge and skills--The students will be able to: (AF3.0)
  - 49.01 Demonstrate knowledge of arithmetic operations. (AF3.2)
  - 49.02 Analyze and apply data and measurements to solve problems and interpret documents. (AF3.4)
  - 49.03 Construct charts/tables/graphs using functions and data.
  - 49.04 Calculate drug dosages and conversion from English to Metric system
- 50.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 50.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. (PS1.0)
  - 50.02 Employ critical thinking and interpersonal skills to resolve conflicts. (PS 2.0)

- 50.03 Identify and document workplace performance goals and monitor progress toward those goals. (PS 3.0)
- 50.04 Conduct technical research to gather information necessary for decision-making. (PS 4.0)



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Veterinary Assisting 1  
**Course Number:** 8111510  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in areas such as the history of the animal industry; applied scientific and technological concepts; safety; terminology; careers; breed identification; animal care and human relations skills.

01.0 Describe veterinary science and the role of animals in society--The students will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.3; LA.910.2.2, 3; LA.910.4.2.2; SC.912.L.14.6; SC.912.L.15.13, 15; SC.912.L.16.7, 10, 12; SC.912.L.17.11, 12, 13, 14, 15, 16, 17, 18, 19; SC.912.N.1.2; SC.912.N.2.1; SC.912.N.4.1

01.01 Define veterinary science.

01.02 Write a brief history of the domestication of animals.

01.03 Choose the top three issues facing the animal industry today and describe the effect of each on society.

02.0 Describe the socioeconomic role of veterinary sciences on the livestock industry--The students will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.3; LA.910.2.2.3; LA.910.4.2.2; SC.912.L.14.6; SC.912.L.15.3, 4, 13, 15; SC.912.L.16.7, 10, 12; SC.912.L.17.2, 11, 12, 13, 14, 15, 16, 17, 18, 19; 5I; SC.912.N.1.2; SC.912.N.4.1; SC.912.N.4.2,

02.01 Prepare a report on the history of the veterinary sciences, companion animal and livestock industry.

02.02 Assess the impact of companion animals on the veterinary science industry.

02.03 Discuss the role of the animal industry in the interaction of population, food, energy, and the environment.

03.0 Discuss the human-animal bond and its effects on human health--The students will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.3, SC.912.L.14.6; SC.912.L.16.10, 11; SC.912.L.17.20

03.01 Explain the human-animal bond.

03.02 Discuss the positive health effects on people resulting from their interaction with animals.

03.03 Discuss programs that use human-animal interaction as a therapy tool.

- 03.04 Describe the characteristics of animals used in the animal-facilitated therapy programs.
- 03.05 Describe national and local programs that use animal-facilitated therapy.
- 03.06 Discuss grief-response and emotional impact of animal loss.
  
- 04.0 Demonstrate the proper use of veterinary science terminologies--The students will be able to:
  - 04.01 Define common veterinary and medical terminology.
  - 04.02 Compile a list of prefixes and suffixes for veterinary medical terminology.
  - 04.03 Categorize gender and species-related terminology.
  
- 05.0 Identify careers in the animal industry--The students will be able to:
  - 05.01 Compile a list of major animal-industry careers.
  - 05.02 Describe training requirements for entry and advancement in animal-industry careers.
  - 05.03 Identify professional organizations and trade journals in the animal industry.
  - 05.04 Investigate career opportunities in the veterinary science, companion animal, and large animal industry, and identify educational experiences needed to prepare for those careers.
  - 05.05 Using American Veterinary Medical Association (AVMA) as a reference, distinguish between a Veterinary Assistant, Veterinary Technician, and Veterinary Technologist.
  
- 06.0 Practice safety--The students will be able to:
  - 06.01 List the most common causes of animal related accidents.
  - 06.02 Discuss the importance of following proper safety precautions in the animal industry.
  - 06.03 Demonstrate safety procedures used in the classroom, laboratory, and workplace.
  - 06.04 Practice safe procedures when working with animal-related equipment in the laboratory setting.
  - 06.05 Practice safety precautions around animals.
  - 06.06 Discuss the impact of unsafe procedures.
  
- 07.0 Recognize normal and abnormal animal behaviors--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L15.1, 2, 13, 14; SC.912.L.17.8

  - 07.01 Distinguish between instinctive and learned behaviors.
  - 07.02 Recognize normal and abnormal behavioral characteristics of animals through observations.
  - 07.03 Recognize signs of aggressive animal behaviors.
  - 07.04 Identify behavioral problems.
  - 07.05 Describe behavioral changes due to aging.
  
- 08.0 Restrain and control companion and livestock animals--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.13

- 08.01 Recognize signs of aggressive behaviors in animals.
- 08.02 Explain the appropriate restraining methods for specified behaviors.
- 08.03 Match the appropriate level of restraint needed for a given animal and situation.
- 08.04 Demonstrate verbally and physically restraining animals, including:
  - Place, remove, and restrain a caged animal
  - Restraining a tabled small animal
  - Apply muzzle, E-collar and restraint pole
- 08.05 Demonstrate the appropriate restraining methods for the following large animals:
  - Halter, tie and lead horses and cattle
  - Apply twitch, nose tongs
  - Restrain sheep and swine
  - Load large animals
- 08.06 Discuss chemical restraints of animals.
- 08.07 Describe complications encountered when restraining animals.

09.0 Identify common breeds of companion animals--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.4, 5, 6

- 09.01 Identify canine breeds and list breed characteristics.
- 09.02 Identify feline breeds and list breed characteristics.
- 09.03 Identify breeds of rabbits and list their primary use.

10.0 Investigate the common husbandry practices and daily care of several species of companion animals--The students will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.8; HE.912.C.13; SC.912.L.17.13

- 10.01 Describe techniques of caring for canine breeds.
- 10.02 Describe techniques of caring for feline breeds.
- 10.03 Describe techniques used in the care of rabbits.
- 10.04 Describe techniques used in the care of hamsters.
- 10.05 Describe techniques used in the care of gerbils.
- 10.06 Describe techniques used in the care of rats and mice.
- 10.07 Describe techniques used in the care of bovine.
- 10.08 Describe techniques used in the care of ovine.
- 10.09 Describe techniques used in the care of caprine.
- 10.10 Describe techniques used in the care of porcine.
- 10.11 Describe techniques used in the care of equine.
- 10.12 Describe techniques used in the care of llamas (cameline).
- 10.13 Describe techniques used in the care of poultry.

11.0 Demonstrate human-relations, communications and leadership through FFA activities--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.1.2; MA.912.S.3.2, SC.912.N.1.4; SC.912.N.2.2

- 11.01 Conduct formal and informal meetings using correct parliamentary procedure skills.
  - 11.02 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.
  - 11.03 Delineate the major events in the history of the FFA.
  - 11.04 Develop, implement, and maintain work-based learning through a Supervised Agricultural Experience (SAE) program.
  - 11.05 Collect, interpret, and analyze data using an organized record-keeping system
  - 11.06 Demonstrate procedures for preparing, maintaining and exhibiting animals.
  - 11.07 Cite requirements to show and exhibit selected animals.
- 12.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 12.01 Employ leadership skills to accomplish organizational goals and objectives.(LT1.0)
  - 12.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. (LT3.0)
  - 12.03 Conduct and participate in meetings to accomplish work tasks. (LT 4.0)
  - 12.04 Employ mentoring skills to inspire and teach others. (LT 5.0)

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Veterinary Assisting 2  
**Course Number:** 8111540  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas such as basic first aid; scientific and technological; tools and equipment; breed identification; and functions of systems.

13.0 Demonstrate basic first aid for humans--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.36, 38, 52

- 13.01 Locate and use a first aid kit.
- 13.02 Recognize allergic reactions and toxicity.
- 13.03 Describe proper use of eye wash solution.
- 13.04 Control minor hemorrhage and/or trauma.
- 13.05 Practice emergency procedures.
- 13.06 Discuss the proper procedures of basic first aid and cardiopulmonary resuscitation (CPR).

14.0 Demonstrate basic first aid for companion and livestock animals--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.36

- 14.01 Evaluate emergency health (physical and behavioral) status.
- 14.02 Restrain and move injured animals.
- 14.03 Demonstrate hemorrhage control.
- 14.04 Dress wounds and punctures.
- 14.05 Demonstrate the correct emergency procedures for shock, burns, heatstroke, and fractures.
- 14.06 Describe and access up-to-date information on animal health.
- 14.07 Demonstrate animal CPR.

15.0 Apply scientific and technological principles to the veterinary sciences and companion animal industry--The students will be able to:

This standard supports the following Sunshine State Standards: MA912.S.3.1, 2; MA912.S.5.2; SC.912.L.15.4, 5, 6; SC.912.N.1.1

- 15.01 Discuss the importance of scientific classification in veterinary science.
- 15.02 Review taxonomy and nomenclature.
- 15.03 Use the scientific method to solve problems in veterinary science.

16.0 Demonstrate the use of tools, equipment and instruments in the veterinary science and companion animal industry--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.12.3;  
SC.912.L.14.4

- 16.01 Identify and select the proper tools, equipment, and instruments for a specific job.
- 16.02 Describe the principles of selected mechanical applications as it relates to large animal restraint equipment (e.g., levers, pulleys, hydraulics).
- 16.03 Demonstrate the ability to use an equipment or instrument manual.
- 16.04 Demonstrate the use of selected tools, equipment, and instruments.
- 16.05 Service, maintain, and store tools, equipment, instruments, and supplies.

17.0 Identify common breeds of livestock animals. The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.4, 5, 6

- 17.01 Identify bovine breed characteristics.
- 17.02 Identify ovine breed characteristics.
- 17.03 Identify caprine breed characteristics.
- 17.04 Identify porcine breed characteristics.
- 17.05 Identify equine breed characteristics.
- 17.06 Identify poultry breed characteristics.

18.0 Identify parts and functions of various systems of selected animals--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2, 3, 11, 12, 13, 14. 36, 41, 41, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52; SC.912.L.14.13, 14

- 18.01 Identify internal and external anatomy of selected animals.
- 18.02 Identify parts of the skeletal system of selected animals.
- 18.03 Compare the human skeletal system to that of other animals.
- 18.04 Identify parts and functions of the following systems of selected animals:
  - respiratory system
  - urinary system
  - digestive system
  - cardiovascular system
  - reproductive system
  - nervous system
  - muscular system
  - immune system
  - integumentary system
  - endocrine and exocrine system
- 18.05 Employ correct terminologies for the variety of animal species and conditions within those species.

19.0 Investigate the common husbandry practices and daily care of companion animals and exotic animals and fish –The students will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.3, 8;  
SC.912.L.17.13

- 19.01 Describe techniques used in the care of guinea pigs.
- 19.02 Describe techniques used in the care of chinchillas.
- 19.03 Describe techniques used in the care of ferrets.
- 19.04 Describe techniques used in the care of amphibians.
- 19.05 Describe techniques used in the care of reptiles.
- 19.06 Describe techniques used in the care of birds.
- 19.07 Describe techniques used in the care of fish.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Veterinary Assisting 3  
**Course Number:** 8111550  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas animal digestive systems; animal breeding; animal control; animal overpopulation; animal related laws; and breeds.

20.0 Demonstrate knowledge of animal control and humane societies--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13; SC.912.N.1.4; SC.912.N.2.2

- 20.01 Differentiate between animal control agencies and humane societies.
- 20.02 Describe the responsibilities and goals of animal control agencies and humane societies.
- 20.03 Explain the laws governing each organization.
- 20.04 Identify and locate local animal control agencies and humane societies.

21.0 Describe the problems, causes, and solutions of animal overpopulation--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.1, 5, 8, 11

- 21.01 Explain the concept of overpopulation of companion animals.
- 21.02 Describe the causes of animal overpopulation and the problems it creates.
- 21.03 Define euthanasia and describe its role in animal overpopulation.
- 21.04 Identify organizations involved in the public education of animal overpopulation.
- 21.05 Explain the pet owner's and society's responsibilities concerning animal overpopulation.
- 21.06 Discuss the medical benefits of spay and neutering.

22.0 Locate and interpret animal-related laws--The students will be able to:

- 22.01 Describe local animal control laws.
- 22.02 Describe permitting requirements for exotic and wildlife animals.
- 22.03 Demonstrate knowledge of local and state animal regulations.
- 22.04 Determine the legal limitations of duties of an employee in the animal services industry.
- 22.05 Identify when an Animal Health Certificate is required.
- 22.06 Explain the laws governing the sale of animals and the disposal of animals.

23.0 Identify the different digestive systems of animals and the nutritional requirements of selected species--The students will be able to:



This standard supports the following Sunshine State Standards: SC.912.L.14.46;  
SC.912.L.18.2, 3

- 23.01 Differentiate between ruminants and non-ruminants.
- 23.02 Differentiate between omnivorous, carnivores, and herbivores.
- 23.03 Describe the basic nutritional requirements of selected species.
- 23.04 Analyze different feed labels and identify feed ingredients.
- 23.05 Formulate animal food products for healthy and ill animals.
- 23.06 Schedule feeding times for selected animals.

24.0 Explain the reproductive system and breeding of selected animals--The students will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.3,  
HE.912.C.1.8; SC.912.L.14.33, 41; SC.912.L.15.9, 14, 15; SC.912.L.16.1, 2, 13;  
SC.912.L.17.13

- 24.01 Describe the male and female reproductive systems.
- 24.02 Determine sex of animals.
- 24.03 Determine appropriate age for breeding.
- 24.04 Identify gestation length.
- 24.05 Describe estrous cycle.
- 24.06 Describe breeding techniques.
- 24.07 Select male and female for breeding.
- 24.08 Care of breeding stock.
- 24.09 Care of newborn.
- 24.10 Explain the differences and similarities between reproduction in animal species.

25.0 Identify common breeds of small and exotic animals--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.4, 5, 6

- 25.01 Identify characteristics of avian.
- 25.02 Identify characteristics of reptiles.
- 25.03 Identify characteristics of pocket pets.
- 25.04 Identify characteristics of exotic species.

26.0 Demonstrate language arts knowledge and skills--The students will be able to: (AF 2.0)

- 26.01 Locate, comprehend and evaluate key elements of oral and written information. (AF2.4)
- 26.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. (AF2.5)
- 26.03 Present information formally and informally for specific purposes and audiences. (AF2.9)

27.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- 27.01 Evaluate and justify decisions based on ethical reasoning. (ELR 1.0)

- 27.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. (ELR1.1)
- 27.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. (ELR1.2)
- 27.04 Interpret and explain written organizational policies and procedures.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Veterinary Assisting 4  
**Course Number:** 8111520  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of animal welfare and rights; research; record keeping; disease and parasites.

28.0 Differentiate between animal welfare and animal rights--The students will be able to:

This standard supports the following Sunshine State Standards: LA.910.2.2, 3; LA.910.4.2, 2; SC.912.L.17.13

- 28.01 Define animal welfare and animal rights.
- 28.02 Explain the differences between animal welfare and animal rights.
- 28.03 Identify animal welfare and animal rights advocate groups.
- 28.04 Debate current events concerning animal welfare and animal rights.
- 28.05 Describe animal cruelty and the consequences of cruel treatment of animals.

29.0 Explain the role of animals in research--The students will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.8; SC.912.L.16.10; SC.912.N.4.1

- 29.01 Describe the history of the role of animals in research.
- 29.02 Discuss medical advances made possible through the use of animals in research.
- 29.03 Define USDA and explain its roles in using animals for research.
- 29.04 Describe the role of the Institute of Animal Care and Use Committee (IACUC) with regard to animal research facilities.
- 29.05 Explain the controversy over using animals in research.
- 29.06 Identify organizations that are in favor of and those that are against the use of animals in research.
- 29.07 Develop a personal position on the use of animals in research and support that position.

30.0 Demonstrate human-relations, communications, leadership and employability skills--The students will be able to:

- 30.01 Demonstrate acceptable work habits and attitudes.
- 30.02 Follow oral and written directions with understanding; ask questions that clarify directions, as needed.
- 30.03 Communicate effectively in verbal, written, and nonverbal modes; demonstrate effective telephone skills.
- 30.04 Recognize and demonstrate listening skills and assertive communications skills in the workplace.
- 30.05 Conduct small, informal, formal, and group meetings.

- 30.06 Identify the opportunities for leadership development available through an appropriate students and/or professional organization.
- 30.07 Demonstrate acceptable employee hygiene habits.
- 30.08 Demonstrate appropriate responses to criticism from employer, supervisor, and peers.
- 30.09 Complete pertinent forms for employment, such as a resume, a job application, a W-4 form.
- 30.10 Demonstrate job interview techniques.

31.0 Maintain and analyze records--The students will be able to:

This standard supports the following Sunshine State Standards: MA.912.F.1.1; MA.912.F. 2.1; MA.912.F. 3.3; MA912.F.4.1

- 31.01 Maintain and analyze animal records.
- 31.02 Discuss the legal requirements of maintaining animal health records, and maintain and analyze animal health records.
- 31.03 Maintain and analyze basic business records (inventory, depreciation, receipts, expenses), using computer applications.
- 31.04 Describe the duties of an office or hospital staff member as outlined by NAVTA which includes:
  - Greeting clients
  - Scheduling appointments
  - Admitting patients
  - Basic filing
  - Basic veterinary medical record keeping procedures
  - Basic invoicing, billing and payment on account procedures
  - Telephone etiquette
  - Inventory and restock supplies
  - Maintain laboratory logs

32.0 Demonstrate knowledge of preventive medicine and disease control--The students will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.8; SC.912.L.14.6, 38, 52

- 32.01 Describe the importance of preventive medicine for animal health.
- 32.02 Recognize healthy animals.
- 32.03 Describe common infectious and noninfectious diseases of animals to include bacterial, viral, fungal, prion and zoonotic.
- 32.04 Describe vaccinations available for disease prevention and vaccination procedures.
- 32.05 Recognize health conditions of animals.
- 32.06 Describe isolation procedures for new or sick animals.
- 32.07 Recognize normal and abnormal vital signs of livestock and companion animals.
- 32.08 Demonstrate and record temperature, pulse, respiration, mucous membrane color (MM) and capillary refill time (CRT) and weight of animal.
- 32.09 Collect urine and feces samples for analysis.
- 32.10 Describe the process for collecting blood samples for analysis.

- 32.11 Administer prescribed oral medications.
- 32.12 Describe the process for administering medications by injection, oral, nasal and topical.
- 32.13 Describe the procedure for safe disposal of medications.
- 32.14 Discuss the terms immunology and active and passive immunity.
- 32.15 Describe procedures for periodic health check-up.
- 32.16 Define zoonosis.
- 32.17 Describe selected zoonotic diseases.
- 32.18 Demonstrate proper sanitation techniques for a examination room, hospital facilities, surgical suites, kennel, cattery, paddock, rabbitry, and zoo.
- 32.19 Describe methods of preventive medicine and quarantine for disease control in a kennel, cattery, paddock, rabbitry, and zoo.

33.0 Describe internal and external parasites and control methods--The students will be able to:

This standard supports the following Sunshine State Standards: HE.912.C.1.8

- 33.01 Describe the internal and external parasites of selected animals.
- 33.02 Describe the methods of parasite prevention.
- 33.03 Describe the methods of parasite control.
- 33.04 Use a microscope for selected practices.
- 33.05 Describe the process for fecal sample collection, slide preparation, and examination.

34.0 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:

- 34.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. (SHE 1.0)
- 34.02 Explain emergency procedures to follow in response to workplace accidents.
- 34.03 Create a disaster and/or emergency response plan. (SHE 2.0)
- 34.04 Discuss OSHA as it relates to the animal industry.
- 34.05 Extract pertinent information from a pesticide label and Material Safety Data Sheet (MSDS).
- 34.06 Explain the "Right-To-Know" law.
- 34.07 Describe hazardous waste and sharps disposal.
- 34.08 Select, mix, and apply a non-restricted chemical according to the label (including Environmental Protection Agency (EPA), MSDS, and Worker Protection Standard).

35.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 35.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. (CM 1.0)
- 35.02 Locate, organize and reference written information from various sources. (CM 3.0)
- 35.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. (CM 5.0)
- 35.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. (CM 6.0)
- 35.05 Apply active listening skills to obtain and clarify information. (CM 7.0)

- 35.06 Develop and interpret tables and charts to support written and oral communications. (CM 8.0)
- 35.07 Exhibit public relations skills that aid in achieving customer satisfaction. (CM 10.0)
- 36.0 Use information technology tools--The students will be able to:
  - 36.01 Use personal information management (PIM) applications to increase workplace efficiency. (IT 1.0)
  - 36.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. (IT 2.0)
  - 36.03 Employ computer operations applications to access, create, manage, integrate, and store information. (IT 3.0)
  - 36.04 Employ collaborative/groupware applications to facilitate group work.
- 37.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 37.01 Employ leadership skills to accomplish organizational goals and objectives. (LT1.0)
  - 37.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. (LT3.0)
  - 37.03 Conduct and participate in meetings to accomplish work tasks. (LT 4.0)
  - 37.04 Employ mentoring skills to inspire and teach others.
- 38.0 Explain the importance of employability skills and entrepreneurship skills--The students will be able to:
  - 38.01 Identify and demonstrate positive work behaviors needed to be employable. (ECD 1.0)
  - 38.02 Develop personal career plan that includes goals, objectives, and strategies. (ECD 2.0)
  - 38.03 Examine licensing, certification, and industry credentialing requirements. (ECD 3.0)
  - 38.04 Maintain a career portfolio to document knowledge, skills, and experience. (ECD 5.0)
  - 38.05 Evaluate and compare employment opportunities that match career goals. (ECD 6.0)
  - 38.06 Identify and exhibit traits for retaining employment. (ECD 7.0)
  - 38.07 Identify opportunities and research requirements for career advancement. (ECD 8.0)
  - 38.08 Research the benefits of ongoing professional development. (ECD 9.0)
  - 38.09 Examine and describe entrepreneurship opportunities as a career planning option. (ECD 10.0)
- 39.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 39.01 Describe the nature and types of business organizations. (SY 1.0)
  - 39.02 Explain the effect of key organizational systems on performance and quality.

- 39.03 List and describe quality control systems and/or practices common to the workplace. (SY 2.0)
- 39.04 Explain the impact of the global economy on business organizations.
- 40.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
  - 40.01 Identify and describe the services and legal responsibilities of financial institutions. (FL 2.0)
  - 40.02 Describe the effect of money management on personal and career goals. (FL 3.0)
  - 40.03 Develop a personal budget and financial goals. (FL3.1)
  - 40.04 Complete financial instruments for making deposits and withdrawals. (FL3.2)
  - 40.05 Maintain financial records. (FL3.3)
  - 40.06 Read and reconcile financial statements. (FL3.4)
  - 40.07 Research, compare and contrast investment opportunities.
- 41.0 Demonstrate science knowledge and skills--The students will be able to: (AF4.0)
  - 41.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. (AF4.1)
  - 41.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. (AF4.3)
- 42.0 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:
  - 42.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. (SHE 1.0)
  - 42.02 Explain emergency procedures to follow in response to workplace accidents.
  - 42.03 Create a disaster and/or emergency response plan.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:**           **Veterinary Assisting 5**  
**Course Number:**       **8111530**  
**Course Credit:**         **1**

**Course Description:**

This course is designed to develop competencies in the areas of grooming, effects of captivity of exotics; genetics and biotechnology in reproduction; diagnostic and therapeutic testing; surgical preparation; and pharmacology.

43.0 Groom selected companion and livestock animals--The students will be able to:

- 43.01 Select, maintain, and demonstrate safe use of the grooming equipment.
- 43.02 Groom companion animals (include cosmetic or therapeutic bathing, dipping, ear care and nail trims.)
- 43.03 Describe the steps in expressing anal sacs using the external method.
- 43.04 Identify proper hoof care and hoof trimming needs.
- 43.05 Clip animals.
- 43.06 Read and interpret labels on grooming products.

44.0 Describe exotic animals and the effects of captivity on them--The students will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.8, 13

- 44.01 Define exotic animal, zoo animal, invasive and native animals.
- 44.02 Identify exotic animals native and invasive to Florida.
- 44.03 Explain the effects of urbanization on the wildlife population.
- 44.04 Describe the roles of the Florida Fish and Wildlife Conservation Commission in wildlife management.
- 44.05 Explain the effects of state, national, and international laws on the domestication of the exotic animals.

45.0 Describe the principles of genetics and biotechnology in reproduction--The students will be able to:

This standard supports the following Sunshine State Standards: MA.912.P.1.1, 2; MA.912.P.2.1, 2, 3; SC.912.L.15.13, 14; SC.912.L.16.2, 3, 4, 5, 8, 9, 10

- 45.01 Define genetics and discuss genetic principles.
- 45.02 Explain biotechnology.
- 45.03 Discuss Mendelian genetics.
- 45.04 Develop a Mendel chart.
- 45.05 Define hereditary and environmental variation.
- 45.06 Explain the differences between pure bred, inbred, line bred, selective breeding, line crossing, and out crossing.
- 45.07 Describe dominant and recessive genes.
- 45.08 Define and explain heritability estimates.



- 45.09 Explain the use of genetics in animals, including probability applications.  
45.10 Analyze the impact of recent technology on the animal industry.
- 46.0 Explain diagnostic and therapeutic testing--The students will be able to:
- This standard supports the following Sunshine State Standards: LA.910.2.2.3;  
SC.912.L.14.37; SC.912.N.3.5; SC.912.P.8.2
- 46.01 Discuss urinalysis, complete blood count (CBC), premature ventricular contraction (PCV), skin scrapings, cytology, gram stain, blood chemistry, electrocardiogram and x rays.  
46.02 Assist or demonstrate in the following procedures: collect voided urine samples, determine physical properties of urine, collect blood samples, collect fecal samples, collect and set up fecal float, assist in necropsy and discuss disposal of dead animals, explain how to handle rabies suspect and samples safely.  
46.03 Observe radiology and ultrasound imaging and techniques.
- 47.0 Assess techniques used in surgical assisting and surgical preparation--The students will be able to:
- 47.01 Prepare and sterilize surgical equipment and supplies.  
47.02 Identify common surgical instruments and suture materials.  
47.03 Perform aseptic technique and positioning for surgical preparation.  
47.04 Describe use of the autoclave.  
47.05 Describe medical asepsis.  
47.06 Assist with monitoring recovering patients.  
47.07 Perform post surgical clean up.  
47.08 Fold and prepare surgical gowns and drapes.
- 48.0 Demonstrate knowledge of pharmacology--The students will be able to:
- 48.01 Recognize legal issues involving drugs in the work place. (controlled substances)  
48.02 Recognize general types and groups of drugs.  
48.03 Differentiate prescription drugs and over the counter drugs.  
48.04 Describe proper prescription label requirements.  
48.05 Describe how to label, pack and dispense drugs correctly.  
48.06 Reconstitute vaccines and be familiar with proper vaccine protocols.  
48.07 Describe routes and methods of drug and vaccine administration.
- 49.0 Demonstrate mathematics knowledge and skills--The students will be able to: (AF3.0)
- Demonstrate knowledge of arithmetic operations. (AF3.2)  
49.01 Analyze and apply data and measurements to solve problems and interpret documents. (AF3.4)  
49.02 Construct charts/tables/graphs using functions and data.  
49.03 Calculate drug dosages and conversion from English to Metric system.
- 50.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

- 50.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. (PS1.0)
- 50.02 Employ critical thinking and interpersonal skills to resolve conflicts. (PS 2.0)
- 50.03 Identify and document workplace performance goals and monitor progress toward those goals. (PS 3.0)
- 50.04 Conduct technical research to gather information necessary for decision-making. (PS 4.0)

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Agricultural Sales and Services  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	<b>8116000</b>
CIP Number	0101050100
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @ 2 ¶Any AG ED G
CTSO	FFA
SOC Codes (all applicable)	13-1021
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 sales and services sector 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.

### **Program Structure**

This program is a planned sequence of instruction consisting of three courses and 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
	8106810	Agriscience Foundations 1	1 credit		2
	8116010	Agricultural Sales and Services 2	1 credit		2
A	8116020	Agricultural Sales and Services 3	1 credit	13-1021	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.

- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Describe the basic concepts of agribusiness.
- 11.0 Operate and maintain equipment facilities.
- 12.0 Handle merchandise.
- 13.0 Demonstrate positive customer-relations skills.
- 14.0 Demonstrate employability skills.
- 15.0 Demonstrate language arts knowledge and skills. (AF 2.0)
- 16.0 Demonstrate mathematics knowledge and skills. (AF3.0)
- 17.0 Demonstrate science knowledge and skills. (AF4.0)
- 18.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 19.0 Solve problems using critical thinking skills, creativity and innovation.
- 20.0 Use information technology tools.
- 21.0 Demonstrate knowledge of the general principles of agribusiness.
- 22.0 Perform agricultural business activities.
- 23.0 Merchandise and sell agricultural products and services.
- 24.0 Perform promotional activities.
- 25.0 Observe local, state, and federal rules and regulations.
- 26.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 27.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 28.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 29.0 Describe the importance of professional ethics and legal responsibilities.
- 30.0 Explain the importance of employability skill and entrepreneurship skills.
- 31.0 Demonstrate personal money-management concepts, procedures, and strategies.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.



05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills --The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Sales and Services 2  
**Course Number:** 8116010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the basic concepts of agribusiness; the operation and maintenance of equipment and maintenance of facilities; handling merchandise; demonstration of positive customer-relations and employability skills.

10.0 Describe the basic concepts of agribusiness--The student will be able to:

10.01 Explain the following concepts:

- business cycle
- profit
- competition

10.02 Identify and discuss ethical issues in agribusiness.

11.0 Operate and maintain equipment and facilities--The student will be able to:

11.01 Operate and maintain the equipment appropriate for a selected agribusiness.

11.02 Maintain facilities for a selected agribusiness.

11.03 Assemble tools and equipment, using manufacturers' manuals.

11.04 Perform routine maintenance on agricultural equipment, using manufacturers' manuals.

11.05 Construct and repair structures, observing safety precautions.

11.06 Follow safety precautions.

11.07 Maintain maintenance and repair records, using an applicable computer application.

12.0 Handle merchandise--The student will be able to:

12.01 Load and unload delivery vehicles.

12.02 Process incoming merchandise, including verifying invoices and returning unacceptable merchandise.

12.03 Store received agricultural products according to the manufacturer's specifications.

12.04 Prepare agricultural products for shipment.

12.05 Store flammable liquids and agricultural chemicals according to label.

12.06 Conduct an inventory and utilize a computerized inventory-control system.

12.07 Describe inventory rotation.

13.0 Demonstrate acceptable customer-relations skills--The student will be able to:

13.01 Maintain a customer file system.

13.02 Evaluate the importance of self-control in customer-relations.

13.03 Identify and demonstrate appropriate responses to criticism and praise.

- 13.04 Explain the effects of positive human relations on success in business.
  - 13.05 Demonstrate respect for the customer's desires and property.
  - 13.06 Practice effective telephone skills to enhance customer relations.
- 14.0 Demonstrate employability skills--The student will be able to:
- 14.01 Conduct a job search and identify advanced-training opportunities and requirements.
  - 14.02 Calculate the employer's investment cost for an employee.
  - 14.03 Secure information about a job, including employee benefits.
  - 14.04 Prepare a resume.
  - 14.05 Evaluate a job offer, considering various factors such as career advancement, job satisfaction, employee benefits, etc.
  - 14.06 Demonstrate ethical and responsible practices.
  - 14.07 Evaluate the importance of pride in the quality of workmanship.
  - 14.08 Describe the advantages of a good driving record and the ramifications of a poor driving record on employability opportunities.
  - 14.09 Explain the importance of confidentiality in the workplace.
  - 14.10 Demonstrate appropriate responses to performance evaluations from the employer, the supervisor, and other persons in the workplace.
- 15.0 Demonstrate language arts knowledge and skills--The students will be able to: (AF 2.0)
- 15.01 Locate, comprehend and evaluate key elements of oral and written information. (AF2.4)
  - 15.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. (AF2.5)
  - 15.03 Present information formally and informally for specific purposes and audiences. (AF2.9)
- 16.0 Demonstrate mathematics knowledge and skills--The students will be able to: (AF3.0)
- 16.01 Demonstrate knowledge of arithmetic operations. (AF3.2)
  - 16.02 Analyze and apply data and measurements to solve problems and interpret documents. (AF3.4)
  - 16.03 Construct charts/tables/graphs using functions and data. (AF3.5)
- 17.0 Demonstrate science knowledge and skills--The students will be able to: (AF4.0)
- 17.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. (AF4.1)
  - 17.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. (AF4.3)
- 18.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 18.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. (CM 1.0)

- 18.02 Locate, organize and reference written information from various sources. (CM 3.0)
  - 18.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. (CM 5.0)
  - 18.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. (CM 6.0)
  - 18.05 Apply active listening skills to obtain and clarify information. (CM 7.0)
  - 18.06 Develop and interpret tables and charts to support written and oral communications. (CM 8.0)
  - 18.07 Exhibit public relations skills that aid in achieving customer satisfaction. (CM 10.0)
- 19.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 19.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. (PS1.0)
  - 19.02 Employ critical thinking and interpersonal skills to resolve conflicts. (PS 2.0)
  - 19.03 Identify and document workplace performance goals and monitor progress toward those goals. (PS 3.0)
  - 19.04 Conduct technical research to gather information necessary for decision-making. (PS 4.0)
- 20.0 Use information technology tools--The students will be able to:
- 20.01 Use personal information management (PIM) applications to increase workplace efficiency. (IT 1.0)
  - 20.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. (IT 2.0)
  - 20.03 Employ computer operations applications to access, create, manage, integrate, and store information. (IT 3.0)
  - 20.04 Employ collaborative/groupware applications to facilitate group work. (IT 4.0)

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Sales and Services 3  
**Course Number:** 8116020  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the general principles of agribusiness; performing agricultural business activities; merchandising and selling agricultural products and services; performing promotional activities and local, state, and federal rules and regulations.

- 21.0 Demonstrate knowledge of the general principles of agribusiness--The student will be able to:
- 21.01 Explain the different types of record-keeping systems used in agribusiness.
  - 21.02 Explain and differentiate variable and fixed costs.
  - 21.03 Identify the various types and sources of credit.
  - 21.04 Calculate the time value of money.
  - 21.05 Describe the decision-making process involved in purchasing capital and sales products.
- 22.0 Perform agricultural business activities--The student will be able to:
- 22.01 Open and close the store or facility.
  - 22.02 Operate sales counter equipment.
  - 22.03 Maintain business records.
  - 22.04 Order supplies and equipment through various methods, including catalogs and telecommunication and electronic-communication devices.
  - 22.05 Calculate margins and discounts for agricultural supplies and products (e.g., cash, bulk, quantity, early season, etc.).
  - 22.06 Label and price merchandise, considering the factors involved in pricing agricultural products and services.
  - 22.07 Update prices on merchandise.
  - 22.08 Code and date merchandise.
  - 22.09 Maintain a ledger of accounts, including the calculation of interest.
  - 22.10 Use a computer, demonstrating word-processing skills and the ability to maintain a database, produce a spreadsheet, and access an electronic network.
- 23.0 Merchandise and sell agricultural products and services--The student will be able to:
- 23.01 Analyze marketing and pricing alternatives.
  - 23.02 Differentiate marketing, pricing, value, and grading standards for different agricultural products.
  - 23.03 Merchandise/display agricultural products.
  - 23.04 Explain the purpose, benefit, and quality of the products sold.
  - 23.05 Determine customer needs and wants.
  - 23.06 Recommend products and services that meet the customer's needs or wants.
  - 23.07 Demonstrate effective sales principles and techniques.

- 23.08 Take and fill customer orders by various means, including electronic communications.
  - 23.09 Perform sales counter activities (e.g., processing sales transactions, completing a purchase order and an invoice, calculating state sales tax, etc.).
  - 23.10 Follow up to ensure the quality of services provided to customers.
  - 23.11 Provide technical assistance to customers.
  - 23.12 Process customer complaints.
- 24.0 Perform promotional activities--The student will be able to:
- 24.01 Identify potential customers.
  - 24.02 Collect and analyze market information.
  - 24.03 Develop a plan for advertising an agricultural product or service.
  - 24.04 Identify and participate in appropriate trade shows and demonstrations.
  - 24.05 Make an oral presentation in a promotional meeting, utilizing visual aids.
- 25.0 Observe local, state, and federal rules and regulations--The student will be able to:
- 25.01 Identify current basic government agricultural programs.
  - 25.02 Maintain licensing, inspection, and government-record requirements.
  - 25.03 Maintain state and federal tax records.
  - 25.04 Identify the governmental and regulatory agencies related to agribusiness and explain their impact on agribusiness.
  - 25.05 Identify the sources of technical assistance available from private and government
- 26.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 26.01 Describe the nature and types of business organizations. (SY 1.0)
  - 26.02 Explain the effect of key organizational systems on performance and quality.
  - 26.03 List and describe quality control systems and/or practices common to the workplace. (SY 2.0)
  - 26.04 Explain the impact of the global economy on business organizations.
- 27.0 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:
- 27.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. (SHE 1.0)
  - 27.02 Explain emergency procedures to follow in response to workplace accidents.
  - 27.03 Create a disaster and/or emergency response plan. (SHE 2.0)
- 28.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 28.01 Employ leadership skills to accomplish organizational goals and objectives. (LT1.0)
  - 28.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. (LT3.0)

- 28.03 Conduct and participate in meetings to accomplish work tasks. (LT 4.0)
- 28.04 Employ mentoring skills to inspire and teach others. (LT 5.0)
- 29.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 29.01 Evaluate and justify decisions based on ethical reasoning. (ELR 1.0)
  - 29.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. (ELR1.1)
  - 29.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. (ELR1.2)
  - 29.04 Interpret and explain written organizational policies and procedures. (ELR 2.0)
- 30.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
  - 30.01 Identify and demonstrate positive work behaviors needed to be employable. (ECD 1.0)
  - 30.02 Develop personal career plan that includes goals, objectives, and strategies. (ECD 2.0)
  - 30.03 Examine licensing, certification, and industry credentialing requirements. (ECD 3.0)
  - 30.04 Maintain a career portfolio to document knowledge, skills, and experience. (ECD 5.0)
  - 30.05 Evaluate and compare employment opportunities that match career goals. (ECD 6.0)
  - 30.06 Identify and exhibit traits for retaining employment. (ECD 7.0)
  - 30.07 Identify opportunities and research requirements for career advancement. (ECD 8.0)
  - 30.08 Research the benefits of ongoing professional development. (ECD 9.0)
  - 30.09 Examine and describe entrepreneurship opportunities as a career planning option. (ECD 10.0)
- 31.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
  - 31.01 Identify and describe the services and legal responsibilities of financial institutions. (FL 2.0)
  - 31.02 Describe the effect of money management on personal and career goals. (FL 3.0)
  - 31.03 Develop a personal budget and financial goals. (FL3.1)
  - 31.04 Complete financial instruments for making deposits and withdrawals. (FL3.2)
  - 31.05 Maintain financial records. (FL3.3)
  - 31.06 Read and reconcile financial statements. (FL3.4)
  - 31.07 Research, compare and contrast investment opportunities.



2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Agricultural Communications  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	<b>8117000</b>
CIP Number	0101080200
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes	27-3099
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 communications sector of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in instruction in animal and plant production and processing; agriculture marketing and communications; employability skills; mathematics; basic science; biological sciences; and human-relations skills.

### **Program Structure**

This program is a planned sequence of instruction consisting of three courses and 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
	8106810	Agriscience Foundations 1	1 credit		2
	8117010	Agricultural Communications 2	1 credit		2
A	8117020	Agricultural Communications 3	1 credit	27-3099	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fl DOE.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.

- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Investigate the communications sector of the agricultural industry.
- 11.0 Identify the forms of communication.
- 12.0 Develop communication messages.
- 13.0 Demonstrate oral communications skills.
- 14.0 Conduct interviews.
- 15.0 Investigate printed agricultural media.
- 16.0 Utilize photography and graphics.
- 17.0 Develop, design and edit publications and documents.
- 18.0 Develop audio and video media.
- 19.0 Investigate ethical and professional issues in agricultural communications.
- 20.0 Demonstrate leadership, employability, and human relations skills.
- 21.0 Use online social media.
- 22.0 Create an agricultural communications campaign.
- 23.0 Demonstrate language arts knowledge and skills.
- 24.0 Demonstrate mathematics knowledge and skills.
- 25.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 26.0 Solve problems using critical thinking skills, creativity and innovation.
- 27.0 Use information technology tools.
- 28.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 29.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 31.0 Describe the importance of professional ethics and legal responsibilities.
- 32.0 Explain the importance of employability skill and entrepreneurship skills.
- 33.0 Demonstrate personal money-management concepts, procedures, and strategies.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science--The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills--The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Communications 2  
**Course Number:** 8117010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the communications sector of the agricultural industry including instruction in developing and editing materials for printed media and media broadcast, utilizing photography and graphics, the importance of the internet in communications, writing technical papers and media scripts and ethical and professional issues in the industry.

10.0 Investigate the communications sector of the agricultural industry --The student will be able to:

- 10.01 Describe the importance of communications in American agriculture.
- 10.02 Discuss career opportunities in agricultural communications including the educational requirements.
- 10.03 Identify professional organizations related to agricultural communications.
- 10.04 Identify the impact of communications to the agriculture industry and to society.

11.0 Identify the forms of communication --The student will be able to:

- 11.01 Explain the purpose of communication.
- 11.02 Explain the different types of communication: verbal, non-verbal, written and visual.
- 11.03 Compare the various forms of communication technologies: print, video, online media, visual arts and social media.
- 11.04 Identify communication barriers and determine methods of overcoming these barriers.

12.0 Develop communication messages – The student will be able to:

- 12.01 Conduct an audience analysis.
- 12.02 Research information for message development.
- 12.03 Analyze research for credibility.
- 12.04 Identify elements of informative and persuasive messages.
- 12.05 Compare and contrast media channels.
- 12.06 Identify agricultural messages in the media.
- 12.07 Create informative and persuasive messages using various communication methods.

13.0 Demonstrate oral communications skills --The student will be able to:

- 13.01 Determine types of speeches: informative, persuasive.
- 13.02 Identify the importance of public speaking skills in career development.
- 13.03 Explain the characteristics of an effective public speaker.

- 13.04 Explain the steps necessary to prepare a speech.
- 13.05 Present a prepared speech.
- 13.06 Present an extemporaneous speech.
  
- 14.0 Conduct interviews--The student will be able to:
  - 14.01 Research information for an interview.
  - 14.02 Identify the types of interview questions.
  - 14.03 Write interview questions.
  - 14.04 Conduct an interview.
  - 14.05 Conduct follow-up procedures.
  
- 15.0 Investigate printed agricultural media --The student will be able to:
  - 15.01 Explain the importance of printed media to the agricultural industry.
  - 15.02 Describe the components of various styles in written articles.
  - 15.03 Identify and list the criteria for newsworthiness of a news story.
  - 15.04 Explain the structure of the inverted pyramid.
  - 15.05 List the five Ws and H: who, what, when, where, why and how.
  - 15.06 Write a lead for a story.
  - 15.07 Compose a news story and news release on an agricultural topic.
  - 15.08 Use the *Associated Press Stylebook and Libel Manual* to edit articles.
  - 15.09 Define the components of an editorial.
  
- 16.0 Utilize photography and graphics --The student will be able to:
  - 16.01 Identify the types of photography and graphic design and describe the importance of each to agricultural communications.
  - 16.02 Identify key terms in digital photography.
  - 16.03 Compose a quality photograph.
  - 16.04 Demonstrate the use of technology, software, and hardware used in photography and graphic design.
  - 16.05 Identify key terms in digital photo editing.
  
- 17.0 Develop, design and edit publications and documents --The student will be able to:
  - 17.01 Identify key terms in publication and document design.
  - 17.02 Explain and apply the components of the publication and document development process.
  - 17.03 Identify common mistakes in publications and documents.
  - 17.04 Use the appropriate software to design a publication and document.
  
- 18.0 Develop audio and video media --The student will be able to:
  - 18.01 Explain and implement the media production process.
  - 18.02 Write a media script.
  - 18.03 Describe the importance of grammar and punctuation in writing scripts.
  - 18.04 Compare the relationship of active and passive voice in script writing.
  - 18.05 Describe the relevance of jargon, clichés, metaphors and absolute words in script writing.

- 18.06 Draw a video storyboard.
  - 18.07 Write a video shot outline.
  - 18.08 Identify a proper video shot sequence (long shot, medium shot, close-up).
  - 18.09 Create a public service announcement.
  - 18.10 Demonstrate proper tone and voice inflection for radio and video.
- 19.0 Investigate ethical and professional issues in agricultural communications --The student will be able to:
- 19.01 Demonstrate characteristics of responsible/ethical media professionals: public relations professional, reporter and editor.
  - 19.02 Adhere to all media deadlines.
  - 19.03 Describe plagiarism, libel, slander, copyright and intellectual property.
- 20.0 Demonstrate leadership, employability, and human relations skills --The student will be able to:
- 20.01 Conduct a job search for a career in agricultural communications.
  - 20.02 Develop a resume.
  - 20.03 Identify documents that may be required when applying for a job in the agricultural communication field.
  - 20.04 Identify and demonstrate proper human relation skills.
  - 20.05 Write a proper thank you letter.
- 20.0 Demonstrate language arts knowledge and skills. The students will be able to: AF 2.0
- 22.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 21.0 Demonstrate mathematics knowledge and skills. The students will be able to: AF3.0
- 23.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 23.02 Construct charts/tables/graphs using functions and data. AF3.5
- 22.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. The students will be able to:
- 25.02 Locate, organize and reference written information from various sources. CM 3.0
  - 25.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 25.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 26.0 Solve problems using critical thinking skills, creativity and innovation. The students will be able to:
- 26.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 26.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0

- 27.0 Use information technology tools. The students will be able to:
- 27.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 27.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 28.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The students will be able to:
- 28.04 Explain the impact of the global economy on business organizations
- 29.0 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:
- 29.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 29.02 Explain emergency procedures to follow in response to workplace accidents.
  - 29.03 Create a disaster and/or emergency response plan. SHE 2.0
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. The students will be able to:
- 30.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 31.0 Describe the importance of professional ethics and legal responsibilities. The students will be able to:
- 31.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 32.0 Explain the importance of employability skill and entrepreneurship skills. The students will be able to:
- 32.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 32.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 32.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 32.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 32.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 33.0 Demonstrate personal money-management concepts, procedures, and strategies. The students will be able to:
- 33.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0

- 33.02 Describe the effect of money management on personal and career goals. FL 3.0
- 33.03 Develop a personal budget and financial goals. FL3.1

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agricultural Communications 3  
**Course Number:** 8117020  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the communications sector of the agricultural industry including instruction in developing and editing materials for printed media and media broadcast, utilizing photography and graphics, the importance of the internet in communications, writing technical papers and media scripts, ethical and professional issues in the industry, and advertising and marketing.

10.0 Explore the scope of the agriscience industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, 4, 5; SC.912.N.4.1

10.03 Identify and describe the importance of professional and trade organizations.

10.04 Examine and interpret trade journals, and academic research in the agriscience industry.

11.0 Provide for proper animal health and nutrition--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.1.1, 2, 4, 5, 6; M MA.912.A.4.1, 4, 7; A.912.A.5.1.4, 7; MA.912.A.10.1, 2; MA.912.G.8.2; MA.912.S.1.1, 2

11.03 Recognize, describe and demonstrate prevention and treatment of common animal diseases, disorders, and pests.

11.04 Read, interpret, and demonstrate correct uses of pesticides, medication, and other additives according to their labels.

11.05 Describe nutritional requirements of animals.

11.06 Formulate and compute least-cost feed rations.

11.07 Select and apply growth stimulators and implants.

11.08 Determine feeding rates and methods of feeding animals.

14.0 Compare, select, and use plant production systems--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.1.1, 2, 4, 6; MA.912.G.1.1, 2, 4; MA.912.S.3.1, 2

14.05 Recommend varieties of local commercial plants and field crops.

14.06 Calculate planting rate and spacing.

14.07 Operate and adjust planting equipment.

15.0 Fertilize plants and crops--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.10, 16; SC.912.P.8.8, 11; MA.912.A.1.2, 4, 5; MA.912.A.5.1, 4, 7; MA.912.A.10.1, 2; MA.912.G.1.1, 2, 4; MA.912.G.2.7; MA.912.G.4.1, 4, 5; MA.912.G.5.1, 3, MA.912.G.8.2; 4; MA.912.S.1.1, 2; MA.912.S.2.2; MA.912.S.3.6

- 15.04 Access why the resources soil provides supports life.
- 15.05 Demonstrate how the importance of soil characteristics affects agriculture.
- 15.06 Develop fertilization schedules and calculate fertilizer rates for plants; solve time, distance, area, and volume problems in agriscience.
- 15.07 Identify common nutrient-deficiency symptoms in plants.
- 15.08 Calibrate fertilization equipment and fertilize plants.

16.0 Irrigate plants and crops--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.7.5,6, 7, 8, 9; SC.912.L.17.10; MA.912.A.1.1, 2, 4, 5; MA.912.A.5.1, 4, 7; MA.912.A.10.1, 2; MA.912.G.1.1; MA.912.G.2.7; MA.912.G.4.1, 4, 5; MA.912.G.5.1, 3, 4; MA.912.G.6.1, 2, 4, 5; MA.912.G.8.2; MA.912.S.1.1, 2; MA.912.S.2.2; MA.912.S.3.1, 3, 6

- 16.01 Recognize soil and plant conditions indicating irrigation needs and develop an irrigation schedule.
- 16.02 Compare and select irrigation equipment and methods.
- 16.03 Install, operate, maintain, and repair irrigation equipment.

17.0 Control plant pests--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.6, 8, 9, 13, 17; MA.912.A.5.1, 4, 7; MA.912.A.10.1, 2; MA.912.G.5.1, 3, 4; MA.912.G.8.2; MA.912.S.1.1, 2, 4, 5; MA.912.S.2.2; MA.912.S.3.6;

- 17.01 Compare and contrast common plant pests and their damages.
- 17.02 Diagram life cycles of insects, pests, and diseases.
- 17.03 Interpret the procedures and requirements for obtaining a restricted-use-pesticide operator's license.
- 17.04 Select, mix, and apply a no restricted chemical according to the label and local, state, federal and EPA regulations.
- 17.05 Describe biological, chemical and cultural methods of controlling plant pests.

18.0 Operate, maintain, and service facilities, tools, and equipment--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.10.3, 14,15, 16, 18; MA.912.A.1.1, 2, 3, 4, 5; MA.912.A.5.14; MA.912.A.10.1; MA.912.G.2.7; MA.912.G.4.1, 4, 5; MA.912.G.8.1

- 18.03 Demonstrate basic facility maintenance, installation, or repair. (e.g., welding, electricity, plumbing, fencing, construction)
- 18.04 Safely operate, maintain, service, and repair equipment.

19.0 Describe procedures for harvesting and marketing agricultural products--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.8.10; MA.912.A.1.1, 2, 4, 5; MA912.A.2.1, 2, 4, 5; MA.912.A.3.5; MA.912.A.10.1, 2; MA.912.G.2.7; MA.912.S.3.1, 2, 3

- 19.01 Determine maturity, condition, quality, and volume of products to be harvested.
- 19.02 Describe procedures for harvesting products.
- 19.03 Collect and interpret market reports and identify market outlets for agricultural products.
- 19.04 Organize a marketing program for agricultural products.
- 19.05 Assess kinds and types of storage facilities for agricultural products.
- 19.06 Grade, treat, pack, and/or store harvested products.

20.0 Apply principles of agribusiness finance--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.4.2; MA.912.A.1.1, 2, 3, 4, 5, 6, 8; MA.912.A.2.1, 2, 3, 7; MA.912.A.5.1, 4, 7; MA.912.A.10.1, 2; MA.912.F.3.4,5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17; MA.912.F.4.4, 6, 7

- 20.04 Explain the purposes and structures of contracts, leases, deeds, and insurance policies.
- 20.05 Maintain and interpret agribusiness financial records including depreciation, inventory, and budgets.

21.0 Demonstrate leadership, employability, communications, and human-relations skills--The student will be able to:

- 21.03 Complete a job application.

22.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0

- 22.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 22.03 Present information formally and informally for specific purposes and audiences. AF2.9

23.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 23.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4

24.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

- 24.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3



- 25.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 25.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 25.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 25.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 25.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 26.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 26.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 26.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 27.0 Use information technology tools--The students will be able to:
- 27.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 27.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 28.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 28.01 Describe the nature and types of business organizations. SY 1.0
  - 28.02 Explain the effect of key organizational systems on performance and quality.
  - 28.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 30.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 30.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 31.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 31.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 31.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 31.04 Interpret and explain written organizational policies and procedures. ELR 2.0

32.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

32.03 Examine licensing, certification, and industry credentialing requirements.

ECD 3.0

32.06 Identify and exhibit traits for retaining employment. ECD 7.0

32.07 Identify opportunities and research requirements for career advancement.

ECD 8.0

32.08 Research the benefits of ongoing professional development. ECD 9.0

33.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

33.04 Complete financial instruments for making deposits and withdrawals. FL3.2

33.05 Maintain financial records. FL3.3

33.06 Read and reconcile financial statements. FL3.4

33.07 Research, compare and contrast investment opportunities.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Forestry  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	<b>8118300</b>
CIP Number	0103049901
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	AGRICULTUR 1 @2 FORESTRY #7 AGRI RES #7
CTSO	FFA
SOC Codes	45-4011, 19-4093
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 forestry 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.

### **Program Structure**

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

When offered at the post secondary level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8106810	Agriscience Foundations 1	1 Credit		2
	8118310	Forestry and Natural Resources 2	1 Credit		2
	8118320	Forestry and Natural Resources 3	1 Credit	45-4011	2
B	8118330	Forestry 4	1 Credit	19-4093	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

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

FFA (secondary programs) 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

## **Articulation**

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

## **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

## **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fl DOE.org/schools/pdf/ListPracticalArtsCourses.pdf>.

## **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Describe the forestry and natural resources industry.
- 11.0 Practice forestry and natural resources safety.
- 12.0 Operate, maintain, and repair machinery, equipment, and facilities.
- 13.0 Identify the major ecosystems in Florida.
- 14.0 Monitor water resources.
- 15.0 Collect and test soil samples.
- 16.0 Assist in managing wildlife populations.
- 17.0 Assist in controlling and using fire in forests and other lands.
- 18.0 Assist in managing forest pests.
- 19.0 Identify applicable local, state, and federal rules and regulations and assistance programs.
- 20.0 Apply multi-use principles to forest and other lands.
- 21.0 Perform basic surveying operations.
- 22.0 Read and interpret aerial photographs and maps.
- 23.0 Collect and test water samples.
- 24.0 Analyze and interpret soil survey data.
- 25.0 Apply the principles of Best Management Practices (BMP).
- 26.0 Perform basic nursery operation activities.
- 27.0 Identify technological advances in the industry.
- 28.0 Identify wildlife population management practices.
- 29.0 Identify multi-use principles for forest and other lands.
- 30.0 Apply basic financial management skills.
- 31.0 Demonstrate leadership and employability skills.
- 32.0 Monitor air quality.
- 33.0 Apply the principles of basic nursery operations.
- 34.0 Assist in managing the urban forest.
- 35.0 Describe timber marketing procedures and techniques.
- 36.0 Apply business management skills and identify appropriate legal documents.
- 37.0 Measure trees and forest volume.
- 38.0 Perform preventive maintenance, checks, and services for forestry equipment.
- 39.0 Explain the basic silvicultural systems used in forest management.
- 40.0 Prescribe burning for forest management.
- 41.0 Demonstrate language arts knowledge and skills.
- 42.0 Demonstrate mathematics knowledge and skills.
- 43.0 Demonstrate science knowledge and skills.
- 44.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 45.0 Solve problems using critical thinking skills, creativity and innovation.
- 46.0 Use information technology tools.

- 47.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 48.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 49.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 50.0 Describe the importance of professional ethics and legal responsibilities.
- 51.0 Explain the importance of employability skill and entrepreneurship skills.
- 52.0 Demonstrate personal money-management concepts, procedures, and strategies.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.



03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills --The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8118310  
**Course Number:** Forestry and Natural Resources 2  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of career opportunities; safety; operation, maintenance and repair of machinery, equipment and facilities; soil testing, surveying; water resources; and financial management skills.

10.0 Describe the forestry and natural resources industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.19, 18, 20; SC.912.N.1.1, 4, 5; SC.912.N.1.4

- 10.01 Identify career and educational opportunities in the forestry and natural resources industries.
- 10.02 Describe the importance of forestry and natural resources.
- 10.03 Identify professional and interest organizations and trade journals in the forestry and natural resources industries.

11.0 Practice forestry and natural resources safety--The student will be able to:

- 11.01 Identify and eliminate hazards of the workplace.
- 11.02 Observe color-coded warnings in work areas and on equipment and machinery.
- 11.03 Demonstrate safety procedures and workplace "housekeeping" practices.
- 11.04 Identify safe and effective fire extinguishing techniques.
- 11.05 Apply minor first aid treatment and identify emergency procedures.
- 11.06 Safely handle and store flammable and nonrestricted chemicals.
- 11.07 Select personal safety equipment and appropriate clothing.
- 11.08 Operate machinery and equipment according to the safety recommendations of the manufacturers.

12.0 Operate, maintain, and repair machinery, equipment, and facilities--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.14, 17, 20

- 12.01 Use the equipment operator parts, and repair manuals.;
- 12.02 Service and maintain small gasoline engines.
- 12.03 Operate, service, and maintain tractors and equipment.
- 12.04 Dispose of waste products according to required procedures.
- 12.06 Use shop and lab instruments and equipment.
- 12.07 Perform minor welding repairs using arc and oxy-acetylene equipment.

14.0 Monitor water resources--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.16;  
SC.912.L.18.12; SC.912.P.12.2

14.01 Identify important physical and chemical properties of water.

14.02 Identify present and potential sources of water pollution.

15.0 Collect and test soil samples--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.11, 19;  
SC.912.N.1.4; SC.912.P.8.2, 3, 11;

15.01 Identify important physical and chemical properties of soil.

15.02 Collect soil samples representative of an area, complete soil data forms, and submit them for laboratory analysis.

15.03 Test soil for acidity or alkalinity and recommend proper soil additives to correct the pH level.

15.04 Determine the appropriate conservation management practices for planting a particular area.

15.05 Determine land classes according to soil classification standards.

20.0 Apply multi-use principles to forests and other lands--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13, 16, 17

20.01 Identify the types of land ownership.

21.0 Perform basic surveying operations--The student will be able to:

21.01 Make linear measurements and calculate an area of land.

21.02 Perform basic surveying operations.

21.03 Locate a land area, using a legal land description.

22.0 Read and interpret aerial photographs and maps--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13, 15, 17

22.01 Interpret the terms, symbols, and scales used on soil and topographic maps.

24.0 Analyze and interpret soil survey data--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, 6

24.01 Locate a designated site in the soil survey.

24.02 Analyze and interpret soil survey data.

26.0 Perform basic nursery operation activities--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7;  
SC.912.L.16.17; SC.912.L.17.4; SC.912.L.18.7

26.01 Identify methods of propagation.

- 26.02 Perform basic nursery operation activities, such as pruning, trimming, and fertilizing.
- 26.03 Maintain plants.
- 30.0 Apply basic financial management skills--The student will be able to:
  - 30.01 Complete basic financial records.
  - 30.02 Demonstrate the use of banking procedures.
- 31.0 Demonstrate leadership and employability skills--The student will be able to:
  - 31.01 Conduct group meetings, using parliamentary procedure and public speaking skills.
  - 31.02 Identify documents that may be required for a job application.
  - 31.03 Complete a job application form.
  - 31.04 Demonstrate competencies in job-interview techniques.
- 32.0 Monitor air quality--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.15, 16; SC.912.N.1.4; SC.912.P.8.2

  - 32.01 Identify important physical and chemical properties of air.
  - 32.02 Identify present and potential sources of air pollution.
  - 32.03 Collect representative air samples.
  - 32.04 Analyze and interpret lab results.
  - 32.05 Identify air pollution control equipment.
- 41.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 41.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 42.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 42.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 42.02 Construct charts/tables/graphs using functions and data. AF3.5
- 43.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 43.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 44.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 44.01 Locate, organize and reference written information from various sources. CM 3.0
  - 44.02 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 44.03 Apply active listening skills to obtain and clarify information. CM 7.0

- 45.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 45.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 45.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 46.0 Use information technology tools--The students will be able to:
- 46.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 46.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 47.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 47.01 Explain the impact of the global economy on business organizations
- 48.0 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:
- 48.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 48.02 Explain emergency procedures to follow in response to workplace accidents.
  - 48.03 Create a disaster and/or emergency response plan. SHE 2.0
- 49.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 49.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 49.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 50.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 50.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 51.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 51.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 51.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 51.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 51.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0

- 51.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 52.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
  - 52.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 52.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 52.03 Develop a personal budget and financial goals. FL3.1



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8118320  
**Course Number:** Forestry and Natural Resources 3  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of safety; operation, maintenance, and repair of machinery, equipment and facilities; ecosystems; water resources; wildlife populations; fire use and control; pest management; analyzing and interpreting data.

11.0 Practice forestry and natural resources safety--The student will be able to:

- 11.09 Comply with Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) safety rules and regulations.
- 11.10 Describe Florida's "Right-to-Know" law (as recorded in the Florida Statutes, Chapter 442).

12.0 Operate, maintain, and repair machinery, equipment, and facilities--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.14, 17, .20

- 12.04 Keep records of the maintenance and repair of equipment and machinery.
- 12.05 Prepare equipment for storage.
- 12.06 Maintain and repair facilities.

13.0 Identify the major ecosystems in Florida--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.7.4, 8; SC.912.L.17.4, 10, 16, 17

- 13.01 Define "ecosystem" and identify the major ecosystems in Florida.
- 13.02 Identify common plant and animal species of the major ecosystems.
- 13.03 Identify environmental factors affecting each ecosystem in Florida.
- 13.04 Identify habitats of the most threatened and endangered plant and animal species in Florida.
- 13.05 Identify the hydrologic cycle of and the major uses for water.

14.0 Monitor water resources--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.16; SC.912.L.18.12; SC.912.P.12.2

- 14.03 Determine stream flow.
- 14.04 Monitor water levels of rivers, streams, ponds, and lakes.
- 14.05 Identify and monitor erosion hazards and environmental quality.

16.0 Assist in managing wildlife populations--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.7.5;  
SC.912.L.17.6, 8

- 16.01 Prepare a brief report on the history of wildlife management in Florida.
- 16.02 Identify private, state, and federal agencies that are involved in animal wildlife conservation.
- 16.03 Interpret wildlife, game, and fishing laws, rules, and regulations.
- 16.04 Identify the pests, insects, and diseases of common wildlife species.
- 16.05 Identify the exotic plants and animals that threaten game and non-game species.

17.0 Assist in controlling and using fire in forests and other lands--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.7.5

- 17.01 Identify the major causes of wildfire.
- 17.02 Assist in determining fire danger in forests and other lands.
- 17.03 Describe personal safety procedures for forest fire fighters.
- 17.04 Identify and describe the use of basic tools for forest fire fighting.
- 17.05 Explain the uses of prescribed burning in forestry, natural resources, and wildlife management.
- 17.06 Identify the different types of burning assistance that are available through agencies or vendors.

18.0 Assist in managing forest pests--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.6

- 18.01 Identify common forest pests, insects, and diseases.
- 18.02 Assist with common forest pest control.
- 18.03 Assist with chemical, mechanical, and other controls of undesirable species.

19.0 Identify applicable local, state, and federal rules and regulations and assistance programs--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13,  
SC.912.L.17.15, SC.912.L.17.16, SC.912.L.17.17

- 19.01 Locate applicable portions of comprehensive plans.
- 19.02 Identify agencies affecting land and wildlife utilization.
- 19.03 Identify agencies regulating employee/employer relations (e.g., the Occupational Safety and Health Administration [OSHA]).
- 19.04 Identify public- and private-assistance programs for private-land owners.
- 19.05 Describe applicable local, state, and federal rules and regulations.

20.0 Apply multi-use principles to forests and other lands--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13, 16, 17

20.02 Assist in preparing a multi-use plan for forests and other lands.

22.0 Read and interpret aerial photographs and maps--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13, 15, 17

22.02 Use maps and aerial photographs for determining acreage.

22.03 Use aerial photographs to identify major timber types and land features.

23.0 Collect and test water samples--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.4;  
SC.912.P.8.11

23.01 Collect, store, and label water samples.

23.02 Determine the quality of water samples by measuring for pH, turbidity, dissolved solids, and dissolved oxygen.

24.0 Analyze and interpret soil survey data--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, 6

24.03 Apply soil survey information to silvicultural practices and environmental management.

25.0 Apply the principles of best management practices (BMP)--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.18.12

25.01 Define the terms used in best management practices (BMP).

25.02 Determine erosion and slope coefficients, using the BMP manual.

25.03 Solve problems in land use, applying the principles found in the BMP manual.

27.0 Identify technological advances in the industry--The student will be able to:

27.01 Identify satellite surveying operations and laser systems.

27.02 Identify satellite thermal infrared imagery.

27.03 Identify computer mapping systems and geographic information systems.

27.04 Use electronic communication devices.

27.05 Use personal information management (PIM) applications to increase workplace efficiency.

27.06 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.

27.07 Employ computer operations applications to access, create, manage, integrate, and store information.

27.08 Employ collaborative/groupware applications to facilitate group work.

28.0 Identify wildlife population management practices--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.15.4, 6, 13; SC.912.L.17.5, 6, 9, 13, 16, 17

28.01 Identify appropriate management practices for a wildlife habitat.

28.02 Identify species of Florida's common wildlife (land and aquatic) and classify them as game, non-game, endangered, or threatened.

29.0 Identify multi-use principles for forest and other lands--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.12, 13; SC.912.N.4.1

29.01 Identify legal responsibilities for private- and public-land owners when land is used by the public.

29.02 Identify the different types of leases and their necessary components.

30.0 Apply basic financial management skills--The student will be able to:

30.03 Calculate interest on loans.

30.04 Complete selected income tax return forms.

31.0 Demonstrate leadership and employability skills--The student will be able to:

31.05 Demonstrate knowledge of how to make job changes appropriately.

31.06 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.

31.07 Describe the importance of a drug free workplace and the industry policies regarding drug use.

31.08 Demonstrate appropriate responses to performance evaluations from an employer, a supervisor, or other persons in the workplace.

41.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0

41.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5

41.03 Present information formally and informally for specific purposes and audiences. AF2.9

42.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

42.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4

43.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

43.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

44.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

- 44.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 44.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 44.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 44.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 45.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 45.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 45.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 46.0 Use information technology tools--The students will be able to:
- 46.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 46.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 47.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 47.01 Describe the nature and types of business organizations. SY 1.0
  - 47.02 Explain the effect of key organizational systems on performance and quality.
  - 47.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 48.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 48.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 48.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 50.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 50.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 50.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 50.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 51.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 51.03 Examine licensing, certification, and industry credentialing requirements.  
ECD 3.0
- 51.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 51.07 Identify opportunities and research requirements for career advancement.  
ECD 8.0
- 51.08 Research the benefits of ongoing professional development. ECD 9.0
  
- 52.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
  - 52.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 52.05 Maintain financial records. FL3.3
  - 52.06 Read and reconcile financial statements. FL3.4
  - 52.07 Research, compare and contrast investment opportunities.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** 8118330  
**Course Number:** Forestry 4  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of urban forest; timber marketing; business management skills; measuring trees and forest volume; silvicultural systems; prescribed burning; preventative maintenance.

33.0 Apply the principles of basic nursery operations--The student will be able to:

- 33.01 Select the method of, and assist in, site preparation.
- 33.02 Care for seedlings from the nursery to planting.
- 33.03 Plant tree seedlings, using a hand or mechanical planter.
- 33.04 Explain the requirements for reforestation.

34.0 Assist in managing the urban forest--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.12, 13; SC.912.N.1.1; SC.912.N.4.1, 2

- 34.01 Assist in selecting, planting, and transplanting trees in the urban landscape.
- 34.02 Demonstrate proper tree pruning, trimming, and fertilization techniques.
- 34.03 Describe the procedure for an urban tree inventory.
- 34.04 Describe the basic requirements for a tree protection ordinance.
- 34.05 Develop a vegetative plan for improving wildlife habitat in urban areas.
- 34.06 Develop a plan for the basic maintenance of tree health.

35.0 Describe timber marketing procedures and techniques--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.6.2

- 35.01 Identify the products made from trees and other natural resources and their value.
- 35.02 Select and mark trees to be removed in timber stand improvement.
- 35.03 Conduct a simple cruise.
- 35.04 Calculate the volume and value of timber.
- 35.05 Identify the components of timber sales contracts.
- 35.06 Identify the methods of harvesting and erosion prevention.

36.0 Apply business management skills and identify appropriate legal documents--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13, 16, 17; SC.912.N.4.2

- 36.01 Identify 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 eligibility requirements for greenbelt, bluebelt, and homestead tax exemptions.
- 36.05 Interpret enterprise budgets and amortization tables.
- 36.06 Identify the characteristics of legal documents (such as contracts, deeds, and leases).

37.0 Measure trees and forest volume--The student will be able to:

- 37.01 Identify and describe the use of tree measuring tools and instruments, such as dendrometers, hypsometers, increment borers, prisms, volume tables, and logger's tape.
- 37.02 Measure trees and forests, using selected forest measurement tools.

38.0 Perform preventive maintenance, checks, and services for forestry equipment--The student will be able to:

- 38.01 Perform daily operator maintenance checks for equipment.
- 38.02 Determine the preventive maintenance procedures, using the equipment operator manuals.
- 38.03 Perform scheduled preventive maintenance procedures.
- 38.04 Interpret and perform operator's troubleshooting procedures as described in the operator's manual.
- 38.05 Keep records of the maintenance and servicing of equipment.

39.0 Explain the basic silvicultural systems used in forest management--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.11, 13, 16, 17, 19; SC.912.N.4.1, 2

- 39.01 Identify basic silvicultural systems.
- 39.02 Conduct a site evaluation.
- 39.03 Select tree species according to the site evaluation.
- 39.04 Explain the requirements for tree growth for effective forest management.
- 39.05 Determine site quality and growth rate for a timber stand.
- 39.06 Prepare a basic forest management plan, including cost and profit analyses.

40.0 Prescribe burning for forest management--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.7.5

- 40.01 Develop a plan for a prescribed burning, including permits, maps, and descriptions of desirable burning conditions and fire lines.
- 40.02 Prepare a smoke management plan.
- 40.03 Describe the requirements for obtaining different types of burning authorization and the applicable restrictions.
- 40.04 Prepare a prescribed burning authorization request.
- 40.05 Explain the effects of fuel characteristics and weather factors on fire behavior.



40.06 Identify the precautions to be followed in using fire as a management tool.

**Florida Department of Education  
Curriculum Framework**

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

Secondary – Career Preparatory	
Program Number	8121300
CIP Number	0101060510
Grade Level	9-12, 30, 31
Standard Length	6 credits
Teacher Certification	AGRICULTUR 1 @2 HORTICULT #7
CTSO	FFA
SOC Codes (all applicable)	37-3011, 37-1012
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 horticulture and landscape industries 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.

**Program Structure**

This program is a planned sequence of instruction consisting of a core and two 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
A	8106810	Agriscience Foundations 1	1 credit		2
	8121510	Introductory Horticulture 2	1 credit		2
	8121520	Horticultural Science 3	1 credit	37-3011	2
B	8121310	Landscape and Turf Science 4	1 credit		2
	8121320	Landscape and Turf Science 5	1 credit		2
	8121330	Landscape Operations 6	1 credit	37-1012	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential

Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

The Certified Horticulture Professional certification has a statewide articulation agreement approved by the Articulation Coordinating Committee. It articulates to the Landscape and Horticulture Technology (0101060500) program for six credits.

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

## **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to

<http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Describe the horticulture industry.
- 11.0 Identify and classify plants.
- 12.0 Propagate plants.
- 13.0 Identify growing media and apply fertilizers.
- 14.0 Irrigate plants and turf.
- 15.0 Describe pest control approaches.
- 16.0 Control plant growth.
- 17.0 Harvest, transport, and install plant materials.
- 18.0 Operate, repair, and maintain tools and equipment.
- 19.0 Demonstrate leadership, employability, communications, and human relations skills.
- 20.0 Describe the principles and requirements of plant growth.
- 21.0 Apply best management practices in the horticulture industry.
- 22.0 Identify safety procedures in the workplace.
- 23.0 Identify emerging technologies in the horticulture industry.
- 24.0 Apply principles of landscape design and maintenance.
- 25.0 Demonstrate language arts knowledge and skills.
- 26.0 Demonstrate mathematics knowledge and skills.
- 27.0 Demonstrate science knowledge and skills.
- 28.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 29.0 Solve problems using critical thinking skills, creativity and innovation.
- 30.0 Use information technology tools.
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 32.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 34.0 Describe the importance of professional ethics and legal responsibilities.
- 35.0 Explain the importance of employability skill and entrepreneurship skills.
- 36.0 Demonstrate personal money-management concepts, procedures, and strategies

- 37.0 Maintain tools and equipment.
- 38.0 Apply chemicals and calibrate spray equipment.
- 39.0 Classify plants and turfgrass.
- 40.0 Demonstrate fertilization skills.
- 41.0 Irrigate plants and turf.
- 42.0 Layout and install landscape and/or interiorscape.
- 43.0 Maintain landscape.
- 44.0 Maintain customer relations and observe follow-up procedures.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.



05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills --The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

**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.

10.0 Describe the horticulture industry--The student will be able to:

- 10.01 Describe the importance of horticulture to the American and global economies.
- 10.02 Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.
- 10.03 Describe the importance of horticulture to the environment.
- 10.04 Identify professional organizations and certifications for the horticultural industry.

11.0 Identify and classify plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2, 3, 7, 8, 10, 53; SC.912.L.15.4, 5, 6; SC; SC.L.912.18.7, 8, 9; MA.912.S.3.2

- 11.01 Identify plants by scientific and common names.
- 11.02 Classify plants botanically.

12.0 Propagate plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7, 8; SC.912.L.16.12, 17; MA.912.P.1.2

- 12.01 Identify propagating and growing facilities and structures.
- 12.02 Prepare propagation media.
- 12.03 Select and collect propagation materials.
- 12.04 Demonstrate propagation by sexual and asexual methods.
- 12.05 Demonstrate environmental controls for propagation materials.

13.0 Identify growing media and apply fertilizers--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.6.2, 4; SC.912.L.18.11; MA.912.A.2.1, MA.912.S.3.2

- 13.01 Identify soil and media materials.
- 13.02 Identify nutritional needs of plants.
- 13.03 Identify symptoms of nutritional deficiencies and toxicities of plants.
- 13.04 Identify types and kinds of fertilizers.

13.05 Identify methods of distributing fertilizers.

14.0 Irrigate plants and turf--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.18.12; MA.912.G.2.5, 7; MA.912.G.10.1

14.01 Identify water needs of plants.

14.02 Irrigate plants at recommended rates.

14.03 Identify the symptoms of excessive water and water stress in plants.

14.04 Describe the basic irrigation systems and principles used in the landscape and nursery.

15.0 Describe pest control approaches--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.9

15.01 Identify common pests of plants.

15.02 Describe life cycles of common pests of plants.

19.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:

19.01 Conduct group meetings using parliamentary procedure and public speaking skills.

20.0 Describe the principles and requirements of plant growth--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.7.1; SC.912.L.18.7, 9, 10; MA.912.A.3.5; MA.912.C.5.8; MA.912.A.10.1

20.01 Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis.

20.02 Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.

20.03 Explain the process of respiration and the flow of energy in plants.

20.04 Describe the influence of light and temperature on plant growth.

21.0 Apply best management practices in the horticulture industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.9, 11, 12, 13, 14, 15; MA.912.A.10.2; MA.912.G.1.1; 2, 4; MA.912.G.2.5, 7; MA.912.G.4.1, MA.912.G.8.6

21.01 Identify and apply Best Management Practices to reduce pollution and conserve water.

21.02 Identify and apply Best Management Practices for the design and installation of landscapes.

- 25.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
- 25.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 26.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 26.01 Demonstrate knowledge of arithmetic operations. AF3.2  
26.02 Construct charts/tables/graphs using functions and data. AF3.5
- 27.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 27.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 28.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 28.01 Locate, organize and reference written information from various sources. CM 3.0  
28.02 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0  
28.03 Apply active listening skills to obtain and clarify information. CM 7.0
- 29.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 29.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0  
29.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 30.0 Use information technology tools--The students will be able to:
- 30.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0  
30.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 31.01 Explain the impact of the global economy on business organizations
- 32.0 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:
- 32.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0  
32.02 Explain emergency procedures to follow in response to workplace accidents.  
32.03 Create a disaster and/or emergency response plan. SHE 2.0

- 33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 33.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 33.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 34.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 34.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 35.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 35.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 35.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 35.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 35.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 35.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 36.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 36.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 36.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 36.03 Develop a personal budget and financial goals. FL3.1

**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.

11.0 Identify and classify plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2, 3, 7, 8, 10, 53; SC.912.L.15.4, 5, 6; SC; SC.L.912.18.7, 8, 9; MA.912.S.3.2

- 11.03 Describe principles of plant biology and growth.
- 11.04 Explain the functional use of plants.
- 11.05 Describe the major classifications of plants based on life cycle.
- 11.06 Demonstrate the use of scientific and common names of plants including genus and specific epithet and cultivar.
- 11.07 Write scientific names.

13.0 Identify growing media and apply fertilizers--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.6.2, 4; SC.912.L.18.11; SC.912.P.8.5, 7, 11; MA.912.A.1.4, 5; MA.912.A.2.1, 4; MA.912.S.3.2

- 13.06 Interpret information on a label of fertilizer used in Florida.
- 13.07 Apply fertilizer and soil amendments.
- 13.08 Identify materials that are needed to raise pH and calculate the amount to apply to change the pH.
- 13.09 Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.
- 13.10 Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.

15.0 Describe pest control approaches--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.9; SC.912.L.17.6, 7, 12, 13, 15

- 15.03 Classify insects according to feeding habits.
- 15.04 Describe biological, chemical, and cultural methods of controlling plant pests.
- 15.05 Diagnose and outline a plan for controlling pests on a horticultural crop.

16.0 Control plant growth--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7, 15, 17, 31; SC.912.N.1.1, 7; MA.912.A.1.4; 5; MA.912.A.5.7

- 16.01 Identify methods of pruning plants.
- 16.02 Identify appropriate time to prune plants.
- 16.03 Identify and select pruning tools.
- 16.04 Identify Plant Growth Regulators and their use on horticulture and landscape plants.
- 16.05 Outline and use a record book for the use of a plant growth regulator on a horticultural or nursery crop.
- 16.06 Identify cultural, mechanical and chemical methods of weed management.

17.0 Harvest, transport, and install plant materials--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.4, 15; MA.912.G.1.1; MA.912.G.6.2, 7

- 17.01 Determine requirements for preserving plant viability.
- 17.02 Install containerized plant materials.
- 17.03 Select and prepare plants for transporting and transplanting.
- 17.04 Select horticultural products according to Florida grades and standards.

18.0 Operate, repair, and maintain tools and equipment--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.3.2

- 18.01 Perform equipment pre-operational check.
- 18.02 Identify, maintain, and operate hand tools and power tools.

19.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:

- 19.02 Identify acceptable work habits and personal characteristics.
- 19.03 Identify acceptable employee hygiene habits.
- 19.04 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
- 19.05 Describe the importance of industry certifications.

21.0 Apply best management practices in the horticulture industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.9, 11, 12, 13, 14, 15; MA.912.S.3.2

- 21.03 Identify and apply Best Management Practices on fertilizer recommendations for Florida plants and turf.
- 21.04 Identify and apply Best Management Practices on the management and handling of pesticides.



22.0 Identify safety procedures in the workplace--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.14, 17

- 22.01 Identify the common causes of accidents in the horticulture industry.
- 22.02 Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.
- 22.03 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.
- 22.04 Identify proper disposal of hazardous waste materials and biohazards specific to the horticulture industry.
- 22.05 Describe emergency procedures in the horticulture workplace.

23.0 Identify emerging technologies in the horticulture industry--The student will be able to:

This standard supports the following Sunshine State Standards SC.912.L.16.1, 2; SC.912.L.17.15, 17; MA.912.A.5.1, 4; MA.912.P.1.1

- 23.01 Investigate DNA and genetics applications in horticulture including the theory of probability.
- 23.02 Evaluate advances in biotechnology that impact horticulture. (e.g. transgenic crops, biological controls, micro propagation etc.).

24.0 Apply principles of landscape design and maintenance--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.17; MA.912.G.1.2, 4, 5, 7; MA.912.A.2.13; MA.912.A.3.1; MA.912.G.5.4, 7; MA.912.G.6.5; MA.912.G.8.6

- 24.01 Explain and demonstrate the use of line, form, texture and color in designing landscapes.
- 24.02 Explain and demonstrate the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.
- 24.03 Identify points of emphasis and major design areas in the residential landscape.
- 24.04 Identify plant selection for a residential landscape using Florida Friendly Landscape Principles.
- 24.05 Draw and design a landscape plan for a residential or commercial property.
- 24.06 Calculate materials needed according to the identified landscape plan.
- 24.07 Estimate labor requirements and cost-out a landscape plan.

25.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0

- 25.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 25.03 Present information formally and informally for specific purposes and audiences. AF2.9

26.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 26.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 27.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 27.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 28.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 28.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 28.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 28.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 28.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 29.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 29.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 29.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 30.0 Use information technology tools--The students will be able to:
  - 30.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 30.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 31.01 Describe the nature and types of business organizations. SY 1.0
  - 31.02 Explain the effect of key organizational systems on performance and quality.
  - 31.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 33.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 33.04 Employ mentoring skills to inspire and teach others. LT 5.0

- 34.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 31.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 31.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 31.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 35.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 34.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 34.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 34.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 34.08 Research the benefits of ongoing professional development. ECD 9.0
- 36.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 36.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 36.05 Maintain financial records. FL3.3
  - 36.06 Read and reconcile financial statements. FL3.4
  - 36.07 Research, compare and contrast investment opportunities.

**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.

37.0 Maintain tools and equipment--The student will be able to:

- 37.01 Maintain oil level in engines of power equipment.
- 37.02 Check and maintain tire air pressure on equipment.
- 37.03 Maintain fuel levels using proper fuel or fuel mixtures.
- 37.04 Operate manual transmissions.
- 37.05 Identify, operate, and maintain tractor and power equipment.

38.0 Apply chemicals and calibrate spray equipment--The student will be able to:

- 38.01 Select, mix, and apply a nonrestricted chemical according to the label and local, state, federal, and EPA regulations.
- 38.03 Identify and report insect and disease damage.

39.0 Classify plants and turfgrass--The student will be able to:

- 39.01 Classify plants as monocots or dicots.
- 39.02 Classify plants and turfgrass as annuals, biennials, and perennials.
- 39.03 Identify plants and turfgrass that are specific to a region.

40.0 Demonstrate fertilization skills--The students will be able to:

- 40.01 Develop a fertilization schedule.

41.0 Irrigate plants and turf--The student will be able to:

- 41.01 Identify various types of irrigation systems.
- 41.02 Install and maintain piping and water distribution components.
- 41.03 Install valves, timers, rain shut-offs, moisture sensors, and back flow prevention devices.

2012

**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.

37.0 Maintain tools and equipment--The student will be able to:

- 37.06 Service and maintain battery and electrical systems.
- 37.07 Perform minor tune-up on engines.
- 37.08 Load, secure, and transport equipment.
- 37.09 Demonstrate safety precautions while working with tools and equipment.

38.0 Apply chemicals and calibrate spray equipment--The student will be able to:

- 38.02 Calibrate spray and spread equipment.
- 38.03 Determine chemical compatibility.
- 38.04 Determine appropriate time frequency and method of chemical application.

39.0 Classify plants and turfgrass--The student will be able to:

- 39.04 Classify plants and turfgrass according to growth habit.
- 39.05 Identify poisonous plants.

40.0 Demonstrate fertilization skills--The students will be able to:

- 40.02 Determine rate of fertilizer application and calibration equipment.
- 40.03 Calibrate fertilizer equipment.

41.0 Irrigate plants and turf--The student will be able to:

- 41.04 Check and evaluate irrigation system performance.
- 41.05 Maintain irrigation system.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Landscape Operations 6  
**Course Number:** 8121330  
**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.

42.0 Layout and/or install landscape and/or interiorscape--The student will be able to:

- 42.01 Layout and install plants based on the landscape plan.
- 42.02 Prepare landscape and/or interiorscape.
- 42.03 Prepare final grade.
- 42.04 Install mulch and perform final cleanup.

43.0 Maintain landscape--The student will be able to:

- 43.01 Perform maintenance inspection of the project.
- 43.02 Determine water requirements and apply at proper rates.
- 43.03 Identify weeds and apply herbicides safely.
- 43.04 Determine fertilization requirements and apply at proper rates.
- 43.05 Identify plant pest and disease problems and apply corrective measures.
- 43.06 Trim and prune landscape plants.
- 43.07 Maintain turf viability; mow at proper height and frequency, blade edge, line trim, and remove trash.
- 43.08 Explain cause and effect of soil compaction and thatch buildups, and determine appropriate methods of correction.
- 43.09 Cultivate and mulch plants.
- 43.10 Brace and repair trees.
- 43.11 Provide protection for plants from adverse weather conditions.
- 43.12 Comply with local, state, and federal regulations regarding landscape maintenance and pesticide applications.
- 43.13 Demonstrate sanitation and safety practices when maintaining landscape.

44.0 Maintain customer relations and observe follow-up procedures--The student will be able to:

- 44.01 Conduct walk-through of project with client to assure satisfaction.
- 44.02 Identify current and future maintenance requirements.
- 44.03 Analyze project records for profitability and employee performance.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Sports and Recreational Turf Operations  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	<b>8121400</b>
CIP Number	0101060700
Grade Level	9-12, 30, 31
Standard Length	6 credits
Teacher Certification	AGRICULTUR 1 @2 HORTICULT #7
CTSO	FFA
SOC Codes (all applicable)	37-3011, 37-1012
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 horticulture and landscape industries 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.

**Program Structure**

This program is a planned sequence of instruction consisting of a core and two 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
A	8106810	Agriscience Foundations 1	1 credit		2
	8121510	Introductory Horticulture 2	1 credit		2
	8121520	Horticultural Science 3	1 credit	37-3011	2
B	8121310	Landscape and Turf Science 4	1 credit		2
	8121320	Landscape and Turf Science 5	1 credit		2
	8121410	Sports and Recreational Turf Operations 6	1 credit	37-1012	2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be



able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

The Certified Horticulture Professional certification has a statewide articulation agreement approved by the Articulation Coordinating Committee. It articulates to the Landscape and Horticulture Technology (0101060500) program for six credits.

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

## **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Describe the horticulture industry.
- 11.0 Identify and classify plants.
- 12.0 Propagate plants.
- 13.0 Identify growing media and apply fertilizers.
- 14.0 Irrigate plants and turf.
- 15.0 Describe pest control approaches.
- 16.0 Control plant growth.
- 17.0 Harvest, transport, and install plant materials.
- 18.0 Operate, repair, and maintain tools and equipment.
- 19.0 Demonstrate leadership, employability, communications, and human relations skills.
- 20.0 Describe the principles and requirements of plant growth.
- 21.0 Apply best management practices in the horticulture industry.
- 22.0 Identify safety procedures in the workplace.
- 23.0 Identify emerging technologies in the horticulture industry.
- 24.0 Apply principles of landscape design and maintenance.
- 25.0 Demonstrate language arts knowledge and skills.
- 26.0 Demonstrate mathematics knowledge and skills.
- 27.0 Demonstrate science knowledge and skills.
- 28.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 29.0 Solve problems using critical thinking skills, creativity and innovation.
- 30.0 Use information technology tools.
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 32.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 34.0 Describe the importance of professional ethics and legal responsibilities.
- 35.0 Explain the importance of employability skill and entrepreneurship skills.

- 36.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 37.0 Maintain tools and equipment.
- 38.0 Apply chemicals and calibrate spray equipment.
- 39.0 Classify plants and turfgrass.
- 40.0 Demonstrate fertilization skills.
- 41.0 Irrigate plants and turf.
- 42.0 Maintain sports turf
- 43.0 Maintain fairways, roughs, and traps.
- 44.0 Fertilize turf.
- 45.0 Establish turfgrass.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills --The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

**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.

10.0 Describe the horticulture industry--The student will be able to:

- 10.01 Describe the importance of horticulture to the American and global economies.
- 10.02 Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.
- 10.03 Describe the importance of horticulture to the environment.
- 10.04 Identify professional organizations and certifications for the horticultural industry.

11.0 Identify and classify plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2, 3, 7, 8, 10, 53; SC.912.L.15.4, 5, 6; SC; SC.L.912.18.7, 8, 9; MA.912.S.3.2

- 11.01 Identify plants by scientific and common names.
- 11.02 Classify plants botanically.

12.0 Propagate plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7, 8; SC.912.L.16.12, 17; MA.912.P.1.2

- 12.01 Identify propagating and growing facilities and structures.
- 12.02 Prepare propagation media.
- 12.03 Select and collect propagation materials.
- 12.04 Demonstrate propagation by sexual and asexual methods.
- 12.05 Demonstrate environmental controls for propagation materials.

13.0 Identify growing media and apply fertilizers--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.6.2, 4; SC.912.L.18.11; MA.912.A.2.1, MA.912.S.3.2

- 13.01 Identify soil and media materials.
- 13.02 Identify nutritional needs of plants.
- 13.03 Identify symptoms of nutritional deficiencies and toxicities of plants.
- 13.04 Identify types and kinds of fertilizers.



13.05 Identify methods of distributing fertilizers.

14.0 Irrigate plants and turf--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.18.12; MA.912.G.2.5, 7; MA.912.G.10.1

14.01 Identify water needs of plants.

14.02 Irrigate plants at recommended rates.

14.03 Identify the symptoms of excessive water and water stress in plants.

14.04 Describe the basic irrigation systems and principles used in the landscape and nursery.

15.0 Describe pest control approaches--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.9

15.01 Identify common pests of plants.

15.02 Describe life cycles of common pests of plants.

19.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:

19.01 Conduct group meetings using parliamentary procedure and public speaking skills.

20.0 Describe the principles and requirements of plant growth--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.7.1; SC.912.L.18.7, 9, 10; MA.912.A.3.5; MA.912.C.5.8; MA.912.A.10.1

20.01 Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis.

20.02 Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.

20.03 Explain the process of respiration and the flow of energy in plants.

20.04 Describe the influence of light and temperature on plant growth.

21.0 Apply best management practices in the horticulture industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.9, 11, 12, 13, 14, 15; MA.912.A.10.2; MA.912.G.1.1; 2, 4; MA.912.G.2.5, 7; MA.912.G.4.1, MA.912.G.8.6

21.01 Identify and apply Best Management Practices to reduce pollution and conserve water.

21.02 Identify and apply Best Management Practices for the design and installation of landscapes.

- 25.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
- 25.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 26.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 26.01 Demonstrate knowledge of arithmetic operations. AF3.2  
26.02 Construct charts/tables/graphs using functions and data. AF3.5
- 27.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
- 27.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 28.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
- 28.01 Locate, organize and reference written information from various sources. CM 3.0  
28.02 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0  
28.03 Apply active listening skills to obtain and clarify information. CM 7.0
- 29.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 29.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0  
29.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 30.0 Use information technology tools--The students will be able to:
- 30.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0  
30.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 31.01 Explain the impact of the global economy on business organizations
- 32.0 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:
- 32.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0  
32.02 Explain emergency procedures to follow in response to workplace accidents.  
32.03 Create a disaster and/or emergency response plan. SHE 2.0

33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

- 33.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 33.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0

34.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

- 34.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0

35.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 35.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 35.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 35.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 35.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 35.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

36.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 36.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 36.02 Describe the effect of money management on personal and career goals. FL 3.0
- 36.03 Develop a personal budget and financial goals. FL3.1

**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.

11.0 Identify and classify plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2, 3, 7, 8, 10, 53; SC.912.L.15.4, 5, 6; SC; SC.L.912.18.7, 8, 9; MA.912.S.3.2

- 11.03 Describe principles of plant biology and growth.
- 11.04 Explain the functional use of plants.
- 11.05 Describe the major classifications of plants based on life cycle.
- 11.06 Demonstrate the use of scientific and common names of plants including genus and specific epithet and cultivar.
- 11.07 Write scientific names.

13.0 Identify growing media and apply fertilizers--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.6.2, 4; SC.912.L.18.11; SC.912.P.8.5, 7, 11; MA.912.A.1.4, 5; MA.912.A.2.1, 4; MA.912.S.3.2

- 13.06 Interpret information on a label of fertilizer used in Florida.
- 13.07 Apply fertilizer and soil amendments.
- 13.08 Identify materials that are needed to raise pH and calculate the amount to apply to change the pH.
- 13.09 Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.
- 13.10 Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.

15.0 Describe pest control approaches--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.9; SC.912.L.17.6, 7, 12, 13, 15

- 15.03 Classify insects according to feeding habits.
- 15.04 Describe biological, chemical, and cultural methods of controlling plant pests.
- 15.05 Diagnose and outline a plan for controlling pests on a horticultural crop.

16.0 Control plant growth--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7, 15, 17, 31; SC.912.N.1.1, 7; MA.912.A.1.4; 5; MA.912.A.5.7

- 16.01 Identify methods of pruning plants.
- 16.02 Identify appropriate time to prune plants.
- 16.03 Identify and select pruning tools.
- 16.04 Identify Plant Growth Regulators and their use on horticulture and landscape plants.
- 16.05 Outline and use a record book for the use of a plant growth regulator on a horticultural or nursery crop.
- 16.06 Identify cultural, mechanical and chemical methods of weed management.

17.0 Harvest, transport, and install plant materials--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.4, 15; MA.912.G.1.1; MA.912.G.6.2, 7

- 17.01 Determine requirements for preserving plant viability.
- 17.02 Install containerized plant materials.
- 17.03 Select and prepare plants for transporting and transplanting.
- 17.04 Select horticultural products according to Florida grades and standards.

18.0 Operate, repair, and maintain tools and equipment--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.3.2

- 18.01 Perform equipment pre-operational check.
- 18.02 Identify, maintain, and operate hand tools and power tools.

19.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:

- 19.02 Identify acceptable work habits and personal characteristics.
- 19.03 Identify acceptable employee hygiene habits.
- 19.04 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
- 19.05 Describe the importance of industry certifications.

21.0 Apply best management practices in the horticulture industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.9, 11, 12, 13, 14, 15; MA.912.S.3.2

- 21.03 Identify and apply Best Management Practices on fertilizer recommendations for Florida plants and turf.
- 21.04 Identify and apply Best Management Practices on the management and handling of pesticides.

22.0 Identify safety procedures in the workplace--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.14, 17

- 22.01 Identify the common causes of accidents in the horticulture industry.
- 22.02 Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.
- 22.03 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.
- 22.04 Identify proper disposal of hazardous waste materials and biohazards specific to the horticulture industry.
- 22.05 Describe emergency procedures in the horticulture workplace.

23.0 Identify emerging technologies in the horticulture industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.16.1, 2; SC.912.L.17.15, 17; MA.912.A.5.I, 4; MA.912.P.1.1

- 23.01 Investigate DNA and genetics applications in horticulture including the theory of probability.
- 23.02 Evaluate advances in biotechnology that impact horticulture. (e.g. transgenic crops, biological controls, micro propagation etc.).

24.0 Apply principles of landscape design and maintenance--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.17; MA.912.G.1.2, 4, 5, 7; MA.912.A.2.13; MA.912.A.3.1; MA.912.G.5.4, 7; MA.912.G.6.5; MA.912.G.8.6

- 24.01 Explain and demonstrate the use of line, form, texture and color in designing landscapes.
- 24.02 Explain and demonstrate the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.
- 24.03 Identify points of emphasis and major design areas in the residential landscape.
- 24.04 Identify plant selection for a residential landscape using Florida Friendly Landscape Principles.
- 24.05 Draw and design a landscape plan for a residential or commercial property.
- 24.06 Calculate materials needed according to the identified landscape plan.
- 24.07 Estimate labor requirements and cost-out a landscape plan.

25.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0

- 25.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 25.03 Present information formally and informally for specific purposes and audiences. AF2.9

26.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 26.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 27.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 27.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 28.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 28.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 28.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 28.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 28.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 29.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 29.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 29.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 30.0 Use information technology tools--The students will be able to:
  - 30.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 30.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 31.01 Describe the nature and types of business organizations. SY 1.0
  - 31.02 Explain the effect of key organizational systems on performance and quality.
  - 31.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 33.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 33.04 Employ mentoring skills to inspire and teach others. LT 5.0

- 34.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 31.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 31.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 31.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 35.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 34.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 34.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 34.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 34.08 Research the benefits of ongoing professional development. ECD 9.0
- 36.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 36.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 36.05 Maintain financial records. FL3.3
  - 36.06 Read and reconcile financial statements. FL3.4
  - 36.07 Research, compare and contrast investment opportunities.



**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.

37.0 Maintain tools and equipment--The student will be able to:

- 37.01 Maintain oil level in engines of power equipment.
- 37.02 Check and maintain tire air pressure on equipment.
- 37.03 Maintain fuel levels using proper fuel or fuel mixtures.
- 37.04 Operate manual transmissions.
- 37.05 Identify, operate, and maintain tractor and power equipment.

38.0 Apply chemicals and calibrate spray equipment--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.15, 16, 17

- 38.01 Select, mix, and apply a nonrestricted chemical according to the label and local, state, federal, and EPA regulations.
- 38.02 Identify and report insect and disease damage.

39.0 Classify plants and turfgrass--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.5, 7, 10, 53; SC.912.L.15.4, 6; SC.912.L.17.7

- 39.01 Classify plants as monocots or dicots.
- 39.02 Classify plants and turfgrass as annuals, biennials, and perennials.
- 39.03 Identify plants and turfgrass that are specific to a region.

40.0 Demonstrate fertilization skills--The students will be able to:

- 40.01 Develop a fertilization schedule.

41.0 Irrigate plants and turf--The student will be able to:

- 41.01 Identify various types of irrigation systems.
- 41.02 Install and maintain piping and water distribution components.
- 41.03 Install valves, timers, rain shut-offs, moisture sensors, and back flow prevention devices.

**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.

37.0 Maintain tools and equipment--The student will be able to:

- 37.06 Service and maintain battery and electrical systems.
- 37.07 Perform minor tune-up on engines.
- 37.08 Load, secure, and transport equipment.
- 37.09 Demonstrate safety precautions while working with tools and equipment.

38.0 Apply chemicals and calibrate spray equipment--The student will be able to:

- 38.03 Calibrate spray and spread equipment.
- 38.04 Determine chemical compatibility.
- 38.05 Determine appropriate time frequency and method of chemical application.

39.0 Classify plants and turfgrass--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.5, 7, 10, 53; SC.912.L.15.4, 6; SC.912.L.17.7

- 39.04 Classify plants and turfgrass according to growth habit.
- 39.05 Identify poisonous plants.

40.0 Demonstrate fertilization skills--The students will be able to:

- 40.02 Determine rate of fertilizer application and calibration equipment.
- 40.03 Calibrate fertilizer equipment.

41.0 Irrigate plants and turf--The student will be able to:

- 41.04 Check and evaluate irrigation system performance.
- 41.05 Maintain irrigation system.

**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 maintenance of greens and tees; maintenance of fairways, roughs and traps; fertilization of turf and establishing turfgrass.

42.0 Maintain sports turf--The student will be able to:

- 42.01 Mow sport turf with reel mowers.
- 42.02 Relocate cups and markers.
- 42.03 Irrigate turf.
- 42.04 Verticut turf.
- 42.05 Aerate turf and remove debris.
- 42.06 Repair ball marks on greens.

43.0 Maintain fairways, roughs, and traps--The student will be able to:

- 43.01 Irrigate fairways.
- 43.02 Repair divots.
- 43.03 Add sand to traps.
- 43.04 Rake and trim sand traps.
- 43.05 Edge sand traps.

44.0 Fertilize turf--The student will be able to:

- 44.01 Apply top dressing.
- 44.02 Overseed turf.
- 44.03 Apply fertilizer.

45.0 Establish turfgrass--The student will be able to:

- 45.01 Level seedbed.
- 45.02 Plant turf by sprigs, plugs or sod.
- 45.03 Remove sod with sod cutter.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Horticulture Science and Services  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	<b>8121600</b>
CIP Number	0101060610
Grade Level	9-12, 30, 31
Standard Length	6 credits
Teacher Certification	AGRICULTUR 1 @2 HORTICULT #7
CTSO	FFA
SOC Codes (all applicable)	45-2092, 11.9011.01
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 horticulture and landscape industries 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.

**Program Structure**

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
A	8106810	Agriscience Foundations 1	1 credit	45-2092	2
	8121510	Introductory Horticulture 2	1 credit		2
	8121520	Horticultural Science 3	1 credit		2
B	8121610	Horticulture Science and Services 4	1 credit	11.9011.01	2
	8121620	Horticulture Science and Services 5	1 credit		2
	8121630	Horticulture Science and Services 6	1 credit		2

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

## **Articulation**

The Certified Horticulture Professional certification has a statewide articulation agreement approved by the Articulation Coordinating Committee. It articulates to the Landscape and Horticulture Technology (0101060500) program for six credits.

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

## **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

## **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to

<http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

## Standards

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Describe the horticulture industry.
- 11.0 Identify and classify plants.
- 12.0 Propagate plants.
- 13.0 Identify growing media and apply fertilizers.
- 14.0 Irrigate plants and turf.
- 15.0 Describe pest control approaches.
- 16.0 Control plant growth.
- 17.0 Harvest, transport, and install plant materials.
- 18.0 Operate, repair, and maintain tools and equipment.
- 19.0 Demonstrate leadership, employability, communications, and human relations skills.
- 20.0 Describe the principles and requirements of plant growth.
- 21.0 Apply best management practices in the horticulture industry.
- 22.0 Identify safety procedures in the workplace.
- 23.0 Identify emerging technologies in the horticulture industry.
- 24.0 Apply principles of landscape design and maintenance.
- 25.0 Demonstrate language arts knowledge and skills.
- 26.0 Demonstrate mathematics knowledge and skills.
- 27.0 Demonstrate science knowledge and skills.
- 28.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 29.0 Solve problems using critical thinking skills, creativity and innovation.
- 30.0 Use information technology tools.
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 32.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 34.0 Describe the importance of professional ethics and legal responsibilities.
- 35.0 Explain the importance of employability skill and entrepreneurship skills.
- 36.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 37.0 Identify and classify plants.
- 38.0 Control pests.
- 39.0 Operate, repair, and maintain tools and equipment.
- 40.0 Prepare growing media.

Revised: 3/11/2011

- 41.0 Irrigate plants.
- 42.0 Fertilize plant materials.
- 43.0 Maintain and analyze records



**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills --The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.

**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.

10.0    Describe the horticulture industry--The student will be able to:

- 10.01 Describe the importance of horticulture to the American and global economies.
- 10.02 Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.
- 10.03 Describe the importance of horticulture to the environment.
- 10.04 Identify professional organizations and certifications for the horticultural industry.

11.0    Identify and classify plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2, 3, 7, 8, 10, 53; SC.912.L.15.4, 5, 6; SC; SC.L.912.18.7, 8, 9; MA.912.S.3.2

- 11.01 Identify plants by scientific and common names.
- 11.02 Classify plants botanically.

12.0    Propagate plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7, 8; SC.912.L.16.12, 17; MA.912.P.1.2

- 12.01 Identify propagating and growing facilities and structures.
- 12.02 Prepare propagation media.
- 12.03 Select and collect propagation materials.
- 12.04 Demonstrate propagation by sexual and asexual methods.
- 12.05 Demonstrate environmental controls for propagation materials.

13.0    Identify growing media and apply fertilizers--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.6.2, 4; SC.912.L.18.11; MA.912.A.2.1, MA.912.S.3.2

- 13.01 Identify soil and media materials.
- 13.02 Identify nutritional needs of plants.
- 13.03 Identify symptoms of nutritional deficiencies and toxicities of plants.
- 13.04 Identify types and kinds of fertilizers.

13.05 Identify methods of distributing fertilizers.

14.0 Irrigate plants and turf--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.18.12; MA.912.G.2.5, 7; MA.912.G.10.1

14.01 Identify water needs of plants.

14.02 Irrigate plants at recommended rates.

14.03 Identify the symptoms of excessive water and water stress in plants.

14.04 Describe the basic irrigation systems and principles used in the landscape and nursery.

15.0 Describe pest control approaches--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.9

15.01 Identify common pests of plants.

15.02 Describe life cycles of common pests of plants.

19.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:

19.01 Conduct group meetings using parliamentary procedure and public speaking skills.

20.0 Describe the principles and requirements of plant growth--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.7.1; SC.912.L.18.7, 9, 10; MA.912.A.3.5; MA.912.C.5.8; MA.912.A.10.1

20.01 Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis.

20.02 Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.

20.03 Explain the process of respiration and the flow of energy in plants.

20.04 Describe the influence of light and temperature on plant growth.

21.0 Apply best management practices in the horticulture industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.9, 11, 12, 13, 14, 15; MA.912.A.10.2; MA.912.G.1.1; 2, 4; MA.912.G.2.5, 7; MA.912.G.4.1, MA.912.G.8.6

21.01 Identify and apply Best Management Practices to reduce pollution and conserve water.

21.02 Identify and apply Best Management Practices for the design and installation of landscapes.

- 25.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 25.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 26.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 26.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 26.02 Construct charts/tables/graphs using functions and data. AF3.5
- 27.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 27.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 28.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 28.01 Locate, organize and reference written information from various sources. CM 3.0
  - 28.02 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 28.03 Apply active listening skills to obtain and clarify information. CM 7.0
- 29.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 29.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 29.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 30.0 Use information technology tools--The students will be able to:
  - 30.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 30.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 31.01 Explain the impact of the global economy on business organizations
- 32.0 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:
  - 32.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 32.02 Explain emergency procedures to follow in response to workplace accidents.
  - 32.03 Create a disaster and/or emergency response plan. SHE 2.0

- 33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 33.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 33.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 34.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 34.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 35.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 35.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 35.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 35.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 35.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 35.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 36.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 36.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 36.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 36.03 Develop a personal budget and financial goals. FL3.1



**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.

11.0 Identify and classify plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.2, 3, 7, 8, 10, 53; SC.912.L.15.4, 5, 6; SC; SC.L.912.18.7, 8, 9; MA.912.S.3.2

- 11.03 Describe principles of plant biology and growth.
- 11.04 Explain the functional use of plants.
- 11.05 Describe the major classifications of plants based on life cycle.
- 11.06 Demonstrate the use of scientific and common names of plants including genus and specific epithet and cultivar.
- 11.07 Write scientific names.

13.0 Identify growing media and apply fertilizers--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.6.2, 4; SC.912.L.18.11; SC.912.P.8.5, 7, 11; MA.912.A.1.4, 5; MA.912.A.2.1, 4; MA.912.S.3.2

- 13.06 Interpret information on a label of fertilizer used in Florida.
- 13.07 Apply fertilizer and soil amendments.
- 13.08 Identify materials that are needed to raise pH and calculate the amount to apply to change the pH.
- 13.09 Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.
- 13.10 Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.

15.0 Describe pest control approaches--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.9; SC.912.L.17.6, 7, 12, 13, 15

- 15.03 Classify insects according to feeding habits.
- 15.04 Describe biological, chemical, and cultural methods of controlling plant pests.
- 15.05 Diagnose and outline a plan for controlling pests on a horticultural crop.

16.0 Control plant growth--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7, 15, 17, 31; SC.912.N.1.1, 7; MA.912.A.1.4; 5; MA.912.A.5.7

- 16.01 Identify methods of pruning plants.
- 16.02 Identify appropriate time to prune plants.
- 16.03 Identify and select pruning tools.
- 16.04 Identify Plant Growth Regulators and their use on horticulture and landscape plants.
- 16.05 Outline and use a record book for the use of a plant growth regulator on a horticultural or nursery crop.
- 16.06 Identify cultural, mechanical and chemical methods of weed management.

17.0 Harvest, transport, and install plant materials--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.4, 15; MA.912.G.1.1; MA.912.G.6.2, 7

- 17.01 Determine requirements for preserving plant viability.
- 17.02 Install containerized plant materials.
- 17.03 Select and prepare plants for transporting and transplanting.
- 17.04 Select horticultural products according to Florida grades and standards.

18.0 Operate, repair, and maintain tools and equipment--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.3.2

- 18.01 Perform equipment pre-operational check.
- 18.02 Identify, maintain, and operate hand tools and power tools.

19.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:

- 19.02 Identify acceptable work habits and personal characteristics.
- 19.03 Identify acceptable employee hygiene habits.
- 19.04 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
- 19.05 Describe the importance of industry certifications.

21.0 Apply best management practices in the horticulture industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.9, 11, 12, 13, 14, 15; MA.912.S.3.2

- 21.03 Identify and apply Best Management Practices on fertilizer recommendations for Florida plants and turf.
- 21.04 Identify and apply Best Management Practices on the management and handling of pesticides.

22.0 Identify safety procedures in the workplace--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.14, 17

- 22.01 Identify the common causes of accidents in the horticulture industry.
- 22.02 Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.
- 22.03 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.
- 22.04 Identify proper disposal of hazardous waste materials and biohazards specific to the horticulture industry.
- 22.05 Describe emergency procedures in the horticulture workplace.

23.0 Identify emerging technologies in the horticulture industry--The student will be able to:

This standard supports the following Sunshine State Standards SC.912.L.16.1, 2; SC.912.L.17.15, 17; MA.912.A.5.1, 4; MA.912.P.1.1

- 23.01 Investigate DNA and genetics applications in horticulture including the theory of probability.
- 23.02 Evaluate advances in biotechnology that impact horticulture. (e.g. transgenic crops, biological controls, micro propagation etc.).

24.0 Apply principles of landscape design and maintenance--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.17; MA.912.G.1.2, 4, 5, 7; MA.912.A.2.13; MA.912.A.3.1; MA.912.G.5.4, 7; MA.912.G.6.5; MA.912.G.8.6

- 24.01 Explain and demonstrate the use of line, form, texture and color in designing landscapes.
- 24.02 Explain and demonstrate the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.
- 24.03 Identify points of emphasis and major design areas in the residential landscape.
- 24.04 Identify plant selection for a residential landscape using Florida Friendly Landscape Principles.
- 24.05 Draw and design a landscape plan for a residential or commercial property.
- 24.06 Calculate materials needed according to the identified landscape plan.
- 24.07 Estimate labor requirements and cost-out a landscape plan.

25.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0

- 25.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 25.03 Present information formally and informally for specific purposes and audiences. AF2.9

26.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

- 26.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 27.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 27.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 28.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 28.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 28.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 28.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 28.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 29.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 29.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 29.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 30.0 Use information technology tools--The students will be able to:
  - 30.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 30.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 31.01 Describe the nature and types of business organizations. SY 1.0
  - 31.02 Explain the effect of key organizational systems on performance and quality.
  - 31.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 33.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 33.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 33.04 Employ mentoring skills to inspire and teach others. LT 5.0

- 34.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 31.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 31.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 31.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 35.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 34.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 34.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 34.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 34.08 Research the benefits of ongoing professional development. ECD 9.0
- 36.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 36.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 36.05 Maintain financial records. FL3.3
  - 36.06 Read and reconcile financial statements. FL3.4
  - 36.07 Research, compare and contrast investment opportunities.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Horticulture Science and Services 4  
**Course Number:** 8121610  
**Course Credit:** 1

**Course Description:**

This course is designed to further develop competencies in the areas of plant identification and classification; growing media; irrigation system set up; and maintaining and analyzing records including production costs.

37.0 Identify and classify plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7, 10, 31, 53; SC.912.L.15.4, 5, 6; SC.912.L.16.1, 2, 3, 14, 17; SC.912.L.17.7

- 37.01 Classify plants as monocots or dicots.
- 37.02 Classify plants as annuals, biennials, and perennials.
- 37.05 Prepare propagation materials (seeds, cuttings, etc.) for planting.
- 37.06 Demonstrate sanitation and safety practices when propagating.

39.0 Operate, repair, and maintain tools and equipment--The student will be able to:

- 39.01 Identify, operate, and maintain tractor and power equipment.

40.0 Prepare growing media--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.8.11; SC.912.L.14.6

- 40.01 Sterilize rooting, potting, and growing media.
- 40.02 Adjust pH and nutritional levels of media.
- 40.03 Fill and level benches and pots with media.
- 40.04 Demonstrate sanitation practices when handling and storing plant media materials.

41.0 Irrigate plants--The student will be able to:

- 41.01 Set up an irrigation system for a propagation area.
- 41.02 Set up an irrigation system for a growing structure.
- 41.03 Set up an irrigation system for a retail display.

43.0 Maintain and analyze records--The student will be able to:

- 43.05 Maintain current plant inventory.
- 43.06 Maintain job records, daily log sheets, and inventory.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Horticulture Science and Services 5  
**Course Number:** 8121620  
**Course Credit:** 1

**Course Description:**

This course is designed to further develop competencies in the areas of identifying and evaluating IPM practices; maintaining and repairing irrigation systems; analyzing and evaluating fertilizer usage.

37.0 Identify and classify plants--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.7, 10, 31, 53; SC.912.L.15.4, 5, 6; SC.912.L.16.1, 2, 3, 14, 17; SC.912.L.17.7

- 37.03 Identify plants appropriate to a region.
- 37.04 Classify plants according to growth habit.
- 37.05 Supply growth stimulants to propagation materials
- 37.08 Prepare flats and seedbeds and plant seeds.

38.0 Control pests--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13, 15, 16, 17; SC.912.N.1.1, 3, 4

- 38.01 Report insect and disease damage.
- 38.02 Identify chemical spray damage.

41.0 Irrigate plants--The student will be able to:

- 41.05 Identify and use various types of irrigation systems (low volume, ebb and flow, drip, mat, re-circulating, etc.).

42.0 Fertilize plant materials--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.16; SC.912.N.1.6; SC.912.P.12.12

- 42.01 Collect soil and leaf tissue samples for analysis.
- 42.02 Demonstrate proper handling and storage of fertilizers, observing safety precautions.
- 42.03 Evaluate, operate, and maintain fertilizer distribution equipment.

43.0 Maintain and analyze records--The student will be able to:

- 43.04 Prepare and maintain financial records using computer software.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Horticulture Science and Services 6  
**Course Number:** 8121630  
**Course Credit:** 1

**Course Description:**

This course is designed to further develop competencies in the areas of irrigation; growing media; planting beds and sites; propagation; marketing; repair and maintenance of nursery equipment and facilities.

38.0 Control pests--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.13, 15, 16, 17; SC.912.N.1.1, 3, 4

38.03 Select proper IPM practices (biological, chemical and physical) for control of insects, diseases, vertebrates and weeds.

38.04 Evaluate the efficacy and phytotoxicity of a chemical prior to inclusion in a growing program.

39.0 Operate, repair, and maintain tools and equipment--The student will be able to:

39.02 Load, secure, and transport equipment.

41.0 Irrigate plants--The student will be able to:

41.04 Maintain and repair an irrigation system.

42.0 Fertilize plant materials--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.17.16; SC.912.N.1.6; SC.912.P.12.12

42.04 Interpret and evaluate the results of soil and leaf tissue analysis and determine corrective actions.

42.05 Develop a fertilization schedule for various plant species.

42.06 Determine rate of fertilizer application.

43.0 Maintain and analyze records--The student will be able to:

43.01 Analyze and maintain production and sales records.

43.02 Determine plant production costs.

43.03 Prepare a budget.



2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Food Science Applications  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	8129200
CIP Number	0102030100
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2
CTSO	FFA
SOC Codes (all applicable)	19-4011.02
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 food science sector of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in the application of biological, chemical, and physical principles of converting raw agricultural products into processed forms for human consumption and the storage of these products, human physiology and nutrition, food chemistry, agricultural products processing, food additives, food preparation and packaging, food storage and distribution, and related aspects of human health and safety including toxicology and pathology.

## Program Structure

This program is a planned sequence of instruction consisting of three courses and 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
	8106810	Agriscience Foundations 1	1 credit		2
	8129210	Food Science Applications 2	1 credit		2
A	8129220	Food Science Applications 3	1 credit	19-4011.02	2

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Identify the impact of food preservation on the development of civilizations.
- 11.0 Identify the importance of raw agricultural products to the food science industry.
- 12.0 Analyze the components of the marketing chain.
- 13.0 Discuss food product distribution.
- 14.0 Discuss the role of regulatory agencies in the food industry.
- 15.0 Describe the economic and cultural impact of a global food market
- 16.0 Describe how proteins, carbohydrates, lipids, vitamins and minerals are digested and how food preparation impacts nutritional value and quality.
- 17.0 Describe the biological composition and processing of foods.
- 18.0 Describe the chemical composition and processing of foods.
- 19.0 Describe the physical composition and processing of foods.
- 20.0 Discuss environmental issues impacting the production and processing of foods.
- 21.0 Demonstrate leadership, employability, communications and human relations skills.
- 22.0 Write lab reports to record, interpret and evaluate data.
- 23.0 Explain the process of food product development.
- 24.0 Demonstrate language arts knowledge and skills.
- 25.0 Demonstrate mathematics knowledge and skills.
- 26.0 Demonstrate science knowledge and skills.
- 27.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 28.0 Solve problems using critical thinking skills, creativity and innovation.
- 29.0 Use information technology tools.
- 30.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 31.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 32.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 33.0 Describe the importance of professional ethics and legal responsibilities.
- 34.0 Explain the importance of employability skill and entrepreneurship skills.
- 35.0 Demonstrate personal money-management concepts, procedures, and strategies.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Agriscience Foundations I  
**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.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.1, 3

- 01.01 Investigate the origin and history of agriculture and its relationship to science and technology.
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 Practice agriscience safety skills and procedures --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.012.A.2.1, 2;

- 02.01 Identify the common causes and prevention of accidents in agriscience operations.
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Evaluate the food safety responsibilities that occur along the food supply chain.
- 02.04 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.
- 02.05 Identify proper disposal of hazardous waste materials and biohazards.
- 02.06 Describe emergency procedures.

03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.S.3.1, 9; MA.912.S.4.2; MA.912.S.5.1, 3; MA.912.S.5.2, 3, 4, 5

- 03.01 Employ scientific measurement skills.
- 03.02 Demonstrate safe and effective use of common laboratory equipment.
- 03.03 Identify the parts and functions of plant and animal cells.
- 03.04 Describe the phases of cell reproduction.
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
- 03.06 Interpret, analyze, and report data.
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

04.0 Apply environmental principles to the agricultural industry --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 04.01 Research how different climactic and geological activity influences agriculture.
- 04.02 Describe various ecosystems as they relate to the agriculture industry.
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
- 04.04 Identify regulatory agencies that impact agricultural practices.
- 04.05 Apply Best Management Practices that enhance the natural environment.
- 04.06 Identify conservation practices related to natural resources.

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

This standard supports the following Sunshine State Standards: 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; MA.912.A.2.1; MA.912.S.3.2

- 05.01 Identify and describe the specializations within the plant science industry.
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
- 05.03 Examine the processes of plant growth including photosynthesis and respiration.
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
- 05.05 Analyze information from a fertilizer label.
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
- 05.07 Investigate the impacts of various pests and propose solutions for their control.
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.

05.09 Explore career opportunities in plant science.

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

This standard supports the following Sunshine State Standards: 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

- 06.01 Explain the economic importance of animals and the products obtained from animals.
- 06.02 Categorize animals according to use, type, breed, and scientific classification.
- 06.03 Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
- 06.04 Compare basic internal & external anatomy of animals.
- 06.05 Demonstrate scientific practices in the management, health, safety, and technology of the animal agriculture.
- 06.06 Discuss animal welfare issues.
- 06.07 Investigate the nature and properties of food, fiber, and by-products from animals.
- 06.08 Explore career opportunities in animal science.

07.0 Demonstrate the use of agriscience tools, equipment, and instruments --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.4; SC.912.P.12.2; SC.912.P.12.3 SC.912.P.12.4; SC.912.P.12.9; MA.912.A.1.4, 5, 8; MA.912.A.2.1; MA.912.G.3.1; MA.912.G.8.6; MA.912.S.3.2

- 07.01 Select and demonstrate proper use of agriscience tools, equipment, and instruments.
- 07.02 Examine various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.

08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.4, 5; MA.912.F.5.1, 2, 7

- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
- 08.03 Enhance oral communications through telephone, interview and presentation skills.
- 08.04 Enhance written communication by developing resumes and business letters.
- 08.05 Demonstrate interpersonal (nonverbal) communication skills.
- 08.06 Demonstrate good listening skills.

09.0 Apply leadership and citizenship skills --The student will be able to:

- 09.01 Identify and describe leadership characteristics.
- 09.02 Identify opportunities to apply acquired leadership skills.
- 09.03 Identify and demonstrate ways to be an active citizen.
- 09.04 Participate in community based learning activities.
- 09.05 Demonstrate the ability to work cooperatively.
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
- 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Food Science Applications 2  
**Course Number:** 8129210  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the concepts related to: the use of taste and other sensory tests in developing foods; the application of scientific principles in food processing; food marketing; nutritional and economic value of plant-based food products; safe and efficient distribution and handling of food products; environmental factors in food production and processing; the global and historical impact of food on people; and employability skills necessary in the food industry.

10.0 Identify the impact of food preservation on the development of civilizations--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.20

- 10.01 Describe and differentiate between the five phases of food history.
- 10.02 Compare and contrast historical and modern methods of food preservation.
- 10.03 Explain the impact of food and nutrition on the evolution of society.
- 10.04 Analyze the influence of convenience food trends on society. LA.A.1.4, 2.4;
- 10.05 Identify the origins of food products commonly consumed in the United States.

11.0 Identify the importance of raw agricultural products in the food science industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.18.1, 2; SC.912.N.4.2

- 11.01 Identify wholesale plant, dairy, meat, poultry and aquatic animal food products.
- 11.02 Analyze the factors that impact food grades and grading.
- 11.03 Identify plant production practices that impact food product quality, quantity and consistency.
- 11.04 Examine nutritional content of plant food products.
- 11.05 Compare and contrast consumption trends of plant products in the United States.
- 11.06 Compare the relative economic value of plant food products.

12.0 Analyze the components of the marketing chain--The student will be able to:

- 12.01 Identify the five features of food labels.
- 12.02 Identify USDA regulations regarding food labeling.
- 12.03 Design a food label.
- 12.04 Develop a food product logo and slogan.
- 12.05 Apply basic principles of advertisement.
- 12.06 Design a print advertisement.
- 12.07 Develop a video or audio advertisement.

13.0 Discuss food production distribution--The student will be able to:

- 13.01 Explain the impact of transportation on food cost and availability.
- 13.02 Determine the relationship between transportation and packaging needs.
- 13.03 Compare modes of food product transportation.
- 13.04 Describe the various levels of the food distribution chain.
- 13.05 Analyze the factors that influence profit at various levels of the distribution chain.
- 13.06 Describe the challenges associated with distributing perishable products.

14.0 Discuss the role of regulatory agencies in the food industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.6;  
SC.912.L.18.6

- 14.01 Describe the basic requirements of Hazard Analysis and Critical Control Points (HAACP) in food processing.
- 14.02 Identify food safety regulatory agencies.
- 14.03 Examine the chemical, physical and biological categories of food safety and sanitation.
- 14.04 Discuss the role of sanitation during food processing.
- 14.05 Describe regulations governing the food industry and how they are enforced.
- 14.06 Describe the importance of self-regulation in controlling food quality and safety.

15.0 Describe the economic and cultural impact of a global food market--The student will be able to:

- 15.01 Analyze the influence of culture on American food preferences.
- 15.02 Analyze national and international food preferences on food production in the United States.
- 15.03 Explain the political nature of the world's food supply.
- 15.04 Explain the relationships between global population growth and food supply needs.
- 15.05 Discuss possible causes of world hunger.

16.0 Describe how proteins, carbohydrates, lipids, vitamins, and minerals are digested and how food preparation impacts nutritional value and quality--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.18.1, 2, 3, 4, 11; SC.912.N.1.1, 2, 3, 4, 6, 7; SC912.P.8.7

- 16.01 Discuss the functions of carbohydrates, fats, proteins, minerals, vitamins, water and caloric needs in the body.
- 16.02 Compare and contrast food sources of carbohydrates, fats, proteins, minerals, vitamins, water and caloric needs in the body.
- 16.03 Identify the effects of preparation methods on nutritional content and food quality.

17.0 Describe the biological composition and processing of foods--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.6;  
SC.912.L.16.10; SC.912.P.12.12

- 17.01 Explain microbiology and its application to food processing.
- 17.02 Describe the effects of microbes on food spoilage.

18.0 Describe the chemical composition and processing of foods--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.16.10I; SC.912.L.18.2, 3, 4, 11; SC.912.P.8.7, 11

- 18.01 Explain the use of color in food processing.
- 18.02 Explain the use of flavor in food processing.
- 18.03 Explain the use of preservatives in food processing.
- 18.04 Explain the use of textural agents in food processing.
- 18.05 Examine methods of manipulating color and ripeness of fresh produce.

19.0 Describe the physical composition and processing of foods--The student will be able to:

- 19.01 Describe materials handling in the food industry.
- 19.02 Describe factors and processes related to heat transfer.
- 19.03 Compare and contrast methods of moisture content manipulations.
- 19.04 Examine techniques used in producing formed foods.

20.0 Discuss environmental issues impacting the production and processing of foods--The student will be able to:

- 20.01 Explain how water is used during production impacts the cost of food products.
- 20.02 Describe the impact of pesticides on food production, processing, quality and safety.
- 20.03 Describe the impact of Best Management Practices (BMPs) and Good Agricultural Practices on food production, processing, quality and safety.
- 20.04 Describe the impact of Genetically Modified Organisms (GMOs) on food production, processing, quality and safety;

21.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:

- 21.01 Investigate career opportunities in the food industry and identify educational experiences necessary to prepare for those careers.
- 21.02 Conduct group meetings using parliamentary procedure and public speaking skills.
- 21.03 Correctly follow oral and written directions and ask questions that clarify directions, as needed.
- 21.04 Communicate effectively in verbal, written, and nonverbal modes.
- 21.05 Recognize and demonstrate good listening skills.
- 21.06 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.

22.0 Write lab reports to record, interpret and evaluate data--The student will be able to:

- 22.01 Explain the importance of scientific exploration of food.
- 22.02 Identify and use the basic units of the metric system of measurement.

- 22.03 Demonstrate effective manipulation of scientific materials and equipment in the food science laboratory.
- 22.04 Practice the expected safety procedures and care while working in the food science laboratory.
- 23.0 Explain the process of food product development—the student will be able to:
  - 23.01 Explain how ideas for new products are developed.
  - 23.02 Describe new product development procedures.
  - 23.03 Explain consumer response tests.
  - 23.04 Explain the role of test marketing with new products.
  - 23.05 Explain sensory analysis.
  - 23.06 Compare the categories of sensory properties.
  - 23.07 Assess why the food industry conducts sensory testing.
- 24.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 24.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 24.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 24.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 25.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 25.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 25.02 Construct charts/tables/graphs using functions and data. AF3.5
  - 25.03 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 26.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 26.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 26.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 27.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 27.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 27.02 Locate, organize and reference written information from various sources. CM 3.0
  - 27.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 27.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 27.05 Apply active listening skills to obtain and clarify information. CM 7.0

- 27.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 27.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 28.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 28.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 28.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 28.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 28.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 29.0 Use information technology tools--The students will be able to:
  - 29.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 29.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 29.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 29.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Food Science Applications 3  
**Course Number:** 8129220  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies the food industry. The course addresses concepts related to: developing new food products; scientific experimentation with the chemical and biological components of foods; the impact of microbes in food production; the nutritional and economic value of animal-based food products; food spoilage and waste management; safety and security risks in the food supply; the international trade of foods; and employability skills necessary in the food industry.

11.0 Identify the importance of raw agricultural products in the food science industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.18.1, 2; SC.912.N.4.2

- 11.07 Identify animal production practices that impact food product quality, quantity and consistency.
- 11.08 Examine nutritional content of animal food products.
- 11.09 Compare and contrast consumption trends of animal products in the United States.
- 11.10 Compare the relative economic value of animal food products.

12.0 Analyze the components of the marketing chain--The student will be able to:

- 12.08 Explain how package design and size influence consumer acceptance.
- 12.09 Explore the relationship between value-added products and profitability.
- 12.10 Analyze the economic significance of converting raw products into value-added food products.
- 12.11 Discuss retail store layout and product placement.
- 12.12 Analyze retail-marketing strategies.

14.0 Discuss the role of regulatory agencies in the food industry--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.L.14.6; SC.912.L.18.6

- 14.07 Describe and analyze agro terrorism.
- 14.08 Identify and describe major food pathogens, allergens and food borne illnesses.
- 14.09 Evaluate the food safety responsibilities that occur along the food supply chain.
- 14.10 Explore the health risks associated with pathogens, allergens and food Bourne illnesses.
- 14.11 Apply basic principles of safe food handling.

- 15.0 Describe the economic and cultural impact of a global food market--The student will be able to:
- 15.06 Explore the economic and political impact of international trade.
  - 15.07 Examine the impact of the global food supply on national security.
  - 15.08 Explore the relationship between point of origin laws for imports and major national customers for exports.
  - 15.09 Compare safety and environmental regulations between nations and methods of enforcing compliance.
- 16.0 Describe how proteins, carbohydrates, lipids, vitamins, and minerals are digested and how food preparation impacts nutritional value and quality--The student will be able to:
- This standard supports the following Sunshine State Standards: SC.912.L.18.1, 2, 3, 4, 11; SC.912.N.1.1, 2, 3, 4, 6, 7; SC912.P.8.7
- 16.04 Conduct experiments that examine the chemical processes involved in digestion of carbohydrates, proteins, fats, vitamins and minerals.
  - 16.05 Describe the cellular process involved in assimilating carbohydrates, proteins, fats, vitamins and minerals.
  - 16.06 Analyze the role of enzymes in digestion.
  - 16.07 Examine the relationship between water and nutrient absorption. .
- 17.0 Describe the biological composition and processing of foods--The student will be able to:
- This standard supports the following Sunshine State Standards: SC.912.L.14.6; SC.912.L.16.10; SC.912.P.12.12
- 17.03 Recognize characteristics of spoiled food. .
  - 17.04 Apply the principles of managing Food, Acid, Time, Temperature, Oxygen, and Moisture (FATTOM) in controlling food spoilage.
  - 17.05 Test the effects of yeasts, bacteria, molds and enzymes in food processing.
- 18.0 Describe the chemical composition and processing of foods--The student will be able to:
- This standard supports the following Sunshine State Standards: SC.912.L.16.10; SC.912.L.18.2, 3, 4, 11; SC.912.P.8.7, 11
- 18.06 Analyze the molecular structure of carbohydrates.
  - 18.07 Analyze the molecular structure of fats.
  - 18.08 Analyze the molecular structure of proteins.
  - 18.09 Explain the concepts of pH and buffers as they relate to foods.
  - 18.10 Examine the effects of processing and preparation on the chemical composition of Foods.
  - 18.11 Explain the use of proteins, fats and carbohydrates. .
- 19.0 Describe the physical composition and processing of foods--The student will be able to:
- 19.05 Examine methods for separating food products. .
  - 19.06 Analyze factors related to product mixing.
  - 19.07 Analyze mechanical factors influencing product preparation.

- 19.08 Compare processing methods used to enhance shelf life of fresh produce.
- 20.0 Discuss environmental issues impacting the production and processing of foods--The student will be able to:
- 20.05 Describe the requirements of water used in food processing.
  - 20.06 Discuss methods used in food processing for disposing of solid wastes.
  - 20.07 Compare and contrast methods of wastewater management used in food processing.
- 21.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:
- 21.06 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.
  - 21.07 Identify acceptable work habits and personal characteristics.
  - 21.08 Identify acceptable employee hygiene habits.
  - 21.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
  - 21.10 Describe the importance of industry certifications.
  - 21.11 Conduct small informal and formal group meetings.
- 22.0 Write lab reports to record, interpret and evaluate data--The student will be able to:
- 22.05 Apply the steps of the scientific methods.
  - 22.06 Design and write reports of food science laboratory experiments including mathematical and statistical examples for evaluation of collected data.
- 23.0 Explain the process of food product development--The student will be able to:
- 23.08 Develop a new food product.
  - 23.09 Conduct and analyze a food market test.
  - 23.10 Apply sensory analysis techniques.
  - 23.11 Conduct a cost analysis for a new food product.
- 30.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 30.01 Describe the nature and types of business organizations. SY 1.0
  - 30.02 Explain the effect of key organizational systems on performance and quality.
  - 30.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 30.04 Explain the impact of the global economy on business organizations
- 31.0 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:
- 31.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 31.02 Explain emergency procedures to follow in response to workplace accidents.
  - 31.03 Create a disaster and/or emergency response plan. SHE 2.0



- 32.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 32.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 32.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 32.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 32.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 33.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 33.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 33.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 33.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 33.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 34.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 34.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 34.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 34.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 34.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 34.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 34.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 34.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 34.08 Research the benefits of ongoing professional development. ECD 9.0
  - 34.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 35.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 35.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 35.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 35.03 Develop a personal budget and financial goals. FL3.1
  - 35.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 35.05 Maintain financial records. FL3.3
  - 35.06 Read and reconcile financial statements. FL3.4

35.07 Research, compare and contrast investment opportunities.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Course Title:** Food Science Technology  
**Course Type:** Non Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Non Career Preparatory</b>	
Course Number	8500395
CIP Number	09200115PA
Grade Level	9-12, 30, 31
Standard Length	1 credit
Teacher Certification	VOC HME EC @4 GEN HME EC @4 HOME EC @2 FAM CON SC 1
CTSO	FCCLA
Facility Code	[231] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)

### **Purpose**

The purpose of this program is to give students an opportunity to apply knowledge and skills related to the area of food science and nutrition.

The content includes but is not limited to food microbiology including microorganisms and methods of food preservation, physical and chemical changes in foods, structures and functions of nutrients; and human physiology in relation to food.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

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

FCCLA 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 as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 cannot be modified.

## **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

## **Standards**

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

- 01.0 Use scientific methods to solve problems, employ metric measurements, and demonstrate safe and effective use of laboratory instruments; write detailed lab reports that record, interpret and evaluate data.
- 02.0 Identify basic scientific information on elements, compounds, and mixtures; recognize and apply symbols, formulas, and equations that chemists use and describe changes that occur during chemical reactions.
- 03.0 Contrast the effects of acids and bases on foods during preparation.
- 04.0 Explain the science and math process skills to qualify and analyze information gained from sensory evaluations.
- 05.0 Identify and explain the effects of microorganisms on food.
- 06.0 Compare and contrast the different methods of food preservation.
- 07.0 Describe the molecular structure and functions of the six basic nutrients.
- 08.0 Analyze the change in nutrients during food preparation and processing.
- 09.0 Describe relationships between diet and a healthy body.
- 10.0 Investigate food science topics and develop experiments; analyze findings and use knowledge previously gained in this course to record, interpret, and evaluate data.
- 11.0 Recognize how food science interacts with technology and society; explore food science trends and careers.
- 12.0 Demonstrate leadership and organizational skills.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Food Science Technology  
**Course Number:** 8500395  
**Course Credit:** 1

**Course Description:**

This course focuses on the knowledge and skills related to the area of food science and nutrition to include food microbiology, microorganisms, methods of food preservation, physical and chemical changes in foods, structures and functions of nutrients; and human physiology in relation to food.

- 01.0 Use scientific methods to solve problems, employ metric measurements, and demonstrate safe and effective use of laboratory instruments; write detailed lab reports that record, interpret and evaluate data--The student will be able to:
- 01.01 Explain the importance of scientific exploration of food.
  - 01.02 Identify and use the basic units of the metric system of measurement.
  - 01.03 Demonstrate effective manipulation of scientific materials and equipment in the Food Science laboratory.
  - 01.04 Practice the expected safety procedures and care while working in the Food Science laboratory.
  - 01.05 Describe and discuss the steps of the scientific methods using math applications.
  - 01.06 Design and write accurate and complete reports of Food Science laboratory experiments including the mathematical and statistical examples for the evaluation of collected data.
- 02.0 Identify basic scientific information on elements, compounds, and mixtures; recognize and apply symbols, formulas, and equations that chemists use; and describe the physical and chemical changes that occur during chemical reactions--The student will be able to:
- 02.01 Identify chemical symbols for common elements found in foods.
  - 02.02 Use scientific information to identify, classify, and compare elements, compounds, and mixtures.
  - 02.03 Define and differentiate between chemical and physical changes in food.
  - 02.04 Identify and categorize the forms of energy; recognize the importance of energy in physical and chemical changes.
  - 02.05 Describe and demonstrate methods of energy transfer used in food preparation, such as boiling, freezing, and using microwaves.
  - 02.06 Describe the chemical reactions responsible for some of the changes observed in foods.
- 03.0 Contrast the effects of acids and bases on food during preparation--The student will be able to:
- 03.01 Differentiate between the properties of acids and bases.
  - 03.02 Calculate the concentration of an acid or base from titration data.

- 03.03 Identify the importance of acids and bases in food preparation and give examples of each.
- 03.04 Explain the role acids and bases play in the digestive process.
- 04.0 Explain the science and math process skills to qualify and analyze information gained from sensory evaluations--The student will be able to:
  - 04.01 Outline characteristics and design a successful sensory evaluation process.
  - 04.02 Describe the components of sensory evaluation experimentation.
  - 04.03 Use science and math process skills to conduct sensory experimentation; quantify and analyze the information to determine which foods appeal to people.
- 05.0 Identify and explain the effects of microorganisms on food--The student will be able to:
  - 05.01 Compare the beneficial and detrimental effects of microorganisms on food.
  - 05.02 Identify the characteristic of selected microorganisms and related food borne diseases.
  - 05.03 Describe the environmental conditions necessary for the growth of selected microorganisms.
  - 05.04 Explain and demonstrate the cause and effect relationship between using accepted food handling procedures and preventing food borne diseases.
  - 05.05 Conduct and appraise scientific experimentation of the biological magnification of certain classified microorganisms, such as yeast, mold and bacteria.
- 06.0 Compare and contrast the different methods of food preservation--The student will be able to:
  - 06.01 Describe and give methods of how fermentation is useful in preserving foods.
  - 06.02 Describe and give examples of how chemicals are useful in preserving foods.
  - 06.03 Describe and give examples of temperature-related methods used in preservation of foods.
  - 06.04 Conduct an experiment in fermentation, chemical, or temperature-related method of food preservation.
- 07.0 Describe the molecular structure and functions of the six basic nutrients--The student will be able to:
  - 07.01 List the chemical substances that compose food.
  - 07.02 Compare and contrast the properties and functions of the six basic nutrients.
  - 07.03 Write chemical equations using molecular formulas for the reactions that occur involving the six basic nutrients.
  - 07.04 Describe the role of enzymes as catalyst in chemical reactions.
  - 07.05 Draw the molecular structures for the six basic nutrients.
- 08.0 Analyze the change in nutrients during food preparation and processing--The student will be able to:
  - 08.01 Describe the effects of food preparation processing methods on the structure of protein.
  - 08.02 Demonstrate the effect of heat, light, and pH on vitamins and mineral stability.

- 08.03 Conduct experiments to demonstrate the effect of light, air, temperature, water and storage on the quality and stability of fats.
  - 08.04 Explain the effects of temperature, molecular agitation, preparation methods, and storage on carbohydrates.
  - 08.05 Write chemical equations to illustrate enzymatic reaction in food preparation.
  - 08.06 Describe the methods used to control enzymatic reactions during food preparation and processing.
  - 08.07 Compare and contrast the interrelationships among the six basic nutrients during food preparation.
- 09.0 Describe relationships between diet and a healthy body--The student will be able to:
- 09.01 Describe the processes used by the body in utilization of the six basic nutrients.
  - 09.02 Define anabolism and catabolism as two opposing processes of metabolism.
  - 09.03 Analyze the relationship between food intake, energy use, and body weight.
  - 09.04 Explain the interrelationship between diet and individual medical conditions.
  - 09.05 Describe the characteristics of a healthy diet.
- 10.0 Investigate food science topics and develop experiments; analyze findings and use knowledge previously gained in this course to record, interpret, and evaluate data--The student will be able to:
- 10.01 Demonstrate the methodology associated with acquiring data on a Food Science topic.
  - 10.02 Formulate the hypothesis in the area of Food Science that can be tested by experimentation.
  - 10.03 Design a procedure for a food science experiment and conduct the experiment.
  - 10.04 Record the observations, analyze the results, and compare the findings with the original hypothesis.
  - 10.05 Prepare a report and a poster display of the food science experiment.
- 11.0 Recognize how food science interacts with technology and society; explore food science trends and careers--The student will be able to:
- 11.01 Describe how various technological advances in food sciences and nutrition could affect the individual.
  - 11.02 Demonstrate successful problem solving skills in making wise consumer choices and analyzing information from public media.
  - 11.03 Describe career opportunities resulting from science, nutrition, and related technology.
- 12.0 Demonstrate leadership and organizational skills--The student will be able to:
- 12.01 Identify professional and youth organizations.
  - 12.02 Identify purposes and functions of professional and youth organizations.
  - 12.03 Identify roles and responsibilities of members of professional and youth organizations.
  - 12.04 Work cooperatively as a group member to achieve organizational goals.
  - 12.05 Demonstrate confidence in leadership roles and organizational responsibilities.
  - 12.06 Demonstrate commitment to achieve organizational goals.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Floral Design and Marketing  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

	Secondary	PSAV
Program Number	8818000	M805030
CIP Number	0208050300	0208050300
Grade Level	9-12, 30, 31	30, 31
Standard Length	6 credits	900 hours
Teacher Certification	RETAILING @7 G MKTG 1 DIST ED @7 TEACH CDE @7 MKTG MGMT @7 G	RETAILING @7 G MKTG 1 DIST ED @7 TEACH CDE @7 MKTG MGMT @7 G
CTSO	DECA	Delta Epsilon Chi
SOC Codes (all applicable)	53-3031, 41-2031, 43-5111, 27-1023, 41-1011	53-3031, 41-2031, 43-5111, 27-1023, 41-1011
Facility Code	[223] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9 Language: 9 Reading: 9

### 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 floral design sector 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.

### Program Structure

This program is a planned sequence of instruction consisting of six courses and six occupational completion points.

When offered at the post secondary level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ORH0060	Delivery Person (Floral)	150 hrs	53-3031
B	ORH0061	Retail Sales (Floral)	150 hrs	41-2031
C	ORH0062	Weighers, Measurers, Checkers, Samplers and Recordkeeping	150 hrs	43-5111
D	ORH0063	Floral Design (Assistant)	150 hrs	27-1023
E	ORH0064	Floral Designer	150 hrs	27-1023
F	ORH0065	Retail Manager (Floral)	150 hrs	41.1011

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8818010	Floral Design and Marketing 1	1 credit	53-3031	2
B	8818020	Floral Design and Marketing 2	1 credit	41-2031	2
C	8818030	Floral Design and Marketing 3	1 credit	43-5111	2
D	8818040	Floral Design and Marketing 4	1 credit	27-1023	2
E	8818050	Floral Design and Marketing 5	1 credit	27-1023	2
F	8818060	Floral Design and Marketing 6	1 credit	41.1011	2

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

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

DECA, an Association of Marketing Students (secondary) and Delta Epsilon Chi (postsecondary) are the appropriate career and technical student organizations 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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

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 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

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 pursuant to Section 1008.29, F.S.; 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.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Discuss the floral design and marketing industry.
- 02.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 03.0 Demonstrate effective communication skills.

- 04.0 Demonstrate language arts knowledge and skills
- 05.0 Demonstrate mathematics knowledge and skills.
- 06.0 Demonstrate knowledge and application of product and service technology.
- 07.0 Demonstrate distribution skills involved in floral marketing.
- 08.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance
- 09.0 Perform merchandising operations unique to floral marketing.
- 10.0 Apply sales techniques and procedures to the marketing of floral products.
- 11.0 Identify factors for the promotion of floristry products and services.
- 12.0 Demonstrate knowledge of merchandising activities.
- 13.0 Use information technology tools.
- 14.0 Demonstrate knowledge and application of post harvest physiological technology.
- 15.0 Identify procedures and create fresh and silk floral designs.
- 16.0 Create symmetrical and asymmetrical fresh and silk floral design.
- 17.0 Create fresh and/or permanent sympathy designs.
- 18.0 Create fresh and/or permanent wedding designs.
- 19.0 Apply sales promotion techniques and procedures to the marketing of floral products.
- 20.0 Solve problems using critical thinking skills, creativity and innovation
- 21.0 Explain the importance of employability skill and entrepreneurship skills.
- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 23.0 Demonstrate an understanding of the functions of management.
- 24.0 Demonstrate personal money-management concepts, procedures, and strategies
- 25.0 Identify factors to consider when opening/managing a floral business.
- 26.0 Describe the importance of professional ethics and legal responsibilities

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Floral Design and Marketing**  
**PSAV Number: M805030**

**Course Number: ORH0060**  
**Occupational Completion Point: A**  
**Delivery Person, (Floral) – 150 Hours – SOC Code 53-3031**

- 01.0 Discuss the floral design and marketing industry--The student will be able to:
- 01.01 Identify careers in the floral design and marketing industry.
  - 01.02 Describe trends in the floral design and marketing industry.
  - 01.03 Explain floral services.
- 02.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 02.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 02.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 02.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 02.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 03.0 Demonstrate effective communication skills --The student will be able to:
- 03.01 Discuss the role of communications in marketing.
  - 03.02 Demonstrate a proficiency in the effective use of speech and vocabulary.
  - 03.03 Demonstrate effective written communication skills.
  - 03.04 Demonstrate effective oral communication skills.
  - 03.05 Demonstrate effective listening skills.
- 04.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
- 04.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 04.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 04.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 05.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 05.03 Construct charts/tables/graphs using functions and data. AF3.5
- 06.0 Demonstrate knowledge and application of product and service technology--The student will be able to:

- 06.01 Identify varieties of flowers and plants utilized in floral arrangements.
- 06.02 Perform specialized care and handling of flowers and plants utilized in floral arrangements.
- 06.03 Store plants, flowers, and prepared floral arrangements according to established procedures.
- 06.04 Perform "greening," prepare containers, and maintenance of fresh flowers.

07.0 Demonstrate distribution skills involved in floral marketing--The student will be able to:

- 07.01 Tag floral orders.
- 07.02 Package products.
- 07.03 Route and organize deliveries according to priority, location, time, and fuel consumption.
- 07.04 Make confirmation phone calls.
- 07.05 Apply techniques for correct loading of delivery trucks.
- 07.06 Solve delivery problems, such as wrong address, damaged merchandise, and inability to deliver.
- 07.07 Maintain general floral shop upkeep.

**Course Number: ORH0061**

**Occupational Completion Point: B**

**Retail Salesperson (Floral) – 150 Hours – SOC Code 41-2031**

06.0 Demonstrate knowledge and application of product and service technology--The student will be able to:

- 06.05 Identify types of floral arrangements.
- 06.06 Utilize available resources to obtain product knowledge

08.0 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:

- 08.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 08.02 Explain emergency procedures to follow in response to workplace accidents.
- 08.03 Create a disaster and/or emergency response plan. SHE 2.0

09.0 Perform merchandising operations unique to floral marketing--The student will be able to:

- 09.01 Demonstrate correct procedures for handling customer sales transactions.
- 09.02 Explain pricing policies.
- 09.03 Calculate mark-up of floral products.
- 09.04 Describe opening and closing procedures for a floral operation.

10.0 Apply sales techniques and procedures to the marketing of floral products--The student will be able to:

- 10.01 Demonstrate steps of a sale utilizing floral products.

- 10.02 Perform telephone sales.
- 10.03 Process orders using both telephone and computer wire services.

**Course Number: ORH0062**

**Occupational Completion Point: C**

**Weighers, Measurers, Checkers, Samplers And Recordkeeping (Floral) – 150 Hours – SOC Code 43-5111**

11.0 Identify factors for the promotion of floristry products and services--The student will be able to:

- 11.01 Identify the major classifications of retail flower operations.
- 11.02 Describe product presentation and importance of window and store display.
- 11.03 Identify primary goals of display.
- 11.04 Identify types and functions of business records maintained.
- 11.05 Develop a floor plan for a flower shop.

12.0 Demonstrate knowledge of merchandising activities--The student will be able to:

- 12.01 Explain the role of buying and purchasing in a retailing situation.
- 12.02 Follow accepted procedures for inventory control.
- 12.03 Demonstrate stock-keeping procedures.
- 12.04 Operate appropriate weighing and measuring devices for floral products and materials.

13.0 Use information technology tools--The students will be able to:

- 13.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 13.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

**Course Number: ORH0063**

**Occupational Completion Point: D**

**Floral Design (Assistant) – 150 Hours – SOC Code 27-1023**

14.0 Demonstrate knowledge and application of post harvest physiological technology--The student will be able to:

- 14.01 Demonstrate operation of underwater floral cutting equipment.
- 14.02 Demonstrate use of electric floral stem stripper.
- 14.03 Apply knowledge in the use of floral preservatives and pre-hydrating solutions.
- 14.04 Demonstrate knowledge and application of refrigeration, sanitation, and ethylene control.
- 14.05 Identify grower-packaging quantities used for cut flowers and foliage.

- 14.06 Apply knowledge of specialized techniques for conditioning post harvest plant material.
- 15.0 Identify procedures and create fresh and silk floral designs--The student will be able to:
- 15.01 Identify fundamentals of color and texture.
  - 15.02 Identify mechanics, principles, and styles of design.
  - 15.03 Apply fundamentals of creativity.
  - 15.04 Maintain portfolios.
  - 15.05 Identify and practice safety procedures.
  - 15.06 Identify, use, and maintain hand tools and equipment.
  - 15.07 Select appropriate containers.
  - 15.08 Create circular designs.
  - 15.09 Create triangular designs.
  - 15.10 Apply horizontal and vertical design principles as appropriate.
  - 15.11 Apply symmetrical and asymmetrical design principles as appropriate.
  - 15.12 Create body flowers (boutonnieres, corsages, hairpieces, etc.) appropriate to designer's locale.
  - 15.13 Construct dish gardens.
  - 15.14 Decorate blooming plants.
  - 15.15 Construct balloon bouquets.
  - 15.16 Apply principles of mass production skills where and when appropriate.

**Course Number: ORH0064**

**Occupational Completion Point: D**

**Floral Designer – 150 – SOC Code 27-1023**

- 16.0 Create symmetrical and asymmetrical fresh and silk floral designs--The student will be able to:
- 16.01 Create orchid corsages.
  - 16.02 Create a nosegay and corsages.
  - 16.03 Create seasonal/holiday designs.
  - 16.04 Create pieces for religious events.
  - 16.05 Create special event pieces: conventions, parties, banquets, showers, and receptions.
  - 16.06 Create oriental style designs.
  - 16.07 Create silk arrangements working with the limited use of acrylics/polymers.
  - 16.08 Create designs for recipients in special care facilities (maternity, pediatrics, mental health, burns, general hospital, extended care, etc.).
  - 16.09 Create period designs (southwest, colonial, country, European, etc.).
- 17.0 Create fresh and/or permanent sympathy designs--The student will be able to:
- 17.01 Create family pieces.
  - 17.02 Create funeral baskets.
  - 17.03 Create set pieces.
  - 17.04 Create easel pieces.
  - 17.05 Create interior lid pieces.
- 18.0 Create fresh and/or permanent wedding designs--The student will be able to:



- 18.01 Create designs for church/synagogue weddings.
- 18.02 Create designs for special weddings.
- 18.03 Create designs for wedding receptions.
- 18.04 Create designs for wedding party members.

**Course Number: ORH0065**

**Occupational Completion Point: F**

**Retail Manager (Floral) – 150 Hours – SOC Code 41-1011**

19.0 Apply sales promotion techniques and procedures to the marketing of floral products--  
The student will be able to:

- 19.01 Discuss the purposes of advertising, display, and public relations.
- 19.02 Explain the importance of sales promotion.
- 19.03 Identify various forms of advertising media including the Internet.
- 19.04 Conduct wedding consultations.
- 19.05 Conduct funeral consultations.
- 19.06 Conduct life events consultations.
- 19.07 Plan and conduct a sales promotion plan for a product.

20.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

- 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 20.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

21.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 21.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 21.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 21.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 21.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 21.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 21.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 21.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 21.08 Research the benefits of ongoing professional development. ECD 9.0

- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 22.01 Describe the nature and types of business organizations. SY 1.0
  - 22.02 Explain the effect of key organizational systems on performance and quality.
  - 22.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 22.04 Explain the impact of the global economy on business organizations
- 23.0 Demonstrate an understanding of the functions of management--The student will be able to:
- 23.01 Identify and describe steps in the planning process.
  - 23.02 Define Management by Objectives (MBO).
  - 23.03 Develop an organizational chart to illustrate line and staff relationships.
  - 23.04 Identify how to plan personnel needs and how to find employees for specific positions.
  - 23.05 Describe the responsibilities for selecting, training, and appraising employees.
  - 23.06 Identify steps for avoiding difficulties resulting from delegation.
  - 23.07 Define the principles of "chain of command" and "span of control."
  - 23.08 Justify the importance of accountability.
  - 23.09 Name and define the functions of management (planning, organizing, staffing, directing, controlling).
  - 23.10 Discuss the importance of a manager's philosophy of management in creating a work environment.
  - 23.11 Analyze management techniques used by effective managers.
  - 23.12 Explain how motivation, leadership, and communication influence people within an organization.
  - 23.13 Describe methods used in training and development.
- 24.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
- 24.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 24.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 24.03 Develop a personal budget and financial goals. FL3.1
  - 24.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 24.05 Maintain financial records. FL3.3
  - 24.06 Read and reconcile financial statements. FL3.4
  - 24.07 Research, compare and contrast investment opportunities.
- 25.0 Identify factors to consider when opening/managing a floral business--The student will be able to:
- 25.01 Identify primary functions of a retail flower shop.
  - 25.02 Explain the characteristics of store location options.
  - 25.03 Characterize the principle responsibilities of employees.
  - 25.04 Summarize the key management responsibilities required for a successful and profitable flower shop.

- 26.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 26.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 26.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 26.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 26.04 Interpret and explain written organizational policies and procedures. ELR 2.0

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Floral Design and Marketing 1  
**Course Number:** 8818010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop the fundamental competencies necessary for employment in the floral design and marketing industry. Topics include: introduction to the floral industry, human relations skills that are vital to employment in the field, communications and employability skills.

- 01.0 Discuss the floral design and marketing industry--The student will be able to:
- 01.01 Identify careers in the floral design and marketing industry.
  - 01.02 Describe trends in the floral design and marketing industry.
  - 01.03 Explain floral services.
- 02.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 02.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 02.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 02.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 02.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 03.0 Demonstrate effective communication skills --The student will be able to:
- 03.01 Discuss the role of communications in marketing.
  - 03.02 Demonstrate a proficiency in the effective use of speech and vocabulary.
  - 03.03 Demonstrate effective written communication skills.
  - 03.04 Demonstrate effective oral communication skills.
  - 03.05 Demonstrate effective listening skills.
- 04.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
- 04.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 04.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 04.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 05.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
- 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4

- 05.03 Construct charts/tables/graphs using functions and data. AF3.5
- 06.0 Demonstrate knowledge and application of product and service technology--The student will be able to:
  - 06.01 Identify varieties of flowers and plants utilized in floral arrangements.
  - 06.02 Perform specialized care and handling of flowers and plants utilized in floral arrangements.
  - 06.03 Store plants, flowers, and prepared floral arrangements according to established procedures.
  - 06.04 Perform "greening," prepare containers, and maintenance of fresh flowers.
- 07.0 Demonstrate distribution skills involved in floral marketing--The student will be able to:
  - 07.01 Tag floral orders.
  - 07.02 Package products.
  - 07.03 Route and organize deliveries according to priority, location, time, and fuel consumption.
  - 07.04 Make confirmation phone calls.
  - 07.05 Apply techniques for correct loading of delivery trucks.
  - 07.06 Solve delivery problems, such as wrong address, damaged merchandise, and inability to deliver.
  - 07.07 Maintain general floral shop upkeep.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Floral Design and Marketing 2  
**Course Number:** 8818020  
**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.

06.0 Demonstrate knowledge and application of product and service technology--The student will be able to:

- 06.05 Identify types of floral arrangements.
- 06.06 Utilize available resources to obtain product knowledge

08.0 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:

- 08.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 08.02 Explain emergency procedures to follow in response to workplace accidents.
- 08.03 Create a disaster and/or emergency response plan. SHE 2.0

09.0 Perform merchandising operations unique to floral marketing--The student will be able to:

- 09.01 Demonstrate correct procedures for handling customer sales transactions.
- 09.02 Explain pricing policies.
- 09.03 Calculate mark-up of floral products.
- 09.04 Describe opening and closing procedures for a floral operation.

10.0 Apply sales techniques and procedures to the marketing of floral products--The student will be able to:

- 10.01 Demonstrate steps of a sale utilizing floral products.
- 10.02 Perform telephone sales.
- 10.03 Process orders using both telephone and computer wire services.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Floral Design and Marketing 3  
**Course Number:** 8818030  
**Course Credit:** 1

**Course Description:**

This course prepares the student to use data entry and appropriate business software to complete weighers, measures, checkers, and samplers, recordkeeping (Floral) SOC 43-5111.00 including weighing, measuring and checking materials, supplies, and equipment for the purpose of keeping relevant records. Content includes basic skills in accounts receivable, accounts payable, payroll, inventory control, wire service orders, collecting and keeping record of samples of products or materials and maintaining other financial records required for small business operations.

11.0 Identify factors for the promotion of floristry products and services--The student will be able to:

- 11.01 Identify the major classifications of retail flower operations.
- 11.02 Describe product presentation and importance of window and store display.
- 11.03 Identify primary goals of display.
- 11.04 Identify types and functions of business records maintained.
- 11.05 Develop a floor plan for a flower shop.

12.0 Demonstrate knowledge of merchandising activities--The student will be able to:

- 12.01 Explain the role of buying and purchasing in a retailing situation.
- 12.02 Follow accepted procedures for inventory control.
- 12.03 Demonstrate stock-keeping procedures.
- 12.04 Operate appropriate weighing and measuring devices for floral products and materials.

13.0 Use information technology tools--The students will be able to:

- 13.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 13.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Floral Design and Marketing 4  
**Course Number:** 8818040  
**Course Credit:** 1

**Course Description:**

This course prepares the student with basic skills in making symmetrical and asymmetrical fresh and silk floral designs under the supervision of a designer. Students will copy designs, perform skills appropriate for an interior decorator's assist, a floral manufacturing assembly line worker, and/or a craft shop worker.

14.0 Demonstrate knowledge and application of post harvest physiological technology--The student will be able to:

- 14.01 Demonstrate operation of underwater floral cutting equipment.
- 14.02 Demonstrate use of electric floral stem stripper.
- 14.03 Apply knowledge in the use of floral preservatives and pre-hydrating solutions.
- 14.04 Demonstrate knowledge and application of refrigeration, sanitation, and ethylene control.
- 14.05 Identify grower-packaging quantities used for cut flowers and foliage.
- 14.06 Apply knowledge of specialized techniques for conditioning post-harvest plant material.

15.0 Identify procedures and create fresh and silk floral designs--The student will be able to:

- 15.01 Identify fundamentals of color and texture.
- 15.02 Identify mechanics, principles, and styles of design.
- 15.03 Apply fundamentals of creativity.
- 15.04 Maintain portfolios.
- 15.05 Identify and practice safety procedures.
- 15.06 Identify, use, and maintain hand tools and equipment.
- 15.07 Select appropriate containers.
- 15.08 Create circular designs.
- 15.09 Create triangular designs.
- 15.10 Apply horizontal and vertical design principles as appropriate.
- 15.11 Apply symmetrical and asymmetrical design principles as appropriate.
- 15.12 Create body flowers (boutonnieres, corsages, hairpieces, etc.) appropriate to designer's locale.
- 15.13 Construct dish gardens.
- 15.14 Decorate blooming plants.
- 15.15 Construct balloon bouquets.
- 15.16 Apply principles of mass production skills where and when appropriate.



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Floral Design and Marketing 5  
**Course Number:** 8818050  
**Course Credit:** 1

**Course Description:**

This course provides advanced training for the student to utilize creative skills and previous experience to design appropriate floral arrangements according to customer requirements. Content includes creating advanced designs for symmetrical and asymmetrical silk and fresh floral arrangements, including seasonal periods, special events, banquet, sympathy, and wedding designs.

16.0 Create symmetrical and asymmetrical fresh and silk floral designs--The student will be able to:

- 16.01 Create orchid corsages.
- 16.02 Create a nosegay and corsages.
- 16.03 Create seasonal/holiday designs.
- 16.04 Create pieces for religious events.
- 16.05 Create special event pieces: conventions, parties, banquets, showers, and receptions.
- 16.06 Create oriental style designs.
- 16.07 Create silk arrangements working with the limited use of acrylics/polymers.
- 16.08 Create designs for recipients in special care facilities (maternity, pediatrics, mental health, burns, general hospital, extended care, etc.).
- 16.09 Create period designs (southwest, colonial, country, European, etc.).

17.0 Create fresh and/or permanent sympathy designs--The student will be able to:

- 17.01 Create family pieces.
- 17.02 Create funeral baskets.
- 17.03 Create set pieces.
- 17.04 Create easel pieces.
- 17.05 Create interior lid pieces.

18.0 Create fresh and/or permanent wedding designs--The student will be able to:

- 18.01 Create designs for church/synagogue weddings.
- 18.02 Create designs for special weddings.
- 18.03 Create designs for wedding receptions.
- 18.04 Create designs for wedding party members.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Floral Design and Marketing 6  
**Course Number:** 8818060  
**Course Credit:** 1

**Course Description:**

The course prepares students in the basic skills involved with marketing and management of a floral business. Content includes sales promotion and marketing techniques, entrepreneurship, and management functions.

- 19.0 Apply sales promotion techniques and procedures to the marketing of floral products--  
 The student will be able to:
- 19.01 Discuss the purposes of advertising, display, and public relations.
  - 19.02 Explain the importance of sales promotion.
  - 19.03 Identify various forms of advertising media including the Internet.
  - 19.04 Conduct wedding consultations.
  - 19.05 Conduct funeral consultations.
  - 19.06 Conduct life events consultations.
  - 19.07 Plan and conduct a sales promotion plan for a product.
- 20.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
- 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 20.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 21.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:
- 21.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 21.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 21.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 21.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 21.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 21.06 Identify and exhibit traits for retaining employment. ECD 7.0

- 21.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 21.08 Research the benefits of ongoing professional development. ECD 9.0
- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 22.01 Describe the nature and types of business organizations. SY 1.0
  - 22.02 Explain the effect of key organizational systems on performance and quality.
  - 22.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 22.04 Explain the impact of the global economy on business organizations
- 23.0 Demonstrate an understanding of the functions of management--The student will be able to:
  - 23.01 Identify and describe steps in the planning process.
  - 23.02 Define Management by Objectives (MBO).
  - 23.03 Develop an organizational chart to illustrate line and staff relationships.
  - 23.04 Identify how to plan personnel needs and how to find employees for specific positions.
  - 23.05 Describe the responsibilities for selecting, training, and appraising employees.
  - 23.06 Identify steps for avoiding difficulties resulting from delegation.
  - 23.07 Define the principles of "chain of command" and "span of control."
  - 23.08 Justify the importance of accountability.
  - 23.09 Name and define the functions of management (planning, organizing, staffing, directing, controlling).
  - 23.10 Discuss the importance of a manager's philosophy of management in creating a work environment.
  - 23.11 Analyze management techniques used by effective managers.
  - 23.12 Explain how motivation, leadership, and communication influence people within an organization.
  - 23.13 Describe methods used in training and development.
- 24.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:
  - 24.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 24.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 24.03 Develop a personal budget and financial goals. FL3.1
  - 24.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 24.05 Maintain financial records. FL3.3
  - 24.06 Read and reconcile financial statements. FL3.4
  - 24.07 Research, compare and contrast investment opportunities.
- 25.0 Identify factors to consider when opening/managing a floral business--The student will be able to:
  - 25.01 Identify primary functions of a retail flower shop.
  - 25.02 Explain the characteristics of store location options.

- 25.03 Characterize the principle responsibilities of employees.
- 25.04 Summarize the key management responsibilities required for a successful and profitable flower shop.
  
- 26.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 26.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 26.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 26.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 26.04 Interpret and explain written organizational policies and procedures. ELR 2.0

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Land Resources Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

Secondary – Career Preparatory	
Program Number	8913000
CIP Number	0715059902
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	AGRICULTUR 1 @2 WSP OPER @7 G BIOLOGY 1
CTSO	FPSA or FFA
SOC Codes (all applicable)	17-3025
Facility Code	203 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 & 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 land resources sector of the Agriculture, Food & Natural Resources career cluster.

The content includes but is not limited to knowledge of federal, state, and local regulations; ecosystem awareness; problem recognition; water quality issues; solid and liquid waste management issues; air quality issues; managing hazardous materials; managing forests, wetlands, fisheries, and wildlife; planning and administering land use; protecting resources; conducting site assessments; sampling procedures; safety procedures; compliance monitoring and quality assurance procedures; and instruction in environmental technology.

## Program Structure

This program is a planned sequence of instruction consisting of four courses and two occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
	8913010	Introduction to Environmental Technology	1 credit		2
A	8913020	Environmental Technology 2	1 credit	17-3025	2
	8913030	Land Resources 3	1 credit		3
B	8913040	Land Resources 4	1 credit	17-3025	3

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### Career and Technical Student Organization (CTSO)

FPSCA or 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe hydrology.
- 02.0 Practice safety skills and procedures.
- 03.0 Demonstrate sampling procedures.
- 04.0 Discuss related standards and regulations.
- 05.0 Conduct site assessment.
- 06.0 Describe related geologic principles.
- 07.0 Manage wetlands.
- 08.0 Manage wildlife.
- 09.0 Manage forests.
- 10.0 Identify career opportunities and organizational dynamics.
- 11.0 Describe water treatment techniques.
- 12.0 Describe stormwater systems.
- 13.0 Manage data and physical resources.
- 14.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems.
- 15.0 Manage hazardous materials.
- 16.0 Control incidents.
- 17.0 Prepare a plan.
- 18.0 Perform remediation.
- 19.0 Collect and dispose of solid waste.
- 20.0 Identify continuing education needs and opportunities.
- 21.0 Demonstrate language arts knowledge and skills.
- 22.0 Demonstrate mathematics knowledge and skills.
- 23.0 Demonstrate science knowledge and skills.
- 24.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 25.0 Solve problems using critical thinking skills, creativity and innovation.
- 26.0 Use information technology tools.
- 27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 28.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 30.0 Describe the importance of professional ethics and legal responsibilities.
- 31.0 Explain the importance of employability skill and entrepreneurship skills.
- 32.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 33.0 Evaluate wetlands management practices.
- 34.0 Evaluate wildlife management procedures.
- 35.0 Evaluate forest management techniques.
- 36.0 Collect and dispose of solid waste.
- 37.0 Manage fires.
- 38.0 Manage pests.
- 39.0 Manage ecosystems.
- 40.0 Plan and administer land use.
- 41.0 Protect resources.
- 42.0 Demonstrate employability & human relation skills.
- 43.0 Discuss restoration ecology.



2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Environmental Technology  
**Course Number:** 8913010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of hydrology, environmental standards and regulations, site assessment, geologic principles, 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.

**01.0 Describe hydrology--The student will be able to:**

- 01.01 Define basic hydrological terms.
- 01.02 Explain surface water systems.
- 01.03 Explain ground water systems.
- 01.04 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.
- 01.05 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.

**02.0 Practice safety skills and procedures--The student will be able to:**

- 02.01 Demonstrate proper safety precautions and use of common laboratory, testing, and personal protective equipment.
- 02.02 Identify and utilize safe work practices.
- 02.03 Identify physical, chemical, biological, and zoological hazards.
- 02.04 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.
- 02.05 Determine, review, and follow regulations.
- 02.06 Develop and maintain appropriate safety records.
- 02.07 Identify and describe "on the job" hazards and risks including fire/explosive, lead asbestos, and weather hazards.
- 02.08 Perform lifting activities safely.
- 02.09 Identify ladder safety and fall protection.
- 02.10 Become certified in first aid/CPR and describe First Responder responsibilities.

**03.0 Demonstrate sampling procedures--The student will be able to:**

- 03.01 Define sampling objectives and protocol.
- 03.02 Operate, calibrate, and maintain sampling equipment.
- 03.03 Develop sampling strategy.
- 03.04 Perform applicable field measurements.

- 03.05 Appropriately preserve, document, and dispose of samples.
- 03.06 Identify cross-contamination and other risks associated with sampling.
- 03.07 Describe, plan, and utilize quality assurance practices.
- 03.08 Submit samples for analysis.
- 03.09 Perform periodic follow-up sampling.

04.0 Discuss related standards and regulations--The student will be able to:

- 04.01 Explain the importance and impacts of local, state, and federal regulations and required documentation.
- 04.02 Describe the Florida Administrative Code's (F.A.C.) impact on environmental issues.
- 04.03 Discuss the Clean Water Act.
- 04.04 Identify local, state, and national regulatory agencies and discuss their roles in relation to state and federal laws and statutes.
- 04.05 Research how rules and laws are made and mandated.
- 04.06 Research and report how endangered species get listed.
- 04.07 Describe permitting procedures.
- 04.08 Identify regulation resources.
- 04.09 Describe various licensing procedures.

05.0 Conduct site assessment--The student will be able to:

- 05.01 Identify the purposes of site assessment.
- 05.02 Describe required documentation.
- 05.03 Identify the phases of site assessment.
- 05.04 Obtain background design information
- 05.05 Verify blueprint accuracy.
- 05.06 Conduct manual survey.
- 05.07 Obtain physical and performance measurements.
- 05.08 Determine system safety impacts.
- 05.09 Determine possible nature and extent of exposure.
- 05.10 Assess needed equipment and processes.
- 05.11 Identify type of mechanical systems required.
- 05.12 Determine operational criteria.
- 05.13 Recommend corrective action.

06.0 Describe related geologic principles--The student will be able to:

- 06.01 Explain the geological history of Florida.
- 06.02 Create a soil profile and describe the associated components.
- 06.03 Evaluate soil profiles, land-capability classes, and soil conservation practices.
- 06.04 Interpret legal descriptions of land.
- 06.05 Identify mapping and surveying techniques and equipment.

07.0 Manage wetlands--The student will be able to:

- 07.01 Identify ecosystems.
- 07.02 Discuss the structure and function of wetlands.
- 07.03 Define limits of wetlands.
- 07.04 Discuss habitat value.

- 07.05 Identify fauna and flora.
- 07.06 Determine desirable vs. nuisance plant and animal species.
- 08.0 Manage wildlife--The student will be able to:
  - 08.01 Identify and compare wildlife species.
  - 08.02 Identify and describe life histories of game species.
  - 08.03 Identify and describe life histories of non-game species.
  - 08.04 Discuss urban wildlife management.
  - 08.05 Describe community ecology.
  - 08.06 Identify and practice wildlife techniques and principles.
  - 08.07 Discuss population dynamics.
- 09.0 Manage forests--The student will be able to:
  - 09.01 Describe dendrology.
  - 09.02 Describe silviculture.
  - 09.03 Identify and demonstrate replanting techniques.
  - 09.04 Discuss harvesting techniques.
  - 09.05 Identify timber stand improvement.
  - 09.06 Identify timber and forest products.
- 10.0 Identify career opportunities and organizational dynamics--The student will be able to:
  - 10.01 Identify careers and opportunities in the following fields: Surface/stormwater, drinking water, wastewater, groundwater, land resources, air quality, solid waste, and HAZMAT.
  - 10.02 Compare supervisory and administrative responsibilities.
  - 10.03 Identify organizational structures.
  - 10.04 Identify team building communication skills.
  - 10.05 Identify problem-solving techniques.
  - 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.
- 21.0 Demonstrate language arts knowledge and skills--The students will be able to: (AF 2.0)
  - 21.01 Locate, comprehend and evaluate key elements of oral and written information. (AF2.4)
  - 21.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. (AF2.5)
  - 21.03 Present information formally and informally for specific purposes and audiences. (AF2.9)
- 22.0 Demonstrate mathematics knowledge and skills--The students will be able to: (AF3.0)
  - 22.01 Demonstrate knowledge of arithmetic operations. (AF3.2)

- 22.02 Analyze and apply data and measurements to solve problems and interpret documents. (AF3.4)
- 22.03 Construct charts/tables/graphs using functions and data. (AF3.5)
- 23.0 Demonstrate science knowledge and skills--The students will be able to: (AF4.0)
  - 23.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. (AF4.1)
  - 23.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. (AF4.3)
- 24.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 24.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. (CM 1.0)
  - 24.02 Locate, organize and reference written information from various sources. (CM 3.0)
  - 24.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. (CM 5.0)
  - 24.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. (CM 6.0)
  - 24.05 Apply active listening skills to obtain and clarify information. (CM 7.0)
  - 24.06 Develop and interpret tables and charts to support written and oral communications. (CM 8.0)
  - 24.07 Exhibit public relations skills that aid in achieving customer satisfaction. (CM 10.0)
- 25.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 25.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. (PS1.0)
  - 25.02 Employ critical thinking and interpersonal skills to resolve conflicts. (PS 2.0)
  - 25.03 Identify and document workplace performance goals and monitor progress toward those goals. (PS 3.0)
  - 25.04 Conduct technical research to gather information necessary for decision-making. (PS 4.0)

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Environmental Technology 2  
**Course Number:** 8913020  
**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.

02.0 Practice safety skills and procedures--The student will be able to:

- 02.11 Identify safety procedures for: Wells, pumps, electrical equipment, motor vehicles, buildings, and other necessary equipment.
- 02.12 Handle compressed gasses, solids, and liquids safely.
- 02.13 Summarize "Right of Access" law.
- 02.14 Summarize "Confined Space" regulations.
- 02.15 Identify Zero Tolerance policies.
- 02.16 Identify employee limitations.
- 02.17 Identify appropriate decontamination procedures.
- 02.18 Identify principles of toxicology.
- 02.19 Identify routes of exposure.
- 02.20 Identify respirator safety procedures.
- 02.21 Discuss history of hazardous materials and hazardous categories.
- 02.22 Discuss common chemical compatibility.

04.0 Discuss related standards and regulations--The student will be able to:

- 04.10 Identify appropriate agencies and their functions
- 04.11 Describe the role of environmental protection.
- 04.12 Interpret the Regulatory File System.
- 04.13 Create, evaluate and present a well-head protection plan.

10.0 Identify career opportunities and organizational dynamics--The student will be able to:

- 10.11 Recognize and demonstrate effective communications skills in the workplace.
- 10.12 Design and conduct presentations.

11.0 Describe water treatment techniques--The student will be able to:

- 11.01 Understand pretreatment, primary, secondary, and tertiary treatment processes of wastewater.
- 11.02 Describe disposal options.
- 11.03 Identify septic tanks types and functions.

- 12.0 Describe stormwater systems--The student will be able to:
  - 12.01 Research current construction trends and methods of stormwater systems.
  - 12.02 Define topography and its effects on stormwater.
  
- 13.0 Manage data and physical resources--The student will be able to:
  - 13.01 Utilize word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, GIS, and security.
  - 13.02 Identify possible funding sources.
  - 13.03 Prepare budgets and purchase orders.
  - 13.04 Prepare a time management plan.
  - 13.05 Utilize information databases.
  - 13.06 Locate and interpret printed reference materials.
  - 13.07 Describe network opportunities.
  - 13.08 Maintain necessary/required record keeping practices and procedures.
  - 13.09 Keep inventory, time sheets, and equipment maintenance logs.
  - 13.10 Identify suppliers and technical resources.
  
- 14.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems--The student will be able to:
  - 14.01 Define GIS and its function.
  - 14.02 Use GIS software.
  - 14.03 Learn GIS applications.
  - 14.04 Download LANDSTAT Satellite system into GIS.
  - 14.05 Develop a GIS model.
  - 14.06 Define GPS and its function.
  - 14.07 Collect GPS data and load on GIS.
  - 14.08 Research and identify other remote sensing tools.
  
- 15.0 Manage hazardous materials--The student will be able to:
  - 15.01 Describe flow and life cycles of materials.
  - 15.02 Identify proper chemical handling and storage guidelines.
  - 15.03 Describe material management procedures.
  - 15.04 Identify waste minimization, pollution prevention and alternatives to disposal.
  - 15.05 Describe waste determination procedures.
  - 15.06 Describe storage tank procedures.
  - 15.07 Identify biochemical/medical waste.
  - 15.08 Describe shipping and transportation procedures of hazardous materials.
  - 15.09 Identify and interpret phase I and II audits.
  - 15.10 Interpret closure reports.
  - 15.11 Write contamination assessment reports.
  
- 16.0 Control incidents--The student will be able to:
  - 16.01 Identify and describe reasons for controlling incidents.
  - 16.02 Describe levels of response.
  - 16.03 Determine and use proper chain of command.

- 16.04 Determine methods of control.
  - 16.05 Demonstrate site access restriction methods.
  - 16.06 Identify appropriate authorities to be notified.
  - 16.07 Place equipment appropriately.
  - 16.08 Orient zones.
  - 16.09 Identify possible geographic hazards.
  - 16.10 Identify media protocol and procedures for communicating with the public.
  - 16.11 Prepare a press release for a mock incident
- 17.0 Prepare a plan--The student will be able to:
- 17.01 Describe the need for and types of pre-planning.
  - 17.02 Identify and select necessary agency involvement.
  - 17.03 Identify possible contamination zones.
  - 17.04 Create contention plans for hurricane, tornadoes, floods, fires, and nuclear accidents.
  - 17.05 Discuss Superfund Amendments Reauthorization Act (SARA) also known as the Emergency Planning and Community Right-to-Know Act (EPCRA) regulations.
  - 17.06 Create plan for deployment.
  - 17.07 Evaluate contingency plans.
  - 17.08 Write a contingency plan.
  - 17.09 Conduct mock disaster activities.
- 18.0 Perform remediation--The student will be able to:
- 18.01 Research appropriate cleaning methods.
  - 18.02 Create a plan for a disaster clean up including needed materials and equipment.
  - 18.03 Conduct entry and closure methods.
  - 18.04 Identify contamination removal procedures.
  - 18.05 Design a site/system cleanliness verification procedure.
  - 18.06 Identify tear down and demobilization procedures.
- 19.0 Collect and dispose of solid waste--The student will be able to:
- 19.01 Describe history of solid waste disposal.
  - 19.02 Identify types of waste.
  - 19.03 Research and evaluate solid waste disposal options. (Landfill, incineration, and composting, etc.)
- 20.0 Identify continuing education needs and opportunities--The student will be able to:
- 20.01 Determine continuing education needs/goals.
  - 20.02 Identify available educational and financial resources.
  - 20.03 Identify appropriate professional associations and attend meetings where applicable.
  - 20.04 Read and review trade journals.
- 26.0 Use information technology tools--The students will be able to:
- 26.01 Use personal information management (PIM) applications to increase workplace efficiency. (IT 1.0)

- 26.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. (IT 2.0)
- 26.03 Employ computer operations applications to access, create, manage, integrate, and store information. (IT 3.0)
- 26.04 Employ collaborative/groupware applications to facilitate group work. (IT 4.0)
- 27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 27.01 Describe the nature and types of business organizations. (SY 1.0)
  - 27.02 Explain the effect of key organizational systems on performance and quality.
  - 27.03 List and describe quality control systems and/or practices common to the workplace. (SY 2.0)
  - 27.04 Explain the impact of the global economy on business organizations.
- 28.0 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:
  - 28.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. (SHE 1.0)
  - 28.02 Explain emergency procedures to follow in response to workplace accidents.
  - 28.03 Create a disaster and/or emergency response plan. (SHE 2.0)
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 29.01 Employ leadership skills to accomplish organizational goals and objectives. (LT1.0)
  - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. (LT3.0)
  - 29.03 Conduct and participate in meetings to accomplish work tasks. (LT 4.0)
  - 29.04 Employ mentoring skills to inspire and teach others. (LT 5.0)
- 30.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 30.01 Evaluate and justify decisions based on ethical reasoning. (ELR 1.0)
  - 30.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. (ELR1.1)
  - 30.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. (ELR1.2)
  - 30.04 Interpret and explain written organizational policies and procedures. (ELR 2.0)
- 31.0 Explain the importance of employability skill and entrepreneurship skills. The students will be able to:
  - 31.01 Identify and demonstrate positive work behaviors needed to be employable. (ECD 1.0)



- 31.02 Develop personal career plan that includes goals, objectives, and strategies. (ECD 2.0)
  - 31.03 Examine licensing, certification, and industry credentialing requirements. (ECD 3.0)
  - 31.04 Maintain a career portfolio to document knowledge, skills, and experience. (ECD 5.0)
  - 31.05 Evaluate and compare employment opportunities that match career goals. (ECD 6.0)
  - 31.06 Identify and exhibit traits for retaining employment. (ECD 7.0)
  - 31.07 Identify opportunities and research requirements for career advancement. (ECD 8.0)
  - 31.08 Research the benefits of ongoing professional development. (ECD 9.0)
  - 31.09 Examine and describe entrepreneurship opportunities as a career planning option. (ECD 10.0)
- 32.0 Demonstrate personal money-management concepts, procedures, and strategies. The students will be able to:
- 32.01 Identify and describe the services and legal responsibilities of financial institutions. (FL 2.0)
  - 32.02 Describe the effect of money management on personal and career goals. (FL 3.0)
  - 32.03 Develop a personal budget and financial goals. (FL3.1)
  - 32.04 Complete financial instruments for making deposits and withdrawals. (FL3.2)
  - 32.05 Maintain financial records. (FL3.3)
  - 32.06 Read and reconcile financial statements. (FL3.4)
  - 32.07 Research, compare and contrast investment opportunities.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Land Resources 3  
**Course Number:** 8913030  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of managing wetlands, wildlife, forest, fire, pests, and ecosystems, solid waste disposal, 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.

33.0 Evaluate wetlands management practices--The student will be able to:

- 33.01 Research control treatments for undesirable plants.
- 33.02 Discuss mitigation techniques
- 33.03 Evaluate impacts on wetlands.

34.0 Evaluate wildlife management procedures--The student will be able to:

- 34.01 Discuss basic mammalogy.
- 34.02 Discuss basic ornithology.
- 34.03 Discuss basic herpetology.
- 34.04 Use a dichotomous key.
- 34.05 Conduct experimental design and statistical analysis.
- 34.06 Conduct biological data collection.
- 34.07 Interpret data.
- 34.08 Investigate system evolution.
- 34.09 Identify common wildlife diseases and parasites.

35.0 Evaluate forest management techniques--The student will be able to:

- 35.01 Identify surveying techniques.
- 35.02 Perform timber cruising activity.
- 35.03 Perform a pacing exercise.
- 35.04 Calculate area using chains.
- 35.05 Calculate timber volumes using a Biltmore stick.
- 35.06 Identify and discuss Forestry Best Management Practices (BMP).
- 35.07 Research forestry/nursery production practices.
- 35.08 Discuss marketability of forests.
- 35.09 Identify timber marketing strategies.
- 35.10 Identify related forestry equipment.

36.0 Collect and dispose of solid waste--The student will be able to:

- 36.01 Demonstrate the construction of artificial reefs.
- 36.02 Identify disposal methods of hazardous and biomedical waste.

- 36.03 Describe recycling methods.
- 36.04 Visit a Materials Recycling Facility.

37.0 Manage fires--The student will be able to:

- 37.01 Describe the history of fire usage in Florida.
- 37.02 Discuss the effects of prescribed burns and wildfires on communities in Florida.
- 37.03 Identify and discuss safety equipment and practices related to fire management.
- 37.04 Identify and discuss wildfire suppression techniques.
- 37.05 Describe prescribed burn techniques.
- 37.06 Evaluate site for prescribed burn.
- 37.07 Discuss fire weather behavior.
- 37.08 Discuss seasonal ecological affects of burning.
- 37.09 Write a prescription for a prescribed burn.
- 37.10 Visit a prescribed burn site.
- 37.11 Evaluate the burn.

38.0 Manage pests--The student will be able to:

- 38.01 Discuss botany and plant taxonomy.
- 38.02 Discuss common pests.
- 38.03 Classify insects using a dichotomous key
- 38.04 Describe life cycles of common pests.
- 38.05 Describe biological, chemical, and cultural methods of managing plant pests.
- 38.06 Identify and select an appropriate control for each type of pest and/or weed.
- 38.07 Describe the principles and benefits of integrated pest management.

39.0 Manage ecosystems--The student will be able to:

- 39.01 Identify habitat types of Florida.
- 39.02 Identify archeological and historical perspectives of ecosystems.
- 39.03 Describe specific species associations for habitats.
- 39.04 Describe how ecosystems interrelate.
- 39.05 Research associated species.
- 39.06 Identify management techniques.

40.0 Plan and administer land use--The student will be able to:

- 40.01 Discuss the geography of the area.
- 40.02 Review historical information of the area.
- 40.03 Review section, township, and range maps.
- 40.04 Review aerial maps.
- 40.05 Interpret topographical and flood plain maps.
- 40.06 Forecast demographic patterns.
- 40.07 Discuss population dynamics.
- 40.08 Conduct population studies.
- 40.09 Discuss growth management.
- 40.10 Discuss coastal management issues.
- 40.11 Describe special protection zones.
- 40.12 Research per capita land consumption
- 40.13 Compare consumptive and non-consumptive land uses.

40.14 Describe and compare land uses including commercial, residential, recreational and agricultural uses.

40.15 Design a balanced land use plan.

41.0 Protect resources--The student will be able to:

41.01 Identify and discuss archeological sites.

41.02 Describe Endangered Species Act.

41.03 Research regulations regarding protection of wildlife resources.

41.04 Research wetland protection practices.

41.05 Identify soil protection practices.

41.06 Identify related law enforcement careers and responsibilities.

41.07 Identify personal and of jurisdictional rights of landowners.

42.0 Demonstrate employability & human relation skills--The student will be able to:

42.01 Enhance oral communications and presentation skills.

42.02 Demonstrate interpersonal (nonverbal) communication skills.

42.03 Demonstrate good listening skills.

42.04 Discuss media relations.

42.05 Create a media campaign for an environmental issue.

42.06 Develop audience appropriate communications.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Land Resources 4  
**Course Number:** 8913040  
**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.

38.0 Manage pests--The student will be able to:

- 38.08 Discuss urban entomology.
- 38.09 Assess environmental impact of pests.
- 38.10 Conduct pest population studies.
- 38.11 Discuss pesticide safety/regulations.
- 38.12 Discuss basic toxicology.
- 38.13 Identify chemicals used in pest management.
- 38.14 Collect biological data.

39.0 Manage ecosystems--The student will be able to:

- 39.07 Describe political, biological, economical, and sociological impacts on managing ecosystems.
- 39.08 Describe the effects of manipulation of species composition.
- 39.09 Compare population dynamics.
- 39.10 Discuss the effects of genetic isolation.
- 39.11 Discuss bio-diversity.
- 39.12 Evaluate how external factors affect communities.
- 39.13 Research public use.
- 39.14 Identify remote sensing techniques.
- 39.15 Identify vegetative monitoring techniques
- 39.16 Conduct vegetation analysis.
- 39.17 Perform sampling, management, and analysis of data.
- 39.18 Practice ecological ethics.

40.0 Plan and administer land use--The student will be able to:

- 40.16 Conduct an environmental assessment for a specific site.
- 40.17 Conduct a property title search.
- 40.18 Describe different kinds of acquisitions.
- 40.19 Discuss concurrency management system.
- 40.20 Research service comprehensive plans.
- 40.21 Audit conservation as a means to protect and restore.
- 40.22 Discuss the effects of drainage on resources. .

- 40.23 Discuss unique environmental features. .
- 40.24 Analyze sanitary sewer, water supply, and sewer needs. .
- 40.25 Discuss the need for inter-group coordination activities. .
- 40.26 Conduct a compatibility analysis.
- 40.27 Prepare and write a conservation plan for a specific parcel of land.
- 40.28 Write a capital improvement plan.
- 40.29 Project maintenance management costs.

41.0 Demonstrate employability & human relation skills--The student will be able to:

- 41.08 Write a communication plan.
- 41.09 Research ecotourism opportunities
- 41.10 Design an ecotour for an environmental area in the community.
- 41.11 Perform public awareness activities.
- 41.12 Design educational materials.

42.0 Discuss restoration ecology--The student will be able to:

- 42.07 Review geology, pedology, and hydrology.
- 42.08 Research of vegetation dynamics.
- 42.09 Determine requirements for preserving plant viability
- 42.10 Propagate and grow plants through sexual and/or asexual reproduction.
- 42.11 Select and prepare plants for transporting and transplanting.
- 42.12 Install plant materials.
- 42.13 Describe restoration techniques.
- 42.14 Research wetlands reclamation and uplands restoration
- 42.15 Diagnose restoration from a systems approach.
- 42.16 Discuss mine reclamation.
- 42.17 Identify related equipment.
- 42.18 Research applicable monitoring techniques.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Air Quality Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	8914000
CIP Number	0715059903
Grade Level	9-12, 30, 31
Standard Length	3 credits
Teacher Certification	AGRICULTUR 1 @2 WSP OPER @7 G BIOLOGY 1
CTSO	FPSA or FFA
SOC Codes (all applicable)	17-3025
Facility Code	203 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 & 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 air quality sector of the Agriculture, Food & Natural Resources career cluster.

The content includes but is not limited to knowledge of federal, state, and local regulations; ecosystem awareness; problem recognition; water quality issues; solid and liquid waste management issues; air quality issues; managing hazardous materials; managing forests, wetlands, fisheries, and wildlife; planning and administering land use; protecting resources; conducting site assessments; sampling procedures; safety procedures; compliance monitoring and quality assurance procedures; and instruction in environmental technology.

## Program Structure

This program is a planned sequence of instruction consisting of three courses and two occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
	8913010	Introduction to Environmental Technology	1 credit		2
A	8913020	Environmental Technology 2	1 credit	17-3025	2
B	8914010	Air Quality 3	1 credit	17-3025	3

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### Career and Technical Student Organization (CTSO)

FPSC or 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### Accommodations



Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Describe hydrology.
- 02.0 Practice safety skills and procedures.
- 03.0 Demonstrate sampling procedures.
- 04.0 Discuss related standards and regulations.
- 05.0 Conduct site assessment.
- 06.0 Describe related geologic principles.
- 07.0 Manage wetlands.
- 08.0 Manage wildlife.
- 09.0 Manage forests.
- 10.0 Identify career opportunities and organizational dynamics.
- 11.0 Describe water treatment techniques.
- 12.0 Describe stormwater systems.
- 13.0 Manage data and physical resources.
- 14.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems.
- 15.0 Manage hazardous materials.
- 16.0 Control incidents.
- 17.0 Prepare a plan.
- 18.0 Perform remediation.
- 19.0 Collect and dispose of solid waste.
- 20.0 Identify continuing education needs and opportunities.
- 21.0 Demonstrate language arts knowledge and skills.
- 22.0 Demonstrate mathematics knowledge and skills.
- 23.0 Demonstrate science knowledge and skills.
- 24.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 25.0 Solve problems using critical thinking skills, creativity and innovation.
- 26.0 Use information technology tools.
- 27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 28.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 30.0 Describe the importance of professional ethics and legal responsibilities.
- 31.0 Explain the importance of employability skill and entrepreneurship skills.
- 32.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 33.0 Conduct air sampling.
- 34.0 Identify career opportunities and organizational dynamics in air quality occupations.
- 35.0 Describe the health effects of atmospheric pollution.
- 36.0 Demonstrate employability & human relation skills.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Environmental Technology  
**Course Number:** 8913010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of hydrology, environmental standards and regulations, site assessment, geologic principles, 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.

**01.0 Describe hydrology--The student will be able to:**

- 01.01 Define basic hydrological terms.
- 01.02 Explain surface water systems.
- 01.03 Explain ground water systems.
- 01.04 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.
- 01.05 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.

**02.0 Practice safety skills and procedures--The student will be able to:**

- 02.01 Demonstrate proper safety precautions and use of common laboratory, testing, and personal protective equipment.
- 02.02 Identify and utilize safe work practices.
- 02.03 Identify physical, chemical, biological, and zoological hazards.
- 02.04 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.
- 02.05 Determine, review, and follow regulations.
- 02.06 Develop and maintain appropriate safety records.
- 02.07 Identify and describe "on the job" hazards and risks including fire/explosive, lead asbestos, and weather hazards.
- 02.08 Perform lifting activities safely.
- 02.09 Identify ladder safety and fall protection.
- 02.10 Become certified in first aid/CPR and describe First Responder responsibilities.

**03.0 Demonstrate sampling procedures--The student will be able to:**

- 03.01 Define sampling objectives and protocol.
- 03.02 Operate, calibrate, and maintain sampling equipment.
- 03.03 Develop sampling strategy.
- 03.04 Perform applicable field measurements.

- 03.05 Appropriately preserve, document, and dispose of samples.
- 03.06 Identify cross-contamination and other risks associated with sampling.
- 03.07 Describe, plan, and utilize quality assurance practices.
- 03.08 Submit samples for analysis.
- 03.09 Perform periodic follow-up sampling.

04.0 Discuss related standards and regulations--The student will be able to:

- 04.01 Explain the importance and impacts of local, state, and federal regulations and required documentation.
- 04.02 Describe the Florida Administrative Code's (F.A.C.) impact on environmental issues.
- 04.03 Discuss the Clean Water Act.
- 04.04 Identify local, state, and national regulatory agencies and discuss their roles in relation to state and federal laws and statutes.
- 04.05 Research how rules and laws are made and mandated.
- 04.06 Research and report how endangered species get listed.
- 04.07 Describe permitting procedures.
- 04.08 Identify regulation resources.
- 04.09 Describe various licensing procedures.

05.0 Conduct site assessment--The student will be able to:

- 05.01 Identify the purposes of site assessment.
- 05.02 Describe required documentation.
- 05.03 Identify the phases of site assessment.
- 05.04 Obtain background design information
- 05.05 Verify blueprint accuracy.
- 05.06 Conduct manual survey.
- 05.07 Obtain physical and performance measurements.
- 05.08 Determine system safety impacts.
- 05.09 Determine possible nature and extent of exposure.
- 05.10 Assess needed equipment and processes.
- 05.11 Identify type of mechanical systems required.
- 05.12 Determine operational criteria.
- 05.13 Recommend corrective action.

06.0 Describe related geologic principles--The student will be able to:

- 06.01 Explain the geological history of Florida.
- 06.02 Create a soil profile and describe the associated components.
- 06.03 Evaluate soil profiles, land-capability classes, and soil conservation practices.
- 06.04 Interpret legal descriptions of land.
- 06.05 Identify mapping and surveying techniques and equipment.

07.0 Manage wetlands--The student will be able to:

- 07.01 Identify ecosystems.
- 07.02 Discuss the structure and function of wetlands.
- 07.03 Define limits of wetlands.
- 07.04 Discuss habitat value.

- 07.05 Identify fauna and flora.
- 07.06 Determine desirable vs. nuisance plant and animal species.
- 08.0 Manage wildlife--The student will be able to:
  - 08.01 Identify and compare wildlife species.
  - 08.02 Identify and describe life histories of game species.
  - 08.03 Identify and describe life histories of non-game species.
  - 08.04 Discuss urban wildlife management.
  - 08.05 Describe community ecology.
  - 08.06 Identify and practice wildlife techniques and principles.
  - 08.07 Discuss population dynamics.
- 09.0 Manage forests--The student will be able to:
  - 09.01 Describe dendrology.
  - 09.02 Describe silviculture.
  - 09.03 Identify and demonstrate replanting techniques.
  - 09.04 Discuss harvesting techniques.
  - 09.05 Identify timber stand improvement.
  - 09.06 Identify timber and forest products.
- 10.0 Identify career opportunities and organizational dynamics--The student will be able to:
  - 10.01 Identify careers and opportunities in the following fields: Surface/stormwater, drinking water, wastewater, groundwater, land resources, air quality, solid waste, and HAZMAT.
  - 10.02 Compare supervisory and administrative responsibilities.
  - 10.03 Identify organizational structures.
  - 10.04 Identify team building communication skills.
  - 10.05 Identify problem-solving techniques.
  - 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.
- 21.0 Demonstrate language arts knowledge and skills--The students will be able to: (AF 2.0)
  - 21.01 Locate, comprehend and evaluate key elements of oral and written information. (AF2.4)
  - 21.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. (AF2.5)
  - 21.03 Present information formally and informally for specific purposes and audiences. (AF2.9)
- 22.0 Demonstrate mathematics knowledge and skills--The students will be able to: (AF3.0)
  - 22.01 Demonstrate knowledge of arithmetic operations. (AF3.2)

- 22.02 Analyze and apply data and measurements to solve problems and interpret documents. (AF3.4)
- 22.03 Construct charts/tables/graphs using functions and data. (AF3.5)
- 23.0 Demonstrate science knowledge and skills--The students will be able to: (AF4.0)
  - 23.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. (AF4.1)
  - 23.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. (AF4.3)
- 24.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 24.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. (CM 1.0)
  - 24.02 Locate, organize and reference written information from various sources. (CM 3.0)
  - 24.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. (CM 5.0)
  - 24.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. (CM 6.0)
  - 24.05 Apply active listening skills to obtain and clarify information. (CM 7.0)
  - 24.06 Develop and interpret tables and charts to support written and oral communications. (CM 8.0)
  - 24.07 Exhibit public relations skills that aid in achieving customer satisfaction. (CM 10.0)
- 25.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 25.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. (PS1.0)
  - 25.02 Employ critical thinking and interpersonal skills to resolve conflicts. (PS 2.0)
  - 25.03 Identify and document workplace performance goals and monitor progress toward those goals. (PS 3.0)
  - 25.04 Conduct technical research to gather information necessary for decision-making. (PS 4.0)

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Environmental Technology 2  
**Course Number:** 8913020  
**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.

02.0 Practice safety skills and procedures--The student will be able to:

- 02.11 Identify safety procedures for: Wells, pumps, electrical equipment, motor vehicles, buildings, and other necessary equipment.
- 02.12 Handle compressed gasses, solids, and liquids safely.
- 02.13 Summarize "Right of Access" law.
- 02.14 Summarize "Confined Space" regulations.
- 02.15 Identify Zero Tolerance policies.
- 02.16 Identify employee limitations.
- 02.17 Identify appropriate decontamination procedures.
- 02.18 Identify principles of toxicology.
- 02.19 Identify routes of exposure.
- 02.20 Identify respirator safety procedures.
- 02.21 Discuss history of hazardous materials and hazardous categories.
- 02.22 Discuss common chemical compatibility.

04.0 Discuss related standards and regulations--The student will be able to:

- 04.10 Identify appropriate agencies and their functions
- 04.11 Describe the role of environmental protection.
- 04.12 Interpret the Regulatory File System.
- 04.13 Create, evaluate and present a well-head protection plan.

10.0 Identify career opportunities and organizational dynamics--The student will be able to:

- 10.11 Recognize and demonstrate effective communications skills in the workplace.
- 10.12 Design and conduct presentations.

11.0 Describe water treatment techniques--The student will be able to:

- 11.01 Understand pretreatment, primary, secondary, and tertiary treatment processes of wastewater.
- 11.02 Describe disposal options.
- 11.03 Identify septic tanks types and functions.

- 12.0 Describe stormwater systems--The student will be able to:
  - 12.01 Research current construction trends and methods of stormwater systems.
  - 12.02 Define topography and its effects on stormwater.
  
- 13.0 Manage data and physical resources--The student will be able to:
  - 13.01 Utilize word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, GIS, and security.
  - 13.02 Identify possible funding sources.
  - 13.03 Prepare budgets and purchase orders.
  - 13.04 Prepare a time management plan.
  - 13.05 Utilize information databases.
  - 13.06 Locate and interpret printed reference materials.
  - 13.07 Describe network opportunities.
  - 13.08 Maintain necessary/required record keeping practices and procedures.
  - 13.09 Keep inventory, time sheets, and equipment maintenance logs.
  - 13.10 Identify suppliers and technical resources.
  
- 14.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems--The student will be able to:
  - 14.01 Define GIS and its function.
  - 14.02 Use GIS software.
  - 14.03 Learn GIS applications.
  - 14.04 Download LANDSTAT Satellite system into GIS.
  - 14.05 Develop a GIS model.
  - 14.06 Define GPS and its function.
  - 14.07 Collect GPS data and load on GIS.
  - 14.08 Research and identify other remote sensing tools.
  
- 15.0 Manage hazardous materials--The student will be able to:
  - 15.01 Describe flow and life cycles of materials.
  - 15.02 Identify proper chemical handling and storage guidelines.
  - 15.03 Describe material management procedures.
  - 15.04 Identify waste minimization, pollution prevention and alternatives to disposal.
  - 15.05 Describe waste determination procedures.
  - 15.06 Describe storage tank procedures.
  - 15.07 Identify biochemical/medical waste.
  - 15.08 Describe shipping and transportation procedures of hazardous materials.
  - 15.09 Identify and interpret phase I and II audits.
  - 15.10 Interpret closure reports.
  - 15.11 Write contamination assessment reports.
  
- 16.0 Control incidents--The student will be able to:
  - 16.01 Identify and describe reasons for controlling incidents.
  - 16.02 Describe levels of response.
  - 16.03 Determine and use proper chain of command.



- 16.04 Determine methods of control.
  - 16.05 Demonstrate site access restriction methods.
  - 16.06 Identify appropriate authorities to be notified.
  - 16.07 Place equipment appropriately.
  - 16.08 Orient zones.
  - 16.09 Identify possible geographic hazards.
  - 16.10 Identify media protocol and procedures for communicating with the public.
  - 16.11 Prepare a press release for a mock incident
- 17.0 Prepare a plan--The student will be able to:
- 17.01 Describe the need for and types of pre-planning.
  - 17.02 Identify and select necessary agency involvement.
  - 17.03 Identify possible contamination zones.
  - 17.04 Create contention plans for hurricane, tornadoes, floods, fires, and nuclear accidents.
  - 17.05 Discuss Superfund Amendments Reauthorization Act (SARA) also known as the Emergency Planning and Community Right-to-Know Act (EPCRA) regulations.
  - 17.06 Create plan for deployment.
  - 17.07 Evaluate contingency plans.
  - 17.08 Write a contingency plan.
  - 17.09 Conduct mock disaster activities.
- 18.0 Perform remediation--The student will be able to:
- 18.01 Research appropriate cleaning methods.
  - 18.02 Create a plan for a disaster clean up including needed materials and equipment.
  - 18.03 Conduct entry and closure methods.
  - 18.04 Identify contamination removal procedures.
  - 18.05 Design a site/system cleanliness verification procedure.
  - 18.06 Identify tear down and demobilization procedures.
- 19.0 Collect and dispose of solid waste--The student will be able to:
- 19.01 Describe history of solid waste disposal.
  - 19.02 Identify types of waste.
  - 19.03 Research and evaluate solid waste disposal options. (Landfill, incineration, and composting, etc.)
- 20.0 Identify continuing education needs and opportunities--The student will be able to:
- 20.01 Determine continuing education needs/goals.
  - 20.02 Identify available educational and financial resources.
  - 20.03 Identify appropriate professional associations and attend meetings where applicable.
  - 20.04 Read and review trade journals.
- 26.0 Use information technology tools--The students will be able to:
- 26.01 Use personal information management (PIM) applications to increase workplace efficiency. (IT 1.0)

- 26.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. (IT 2.0)
- 26.03 Employ computer operations applications to access, create, manage, integrate, and store information. (IT 3.0)
- 26.04 Employ collaborative/groupware applications to facilitate group work. (IT 4.0)
- 27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 27.01 Describe the nature and types of business organizations. (SY 1.0)
  - 27.02 Explain the effect of key organizational systems on performance and quality.
  - 27.03 List and describe quality control systems and/or practices common to the workplace. (SY 2.0)
  - 27.04 Explain the impact of the global economy on business organizations.
- 28.0 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:
  - 28.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. (SHE 1.0)
  - 28.02 Explain emergency procedures to follow in response to workplace accidents.
  - 28.03 Create a disaster and/or emergency response plan. (SHE 2.0)
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 29.01 Employ leadership skills to accomplish organizational goals and objectives. (LT1.0)
  - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. (LT3.0)
  - 29.03 Conduct and participate in meetings to accomplish work tasks. (LT 4.0)
  - 29.04 Employ mentoring skills to inspire and teach others. (LT 5.0)
- 30.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 30.01 Evaluate and justify decisions based on ethical reasoning. (ELR 1.0)
  - 30.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. (ELR1.1)
  - 30.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. (ELR1.2)
  - 30.04 Interpret and explain written organizational policies and procedures. (ELR 2.0)
- 31.0 Explain the importance of employability skill and entrepreneurship skills. The students will be able to:
  - 31.01 Identify and demonstrate positive work behaviors needed to be employable. (ECD 1.0)

- 31.02 Develop personal career plan that includes goals, objectives, and strategies. (ECD 2.0)
  - 31.03 Examine licensing, certification, and industry credentialing requirements. (ECD 3.0)
  - 31.04 Maintain a career portfolio to document knowledge, skills, and experience. (ECD 5.0)
  - 31.05 Evaluate and compare employment opportunities that match career goals. (ECD 6.0)
  - 31.06 Identify and exhibit traits for retaining employment. (ECD 7.0)
  - 31.07 Identify opportunities and research requirements for career advancement. (ECD 8.0)
  - 31.08 Research the benefits of ongoing professional development. (ECD 9.0)
  - 31.09 Examine and describe entrepreneurship opportunities as a career planning option. (ECD 10.0)
- 32.0 Demonstrate personal money-management concepts, procedures, and strategies. The students will be able to:
- 32.01 Identify and describe the services and legal responsibilities of financial institutions. (FL 2.0)
  - 32.02 Describe the effect of money management on personal and career goals. (FL 3.0)
  - 32.03 Develop a personal budget and financial goals. (FL3.1)
  - 32.04 Complete financial instruments for making deposits and withdrawals. (FL3.2)
  - 32.05 Maintain financial records. (FL3.3)
  - 32.06 Read and reconcile financial statements. (FL3.4)
  - 32.07 Research, compare and contrast investment opportunities.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Air Quality 3  
**Course Number:** 8914010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of sampling procedures, atmospheric pollution, 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.

33.0 Conduct air sampling --The student will be able to:

- 33.01 Discuss air sampling criteria.
- 33.02 Identify necessary air quality tests.
- 33.03 Collect and analyze air samples.
- 33.04 Record data into identified database program.
- 33.05 Interpret lab results.
- 33.06 Evaluate data.
- 33.07 Conduct noise sampling.

34.0 Identify career opportunities and organizational dynamics in air quality occupations—The students will be able to:

- 34.01 Research and create a presentation about air quality occupations and opportunities.
- 34.02 Determine the educational requirements and experience needed to enter and advance in air quality occupations.
- 34.03 Prepare a resume

35.0 Describe the health effects of atmospheric pollution--The student will be able to:

- 35.01 Research air pollutants and their threat to human health.
- 35.02 Identify causes of air pollutants.
- 35.03 Discuss the importance of particle size on distribution and deposition in regard to health effects.
- 35.04 Identify indoor air pollutants.
- 35.05 Discuss the health significance of pollutants formed or found in the home environment.
- 35.06 Describe the relationship between weather and air quality.
- 35.07 Define meteorological effects on dispersion of air pollutants.
- 35.08 Demonstrate an understanding of the qualitative and quantitative differences in pollutants produced by stationary sources as compared to mobile sources.
- 35.09 Describe the global impact of long distance transport.
- 35.10 Discuss the significance of photochemical reactions in air pollution.
- 35.11 Discuss the significance of Global Warming and its affect on climate change

- 35.12 Recognize the role of predictions in science
  - 35.13 Hypothesize the continued effects of the Greenhouse effect.
  - 35.14 Describe the basic principles of air pollution monitoring to assess the magnitude of air pollution problems.
  - 35.15 Describe control measures for particulate and gaseous pollutants.
  - 35.16 Discuss the basic principles of air pollution control technology.
  - 35.17 Research U.S. and Florida laws and regulations related to air pollution control programs and health effects of air pollution.
  - 35.18 Discuss the basic concept of derivation and application of Air Quality Standards.
  - 35.19 Evaluate current "clean air" regulations.
  - 35.20 Create a design to reduce and/or eliminate air pollution.
- 36.0 Demonstrate employability & human relation skills--The student will be able to:
- 36.01 Enhance oral communications and presentation skills.
  - 36.02 Demonstrate interpersonal (nonverbal) communication skills.
  - 36.03 Demonstrate good listening skills.
  - 36.04 Discuss media relations.
  - 36.05 Create a media campaign center around air quality issues.
  - 36.06 Develop audience appropriate communications.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Water Resources Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

<b>Secondary – Career Preparatory</b>	
Program Number	8916000
CIP Number	0715059904
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	AGRICULTUR 1 @2 WSP OPER @7 G BIOLOGY 1
CTSO	FPSA or FFA
SOC Codes (all applicable)	17-3025
Facility Code	203 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</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 & 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 water resources sector of the Agriculture, Food & Natural Resources career cluster.

The content includes but is not limited to knowledge of federal, state, and local regulations; ecosystem awareness; problem recognition; water quality issues; solid and liquid waste management issues; air quality issues; managing hazardous materials; managing forests, wetlands, fisheries, and wildlife; planning and administering land use; protecting resources; conducting site assessments; sampling procedures; safety procedures; compliance monitoring and quality assurance procedures; and instruction in environmental technology.

## Program Structure

This program is a planned sequence of instruction consisting of four courses and two occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
	8913010	Introduction to Environmental Technology	1 credit		2
A	8913020	Environmental Technology 2	1 credit	17-3025	2
	8916010	Water Quality Resources 3	1 credit		3
B	8916020	Water Quality Resources 4	1 credit	17-3025	3

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### Career and Technical Student Organization (CTSO)

FPSA or 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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



- 01.0 Describe hydrology.
- 02.0 Practice safety skills and procedures.
- 03.0 Demonstrate sampling procedures.
- 04.0 Discuss related standards and regulations.
- 05.0 Conduct site assessment.
- 06.0 Describe related geologic principles.
- 07.0 Manage wetlands.
- 08.0 Manage wildlife.
- 09.0 Manage forests.
- 10.0 Identify career opportunities and organizational dynamics.
- 11.0 Describe water treatment techniques.
- 12.0 Describe stormwater systems.
- 13.0 Manage data and physical resources.
- 14.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems.
- 15.0 Manage hazardous materials.
- 16.0 Control incidents.
- 17.0 Prepare preplanning.
- 18.0 Perform remediation.
- 19.0 Collect and dispose of solid waste.
- 20.0 Identify continuing education needs and opportunities.
- 21.0 Demonstrate language arts knowledge and skills.
- 22.0 Demonstrate mathematics knowledge and skills.
- 23.0 Demonstrate science knowledge and skills.
- 24.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 25.0 Solve problems using critical thinking skills, creativity and innovation.
- 26.0 Use information technology tools.
- 27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 28.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 30.0 Describe the importance of professional ethics and legal responsibilities.
- 31.0 Explain the importance of employability skill and entrepreneurship skills.
- 32.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 33.0 Discuss hydrology.
- 34.0 Conduct water sampling.
- 35.0 Discuss geology principles of water resources.
- 36.0 Explain water treatment techniques.
- 37.0 Discuss stormwater systems.
- 38.0 Describe water distribution.
- 39.0 Demonstrate the management and environmentally sound use of water resources.
- 40.0 Manage fisheries.
- 41.0 Maintain water treatment equipment and facilities.
- 42.0 Inspect and maintain drainage systems.
- 43.0 Describe the nature and origin of and career opportunities in aquaculture, mariculture and other hydrological industries.
- 44.0 Identify career opportunities and organizational dynamics in water resources.
- 45.0 Demonstrate water treatment techniques.

- 46.0 Compliance monitoring/inspection.
- 47.0 Discuss comprehensive quality assurance plan.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Environmental Technology  
**Course Number:** 8913010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas of hydrology, environmental standards and regulations, site assessment, geologic principles, 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.

01.0 Describe hydrology--The student will be able to:

- 01.01 Define basic hydrological terms.
- 01.02 Explain surface water systems.
- 01.03 Explain ground water systems.
- 01.04 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.
- 01.05 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.

02.0 Practice safety skills and procedures--The student will be able to:

- 02.01 Demonstrate proper safety precautions and use of common laboratory, testing, and personal protective equipment.
- 02.02 Identify and utilize safe work practices.
- 02.03 Identify physical, chemical, biological, and zoological hazards.
- 02.04 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.
- 02.05 Determine, review, and follow regulations.
- 02.06 Develop and maintain appropriate safety records.
- 02.07 Identify and describe "on the job" hazards and risks including fire/explosive, lead asbestos, and weather hazards.
- 02.08 Perform lifting activities safely.
- 02.09 Identify ladder safety and fall protection.
- 02.10 Become certified in first aid/CPR and describe First Responder responsibilities.

03.0 Demonstrate sampling procedures--The student will be able to:

- 03.01 Define sampling objectives and protocol.
- 03.02 Operate, calibrate, and maintain sampling equipment.
- 03.03 Develop sampling strategy.
- 03.04 Perform applicable field measurements.

- 03.05 Appropriately preserve, document, and dispose of samples.
- 03.06 Identify cross-contamination and other risks associated with sampling.
- 03.07 Describe, plan, and utilize quality assurance practices.
- 03.08 Submit samples for analysis.
- 03.09 Perform periodic follow-up sampling.

04.0 Discuss related standards and regulations--The student will be able to:

- 04.01 Explain the importance and impacts of local, state, and federal regulations and required documentation.
- 04.02 Describe the Florida Administrative Code's (F.A.C.) impact on environmental issues.
- 04.03 Discuss the Clean Water Act.
- 04.04 Identify local, state, and national regulatory agencies and discuss their roles in relation to state and federal laws and statutes.
- 04.05 Research how rules and laws are made and mandated.
- 04.06 Research and report how endangered species get listed.
- 04.07 Describe permitting procedures.
- 04.08 Identify regulation resources.
- 04.09 Describe various licensing procedures.

05.0 Conduct site assessment--The student will be able to:

- 05.01 Identify the purposes of site assessment.
- 05.02 Describe required documentation.
- 05.03 Identify the phases of site assessment.
- 05.04 Obtain background design information
- 05.05 Verify blueprint accuracy.
- 05.06 Conduct manual survey.
- 05.07 Obtain physical and performance measurements.
- 05.08 Determine system safety impacts.
- 05.09 Determine possible nature and extent of exposure.
- 05.10 Assess needed equipment and processes.
- 05.11 Identify type of mechanical systems required.
- 05.12 Determine operational criteria.
- 05.13 Recommend corrective action.

06.0 Describe related geologic principles--The student will be able to:

- 06.01 Explain the geological history of Florida.
- 06.02 Create a soil profile and describe the associated components.
- 06.03 Evaluate soil profiles, land-capability classes, and soil conservation practices.
- 06.04 Interpret legal descriptions of land.
- 06.05 Identify mapping and surveying techniques and equipment.

07.0 Manage wetlands--The student will be able to:

- 07.01 Identify ecosystems.
- 07.02 Discuss the structure and function of wetlands.
- 07.03 Define limits of wetlands.
- 07.04 Discuss habitat value.

- 07.05 Identify fauna and flora.
- 07.06 Determine desirable vs. nuisance plant and animal species.
- 08.0 Manage wildlife--The student will be able to:
  - 08.01 Identify and compare wildlife species.
  - 08.02 Identify and describe life histories of game species.
  - 08.03 Identify and describe life histories of non-game species.
  - 08.04 Discuss urban wildlife management.
  - 08.05 Describe community ecology.
  - 08.06 Identify and practice wildlife techniques and principles.
  - 08.07 Discuss population dynamics.
- 09.0 Manage forests--The student will be able to:
  - 09.01 Describe dendrology.
  - 09.02 Describe silviculture.
  - 09.03 Identify and demonstrate replanting techniques.
  - 09.04 Discuss harvesting techniques.
  - 09.05 Identify timber stand improvement.
  - 09.06 Identify timber and forest products.
- 10.0 Identify career opportunities and organizational dynamics--The student will be able to:
  - 10.01 Identify careers and opportunities in the following fields: Surface/stormwater, drinking water, wastewater, groundwater, land resources, air quality, solid waste, and HAZMAT.
  - 10.02 Compare supervisory and administrative responsibilities.
  - 10.03 Identify organizational structures.
  - 10.04 Identify team building communication skills.
  - 10.05 Identify problem-solving techniques.
  - 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.
- 21.0 Demonstrate language arts knowledge and skills--The students will be able to: (AF 2.0)
  - 21.01 Locate, comprehend and evaluate key elements of oral and written information. (AF2.4)
  - 21.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. (AF2.5)
  - 21.03 Present information formally and informally for specific purposes and audiences. (AF2.9)
- 22.0 Demonstrate mathematics knowledge and skills--The students will be able to: (AF3.0)
  - 22.01 Demonstrate knowledge of arithmetic operations. (AF3.2)

- 22.02 Analyze and apply data and measurements to solve problems and interpret documents. (AF3.4)
- 22.03 Construct charts/tables/graphs using functions and data. (AF3.5)
- 23.0 Demonstrate science knowledge and skills--The students will be able to: (AF4.0)
  - 23.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. (AF4.1)
  - 23.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. (AF4.3)
- 24.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 24.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. (CM 1.0)
  - 24.02 Locate, organize and reference written information from various sources. (CM 3.0)
  - 24.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. (CM 5.0)
  - 24.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. (CM 6.0)
  - 24.05 Apply active listening skills to obtain and clarify information. (CM 7.0)
  - 24.06 Develop and interpret tables and charts to support written and oral communications. (CM 8.0)
  - 24.07 Exhibit public relations skills that aid in achieving customer satisfaction. (CM 10.0)
- 25.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 25.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. (PS1.0)
  - 25.02 Employ critical thinking and interpersonal skills to resolve conflicts. (PS 2.0)
  - 25.03 Identify and document workplace performance goals and monitor progress toward those goals. (PS 3.0)
  - 25.04 Conduct technical research to gather information necessary for decision-making. (PS 4.0)

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Environmental Technology 2  
**Course Number:** 8913020  
**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.

02.0 Practice safety skills and procedures--The student will be able to:

- 02.11 Identify safety procedures for: Wells, pumps, electrical equipment, motor vehicles, buildings, and other necessary equipment.
- 02.12 Handle compressed gasses, solids, and liquids safely.
- 02.13 Summarize "Right of Access" law.
- 02.14 Summarize "Confined Space" regulations.
- 02.15 Identify Zero Tolerance policies.
- 02.16 Identify employee limitations.
- 02.17 Identify appropriate decontamination procedures.
- 02.18 Identify principles of toxicology.
- 02.19 Identify routes of exposure.
- 02.20 Identify respirator safety procedures.
- 02.21 Discuss history of hazardous materials and hazardous categories.
- 02.22 Discuss common chemical compatibility.

04.0 Discuss related standards and regulations--The student will be able to:

- 04.10 Identify appropriate agencies and their functions
- 04.11 Describe the role of environmental protection.
- 04.12 Interpret the Regulatory File System.
- 04.13 Create, evaluate and present a well-head protection plan.

10.0 Identify career opportunities and organizational dynamics--The student will be able to:

- 10.11 Recognize and demonstrate effective communications skills in the workplace.
- 10.12 Design and conduct presentations.

11.0 Describe water treatment techniques--The student will be able to:

- 11.01 Understand pretreatment, primary, secondary, and tertiary treatment processes of wastewater.
- 11.02 Describe disposal options.
- 11.03 Identify septic tanks types and functions.

- 12.0 Describe stormwater systems--The student will be able to:
  - 12.01 Research current construction trends and methods of stormwater systems.
  - 12.02 Define topography and its effects on stormwater.
  
- 13.0 Manage data and physical resources--The student will be able to:
  - 13.01 Utilize word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, GIS, and security.
  - 13.02 Identify possible funding sources.
  - 13.03 Prepare budgets and purchase orders.
  - 13.04 Prepare a time management plan.
  - 13.05 Utilize information databases.
  - 13.06 Locate and interpret printed reference materials.
  - 13.07 Describe network opportunities.
  - 13.08 Maintain necessary/required record keeping practices and procedures.
  - 13.09 Keep inventory, time sheets, and equipment maintenance logs.
  - 13.10 Identify suppliers and technical resources.
  
- 14.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems--The student will be able to:
  - 14.01 Define GIS and its function.
  - 14.02 Use GIS software.
  - 14.03 Learn GIS applications.
  - 14.04 Download LANDSTAT Satellite system into GIS.
  - 14.05 Develop a GIS model.
  - 14.06 Define GPS and its function.
  - 14.07 Collect GPS data and load on GIS.
  - 14.08 Research and identify other remote sensing tools.
  
- 15.0 Manage hazardous materials--The student will be able to:
  - 15.01 Describe flow and life cycles of materials.
  - 15.02 Identify proper chemical handling and storage guidelines.
  - 15.03 Describe material management procedures.
  - 15.04 Identify waste minimization, pollution prevention and alternatives to disposal.
  - 15.05 Describe waste determination procedures.
  - 15.06 Describe storage tank procedures.
  - 15.07 Identify biochemical/medical waste.
  - 15.08 Describe shipping and transportation procedures of hazardous materials.
  - 15.09 Identify and interpret phase I and II audits.
  - 15.10 Interpret closure reports.
  - 15.11 Write contamination assessment reports.
  
- 16.0 Control incidents--The student will be able to:
  - 16.01 Identify and describe reasons for controlling incidents.
  - 16.02 Describe levels of response.
  - 16.03 Determine and use proper chain of command.



- 16.04 Determine methods of control.
  - 16.05 Demonstrate site access restriction methods.
  - 16.06 Identify appropriate authorities to be notified.
  - 16.07 Place equipment appropriately.
  - 16.08 Orient zones.
  - 16.09 Identify possible geographic hazards.
  - 16.10 Identify media protocol and procedures for communicating with the public.
  - 16.11 Prepare a press release for a mock incident
- 17.0 Prepare a plan--The student will be able to:
- 17.01 Describe the need for and types of pre-planning.
  - 17.02 Identify and select necessary agency involvement.
  - 17.03 Identify possible contamination zones.
  - 17.04 Create contention plans for hurricane, tornadoes, floods, fires, and nuclear accidents.
  - 17.05 Discuss Superfund Amendments Reauthorization Act (SARA) also known as the Emergency Planning and Community Right-to-Know Act (EPCRA) regulations.
  - 17.06 Create plan for deployment.
  - 17.07 Evaluate contingency plans.
  - 17.08 Write a contingency plan.
  - 17.09 Conduct mock disaster activities.
- 18.0 Perform remediation--The student will be able to:
- 18.01 Research appropriate cleaning methods.
  - 18.02 Create a plan for a disaster clean up including needed materials and equipment.
  - 18.03 Conduct entry and closure methods.
  - 18.04 Identify contamination removal procedures.
  - 18.05 Design a site/system cleanliness verification procedure.
  - 18.06 Identify tear down and demobilization procedures.
- 19.0 Collect and dispose of solid waste--The student will be able to:
- 19.01 Describe history of solid waste disposal.
  - 19.02 Identify types of waste.
  - 19.03 Research and evaluate solid waste disposal options. (Landfill, incineration, and composting, etc.)
- 20.0 Identify continuing education needs and opportunities--The student will be able to:
- 20.01 Determine continuing education needs/goals.
  - 20.02 Identify available educational and financial resources.
  - 20.03 Identify appropriate professional associations and attend meetings where applicable.
  - 20.04 Read and review trade journals.
- 26.0 Use information technology tools--The students will be able to:
- 26.01 Use personal information management (PIM) applications to increase workplace efficiency. (IT 1.0)

- 26.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. (IT 2.0)
- 26.03 Employ computer operations applications to access, create, manage, integrate, and store information. (IT 3.0)
- 26.04 Employ collaborative/groupware applications to facilitate group work. (IT 4.0)
- 27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 27.01 Describe the nature and types of business organizations. (SY 1.0)
  - 27.02 Explain the effect of key organizational systems on performance and quality.
  - 27.03 List and describe quality control systems and/or practices common to the workplace. (SY 2.0)
  - 27.04 Explain the impact of the global economy on business organizations.
- 28.0 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:
  - 28.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. (SHE 1.0)
  - 28.02 Explain emergency procedures to follow in response to workplace accidents.
  - 28.03 Create a disaster and/or emergency response plan. (SHE 2.0)
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 29.01 Employ leadership skills to accomplish organizational goals and objectives. (LT1.0)
  - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. (LT3.0)
  - 29.03 Conduct and participate in meetings to accomplish work tasks. (LT 4.0)
  - 29.04 Employ mentoring skills to inspire and teach others. (LT 5.0)
- 30.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 30.01 Evaluate and justify decisions based on ethical reasoning. (ELR 1.0)
  - 30.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. (ELR1.1)
  - 30.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. (ELR1.2)
  - 30.04 Interpret and explain written organizational policies and procedures. (ELR 2.0)
- 31.0 Explain the importance of employability skill and entrepreneurship skills. The students will be able to:
  - 31.01 Identify and demonstrate positive work behaviors needed to be employable. (ECD 1.0)

- 31.02 Develop personal career plan that includes goals, objectives, and strategies. (ECD 2.0)
  - 31.03 Examine licensing, certification, and industry credentialing requirements. (ECD 3.0)
  - 31.04 Maintain a career portfolio to document knowledge, skills, and experience. (ECD 5.0)
  - 31.05 Evaluate and compare employment opportunities that match career goals. (ECD 6.0)
  - 31.06 Identify and exhibit traits for retaining employment. (ECD 7.0)
  - 31.07 Identify opportunities and research requirements for career advancement. (ECD 8.0)
  - 31.08 Research the benefits of ongoing professional development. (ECD 9.0)
  - 31.09 Examine and describe entrepreneurship opportunities as a career planning option. (ECD 10.0)
- 32.0 Demonstrate personal money-management concepts, procedures, and strategies. The students will be able to:
- 32.01 Identify and describe the services and legal responsibilities of financial institutions. (FL 2.0)
  - 32.02 Describe the effect of money management on personal and career goals. (FL 3.0)
  - 32.03 Develop a personal budget and financial goals. (FL3.1)
  - 32.04 Complete financial instruments for making deposits and withdrawals. (FL3.2)
  - 32.05 Maintain financial records. (FL3.3)
  - 32.06 Read and reconcile financial statements. (FL3.4)
  - 32.07 Research, compare and contrast investment opportunities.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Water Quality Technology 3  
**Course Number:** 8916010  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas hydrology, geology principles, water treatment techniques, stormwater systems, water distribution, management of water resources, management of fisheries, drainage systems, 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.

33.0 Discuss hydrology--The student will be able to:

- 33.01 Identify alternative sources of water.
- 33.02 Identify soil conditions as they relate to water quality.
- 33.03 Research and explain saltwater intrusion.
- 33.04 Research governmental regulation authorities associate with Florida's water sources.
- 33.05 Identify limnology systems.

34.0 Conduct water sampling--The student will be able to:

- 34.01 Discuss water testing lab criteria.
- 34.02 Collect and analyze water samples: grab and otherwise.
- 34.03 Record data into identified database program.
- 34.04 Interpret lab results.
- 34.05 Evaluate data.
- 34.06 Measure well volumes.
- 34.07 Describe organism sampling techniques.

35.0 Discuss geology principles of water resources--The student will be able to:

- 35.01 Analyze local mineral resources.
- 35.02 Describe lithological descriptions of local units/formations.
- 35.03 Describe Florida aquifer system.
- 35.04 Perform aquifer performance tests.
- 35.05 Discuss basic groundwater chemistry.
- 35.06 Describe basic geographic techniques.
- 35.07 Describe local geology related problems.

36.0 Explain water treatment techniques--The student will be able to:

- 36.01 Describe drinking water treatments.
- 36.02 Identify water treatment recommendations for fish hatcheries.
- 36.03 Identify and describe the qualities water should possess for use in aquaculture.

- 36.04 Explain how changes in water affect aquatic life.
  - 36.05 Explain, monitor, and maintain freshwater/salt water quality standards for the production of desirable species.
  - 36.06 Calculate volume in circular, rectangular and irregular shaped water structures.
  - 36.07 List and explain sources of aquaculture pollution and methods of preventing and/or correcting these pollution problems.
- 37.0 Discuss stormwater systems--The student will be able to:
- 37.01 Determine boundaries of watersheds.
  - 37.02 Identify runoff coefficients.
  - 37.03 Identify the relationship between construction sites and stormwater systems.
  - 37.04 Research rules and regulations in regards to stormwater systems.
  - 37.05 Contact local municipalities to determine stormwater regulations.
- 38.0 Describe water distribution--The student will be able to:
- 38.01 Identify backflow testing procedures.
  - 38.02 Identify necessary equipment for water distribution purposes.
  - 38.03 Read and maintain meters.
  - 38.04 Identify maintenance requirements for fire hydrants, pipes, and valves.
  - 38.05 Identify proper procedures for operation and maintenance of lift stations.
- 39.0 Demonstrate the management and environmentally sound use of water resources—The student will be able to:
- 39.01 Determine quality of groundwater and surface water.
  - 39.02 Identify solids found in water.
  - 39.03 Identify primary and secondary contaminants.
  - 39.04 Identify unregulated organic compounds.
- 40.0 Manage fisheries--The student will be able to:
- 40.01 List and explain the meaning of morphology, anatomy and physiology in relation to Ichthyology.
  - 40.02 List and describe the physiology of aquatic animals.
  - 40.03 Identify and describe the basic structures and external anatomy of crustaceans.
  - 40.04 Identify and describe the basic structure and internal anatomy of an oyster or a mussel.
  - 40.05 Identify and describe the external and internal anatomy of fish.
  - 40.06 Identify and describe the basic morphorology of aquatic macroalgae and mircoalgae.
  - 40.07 Determine why aquatic crops may be more productive than terrestrial crops.
  - 40.08 List and describe important characteristics in choosing a species.
  - 40.09 Develop an information file in aquaculture species.
  - 40.10 List and describe the major factors in the growth of aquatic fauna and flora.
  - 40.11 Identify aquaculture/mariculture species of commercial importance in your area.
- 41.0 Maintain water treatment equipment and facilities--The student will be able to:
- 41.01 Research water treatment equipment and facility components.

- 41.02 Identify appropriate temperatures and other external conditions.
- 41.03 Identify the effect of weather conditions and changes.
- 41.04 Describe appropriate flow rates and tank levels.
- 41.05 Create a checklist and/or policies of necessary procedures to handle daily conditions, hazards and/or malfunctions.
- 41.06 Describe maintenance procedures and techniques of filters, pipes, generators, meters, motors, valves, instruments, injectors, storage basins etc.

42.0 Inspect and maintain drainage systems--The student will be able to:

- 42.01 Research Best Management Procedures.
- 42.02 Demonstrate proper ditch, pond, culvert, and manhole inspection techniques.
- 42.03 Demonstrate proper ditch, pond, culvert, and manhole maintenance techniques
- 42.04 Develop storm cleanup and prevention plan.
- 42.05 Recognize pollutants, illegal dumping and discharge and demonstrate appropriate handling procedures.
- 42.06 Clean outfall structures, inlets, and treatment systems.
- 42.07 Demonstrate the procedures to clean and televise pipes.
- 42.08 Mow ditch banks and right of ways.
- 42.09 Maintain, repair and replace pipe sections.

43.0 Describe the nature and origin of and career opportunities in aquaculture, mariculture and other hydrological industries—The students will be able to:

- 43.01 Identify related associated professional associations.
- 43.02 List and describe the nature of five areas of aquaculture occupations.
- 43.03 List and describe the careers associated with water treatment, distribution, and management.
- 43.04 Determine the educational requirements and experience needed to enter and advance in aquaculture/mariculture occupations

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Water Quality Technology 4  
**Course Number:** 8916020  
**Course Credit:** 1

**Course Description:**

This course is designed to develop competencies in the areas water treatment techniques, stormwater systems, water distribution, management of water resources, management of fisheries, 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.

44.0 Identify career opportunities and organizational dynamics in water resources--The student will be able to:

- 44.01 Research and create a presentation about aquaculture occupations and opportunities.
- 44.02 Research and create a presentation about mariculture occupations and opportunities.
- 44.03 Determine the educational requirements and experience needed to enter and advance in aquaculture/mariculture occupations
- 44.04 Prepare a resume

45.0 Demonstrate water treatment techniques--The student will be able to:

- 45.01 Determine soil types, land slope, and other factors to consider in choosing a location for a manmade pond or other aquaculture operation.
- 45.02 Identify/explain environmentally safe methods of aquaculture wastewater disposal.
- 45.03 Identify and consult agencies regulating water quality standards in order to prevent compliance problems.
- 45.04 Observe different stages of construction of ponds and/or other aquaculture production facilities.

40.0 Manage fisheries--The student will be able to:

- 40.12 Use dichotomous keys to identify fish and other aquatic species.
- 40.13 Discuss disease and parasites related to fish and other aquatic plants and animals.
- 40.14 Discuss habitat improvement for aquatic animals.
- 40.15 Identify aquaculture and mariculture practices.
- 40.16 Identify hatchery management.
- 40.17 Identify monitoring practices.
- 40.18 Discuss harvesting techniques.
- 40.19 Describe population dynamics.
- 40.20 Describe fisheries and marine resources and regulations.

- 40.21 Design an aquaculture/mariculture system
- 40.22 Conduct statistical analysis.
- 40.23 Interpret related data.

46.0 Compliance monitoring/inspection--The student will be able to:

- 46.01 Trace lines.
- 46.02 Survey business and industry.
- 46.03 Conduct pretreatment sampling.
- 46.04 Analyze data and document reports.
- 46.05 Design monitoring plan.
- 46.06 Monitor sites.

47.0 Discuss comprehensive quality assurance plan--The student will be able to:

- 47.01 Discuss quality assurance rules.
- 47.02 Write of follow standard operating procedures.
- 47.03 Describe preventative maintenance techniques.
- 47.04 Describe cleaning/decontamination techniques.
- 47.05 Determine accuracy and precision of sampling techniques.
- 47.06 Discuss need for corrective action.
- 47.07 Document Quality Assurance.



2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Irrigation Operations  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

PSAV	
Program Number	A010206
CIP Number	0101020600
Grade Level	30, 31
Standard Length	600 Hours
Teacher Certification	AGRICULTUR 1 @2 AGRI @2 HORTICULT @7 G
CTSO	N/A
SOC Codes (all applicable)	37-3011, 37-1012
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

### **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 irrigation sector of 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 irrigation sector 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.

## Program Structure

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

When offered at the post secondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AOM0342	Landscaping and Groundskeeping Workers	300 hours	37-3011
B	AOM0343	Irrigation Operations	300 hours	37-1012

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### Basic Skills (if applicable)

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 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements

by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

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 pursuant to Section 1008.29, F.S.; 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.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

## **Standards**

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

- 01.0 Identify irrigation system types and water sources.
- 02.0 Install piping and heads.
- 03.0 Install valves, timers, rain shut-offs, moisture sensors, and suction lines.
- 04.0 Test irrigation systems.
- 05.0 Demonstrate language arts knowledge and skills.
- 06.0 Demonstrate mathematics knowledge and skills.
- 07.0 Demonstrate science knowledge and skills.
- 08.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 09.0 Solve problems using critical thinking skills, creativity and innovation.
- 10.0 Use information technology tools.
- 11.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 12.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 13.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 14.0 Describe the importance of professional ethics and legal responsibilities.
- 15.0 Explain the importance of employability skill and entrepreneurship skills.
- 16.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 17.0 Describe the horticulture industry.
- 18.0 Identify and classify plants.
- 19.0 Propagate plants.
- 20.0 Identify growing media and apply fertilizers.
- 21.0 Irrigate plants and turf.
- 22.0 Describe pest control approaches.
- 23.0 Control plant growth.
- 24.0 Harvest, transport, and install plant materials.
- 25.0 Operate, repair, and maintain tools and equipment.
- 26.0 Demonstrate leadership, employability, communications, and human relations skills.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Irrigation Operations  
PSAV Number: A010206**

**Course Number: AOM0342  
Occupational Completion Point: A  
Landscaping and Groundskeeping Workers – 300 Hours – SOC Code 37-3011**

- 01.0 Identify irrigation system types and water sources--The student will be able to:
- 01.01 Identify various water sources used for irrigation.
  - 01.02 Identify various irrigation system types (i.e., rotary, spray, flood, drip).
  - 01.03 Identify various control systems for irrigation (i.e., electric, hydraulic, manual).
  - 01.04 Determine various pump types and their functions (i.e., centrifugal, turbine, submersible).
  - 01.05 Identify various water conservation systems and xeriscape principles used in irrigation.
  - 01.06 Describe concepts of zoning, precipitation rates, pressure, volume, and velocity.
- 02.0 Install piping and heads--The student will be able to:
- 02.01 Operate a trencher and install trenching for main and lateral lines.
  - 02.02 Backfill and compact trenches.
  - 02.03 Install PVC and galvanized pipe sleeving.
  - 02.04 Measure, cut, clean, prime, and glue PVC pipe (up to 3").
  - 02.05 Glue and assemble fitting and pipe and swing joints.
  - 02.06 Identify and install low voltage direct burial wiring.
  - 02.07 Install heads--rotary, spray, and quick coupler.
  - 02.08 Install head nozzles; adjust flow rates, set radius and patterns of coverage.
- 03.0 Install valves, timers, rain shut-offs, moisture sensors and suction lines--The student will be able to:
- 03.01 Install plastic and brass valves (up to 3").
  - 03.02 Install control timers and connect to master valve or pumping systems (low voltage only).
  - 03.03 Install various rain shut-offs.
  - 03.04 Install various moisture sensors.
  - 03.05 Install pump suction lines and associated equipment.
- 04.0 Test irrigation system--The student will be able to:
- 04.01 Use a moisture meter.
  - 04.02 Read a pressure gauge and perform system pressure testing.
  - 04.03 Read and record data from flow meters.
  - 04.04 Calculate water times and duration and set time controller timing.
  - 04.05 Remove, clean and reinstall heads.
  - 04.06 Repair PVC pipe breaks.

- 04.07 Splice low voltage wiring and repair hydraulic tubing.
- 04.08 Repressurize piping systems.
- 04.09 Reprime centrifugal pumps.
  
- 05.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 05.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 05.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 05.03 Present information formally and informally for specific purposes and audiences. AF2.9
  
- 06.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 06.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 06.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 06.03 Construct charts/tables/graphs using functions and data. AF3.5
  
- 07.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 07.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 07.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
  
- 08.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 08.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 08.02 Locate, organize and reference written information from various sources. CM 3.0
  - 08.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 08.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 08.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 08.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 08.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
  
- 09.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 09.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 09.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 09.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0

- 09.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 10.0 Use information technology tools--The students will be able to:
- 10.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 10.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 10.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 10.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 11.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
- 11.01 Describe the nature and types of business organizations. SY 1.0
  - 11.02 Explain the effect of key organizational systems on performance and quality.
  - 11.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 11.04 Explain the impact of the global economy on business organizations
- 12.0 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:
- 12.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 12.02 Explain emergency procedures to follow in response to workplace accidents.
  - 12.03 Create a disaster and/or emergency response plan. SHE 2.0
- 13.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
- 13.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 13.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 13.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 13.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 14.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
- 14.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 14.04 Interpret and explain written organizational policies and procedures. ELR 2.0

15.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 15.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 15.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 15.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 15.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 15.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 15.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 15.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 15.08 Research the benefits of ongoing professional development. ECD 9.0
- 15.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

16.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 16.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 16.02 Describe the effect of money management on personal and career goals. FL 3.0
- 16.03 Develop a personal budget and financial goals. FL3.1
- 16.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 16.05 Maintain financial records. FL3.3
- 16.06 Read and reconcile financial statements. FL3.4
- 16.07 Research, compare and contrast investment opportunities.

**Course Number: AOM0343**

**Occupational Completion Point: B**

**First-line Supervisor/Managers of Landscaping, Lawn Service and Groundskeeping Workers – 300 Hours – SOC Code 37-1012**

17.0 Describe the horticulture industry--The student will be able to:

- 17.01 Describe the importance of horticulture to the American and global economies.
- 17.02 Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.
- 17.03 Describe the importance of horticulture to the environment.

18.0 Identify and classify plants--The student will be able to:

- 18.01 Identify plants by scientific and common names.
- 18.02 Classify plants botanically and list environmental preference of plants (e.g., shade, sun, wind, moisture, salt).

19.0 Propagate plants--The student will be able to:



- 19.01 Identify propagating and growing facilities and structures.
  - 19.02 Prepare propagation media.
  - 19.03 Select and collect propagation materials.
  - 19.04 Demonstrate propagation by sexual and asexual methods.
  - 19.05 Demonstrate environmental controls for propagation materials (e.g., moisture, temperature, light).
- 20.0 Identify growing media and apply fertilizers--The student will be able to:
- 20.01 Identify soil and media materials.
  - 20.02 Identify nutritional needs of plants.
  - 20.03 Identify symptoms of nutritional deficiencies and toxicities of plants.
  - 20.04 Identify types and kinds of fertilizers.
  - 20.05 Identify methods of distributing fertilizers.
  - 20.06 Interpret analysis of fertilizer from information on tag or container.
  - 20.07 Apply fertilizer and soil amendments.
- 21.0 Irrigate plants and turf--The student will be able to:
- 21.01 Identify water needs of plants.
  - 21.02 Irrigate plants at recommended rates.
- 22.0 Describe pest control approaches--The student will be able to:
- 22.01 Identify common pests of plants (e.g., diseases, weeds, nematodes).
  - 22.02 Describe life cycles of common pests of plants.
  - 22.03 Classify insects according to feeding habits.
  - 22.04 Describe biological, chemical, and cultural methods of controlling plant pests.
- 23.0 Control plant growth--The student will be able to:
- 23.01 Identify methods of pruning plants to achieve desired growth and to maintain health.
  - 23.02 Identify appropriate time to prune plants.
  - 23.03 Identify and select pruning tools for the task.
- 24.0 Harvest, transport, and install plant materials--The student will be able to:
- 24.01 Determine requirements for preserving plant viability.
  - 24.02 Install containerized plant materials.
  - 24.03 Select and prepare plants for transportation and transplanting.
- 25.0 Operate, repair, and maintain tools and equipment--The student will be able to:
- 25.01 Perform equipment preoperational check.
  - 25.02 Identify, maintain, and safely operate hand tools and power tools.
- 26.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:

- 26.01 Conduct group meetings using parliamentary procedure and public speaking skills.
- 26.02 Identify acceptable work habits and personal characteristics.
- 26.03 Identify acceptable employee hygiene habits.
- 26.04 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Landscape Management  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

PSAV	
Program Number	<b>A010615</b>
CIP Number	0101060502
Grade Level	30, 31
Standard Length	900 hours
Teacher Certification	AGRICULTUR 1 @2 AGRI @2 HORTICULT @7 G
CTSO	N/A
SOC Codes (all applicable)	37-3011, 37-1012, 17-1012
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

### **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 horticulture and landscape industries 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.

## Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

When offered at the post secondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ORH0885	Landscape Specialist	300 hours	37-3011
B	ORH0886	First-line Supervisors/ Managers of Landscaping, Lawn Service and Groundskeeping Workers 1	450 Hours	37-1012
C	ORH0887	Landscape Contractor	150 hours	17-1012

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### Basic Skills (if applicable)

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 9, Language 9, and Reading 9. These

grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rff/basic-skills.rtf>).

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 pursuant to Section 1008.29, F.S.; 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.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

The Certified Horticulture Professional certification has a statewide articulation agreement approved by the Articulation Coordinating Committee. It articulates to the Landscape and Horticulture Technology (0101060500) program for six credits.

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

## Standards

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

- 01.0 Describe the horticulture industry.
- 02.0 Identify and classify plants.
- 03.0 Propagate plants.
- 04.0 Identify growing media and apply fertilizers.
- 05.0 Irrigate plants and turf.
- 06.0 Describe pest control approaches.
- 07.0 Control plant growth.
- 08.0 Harvest, transport, and install plant materials.
- 09.0 Operate, repair, and maintain tools and equipment.
- 10.0 Demonstrate leadership, employability, communications, and human relations skills.
- 11.0 Describe the principles and requirements of plant growth.
- 12.0 Apply best management practices in horticulture industry.
- 13.0 Identify safety procedures in the workplace.
- 14.0 Identify emerging technologies in the horticulture industry.
- 15.0 Apply principles of landscape design and maintenance.
- 16.0 Demonstrate language arts knowledge and skills.
- 17.0 Demonstrate mathematics knowledge and skills.
- 18.0 Demonstrate science knowledge and skills.
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 20.0 Solve problems using critical thinking skills, creativity and innovation.
- 21.0 Use information technology tools.
- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 23.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 25.0 Describe the importance of professional ethics and legal responsibilities.
- 26.0 Explain the importance of employability skill and entrepreneurship skills.
- 27.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 28.0 Maintain tools and equipment.
- 29.0 Apply chemical and calibrate spray equipment.
- 30.0 Classify plants and turfgrass.
- 31.0 Demonstrate fertilization skills.
- 32.0 Irrigate plants and turf.
- 33.0 Layout and/or install landscape and interiorscape.
- 34.0 Maintain landscape.
- 35.0 Maintain customer relations and observe follow-up procedures.

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- 36.0 Analyze and design landscape and turf.
- 37.0 Prepare estimates, contracts, and presentation.
- 38.0 Lay out and install landscape and turf.
- 39.0 Conduct final walk-through of landscape project.

**Florida Department of Education  
Student Performance Standards**

**Program Title: Landscape Management**  
**PSAV Number: A010615**

**Course Number: ORH0885**  
**Occupational Completion Point: A**  
**Landscape Specialist – 300 Hours – SOC Code 37-3011**

01.0 Describe the horticulture industry--The student will be able to:

- 01.01 Describe the importance of horticulture to the American and global economies.
- 01.02 Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.
- 01.03 Describe the importance of horticulture to the environment.
- 01.04 Identify professional organizations and certifications for the horticultural industry.

02.0 Identify and classify plants--The student will be able to:

- 02.01 Identify plants by scientific and common names.
- 02.02 Classify plants botanically.
- 02.03 Describe principles of plant biology and growth.
- 02.04 Explain the functional use of plants.
- 02.05 Describe the major classifications of plants based on life cycle.
- 02.06 Demonstrate the use of scientific and common names of plants including genus and specific epithet and cultivar.
- 02.07 Write scientific names.

03.0 Propagate plants--The student will be able to:

- 03.01 Identify propagating and growing facilities and structures.
- 03.02 Prepare propagation media.
- 03.03 Select and collect propagation materials.
- 03.04 Demonstrate propagation by sexual and asexual methods.
- 03.05 Demonstrate environmental controls for propagation materials.

04.0 Identify growing media and apply fertilizers--The student will be able to:

- 04.01 Identify soil and media materials.
- 04.02 Identify nutritional needs of plants.
- 04.03 Identify symptoms of nutritional deficiencies and toxicities of plants.
- 04.04 Identify types and kinds of fertilizers.
- 04.05 Identify methods of distributing fertilizers.
- 04.06 Interpret information on a label of fertilizer used in Florida.
- 04.07 Apply fertilizer and soil amendments.
- 04.08 Identify materials that are needed to raise pH and the amount to apply to change the pH.
- 04.09 Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.



- 04.10 Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.
- 05.0 Irrigate plants and turf--The student will be able to:
  - 05.01 Identify water needs of plants.
  - 05.02 Irrigate plants at recommended rates.
  - 05.03 Identify the symptoms of excessive water and water stress in plants.
  - 05.04 Describe the basic irrigation systems and principles used in the landscape and nursery.
- 06.0 Describe pest control approaches--The student will be able to:
  - 06.01 Identify common pests of plants.
  - 06.02 Describe life cycles of common pests of plants.
  - 06.03 Classify insects according to feeding habits.
  - 06.04 Describe biological, chemical, and cultural methods of controlling plant pests.
  - 06.05 Diagnose and outline a plan for controlling pests on a horticultural crop.
- 07.0 Control plant growth--The student will be able to:
  - 07.01 Identify methods of pruning plants.
  - 07.02 Identify appropriate time to prune plants.
  - 07.03 Identify and select pruning tools.
  - 07.04 Identify Plant Growth Regulators and their use on horticulture and landscape plants.
  - 07.05 Outline and use a record book for the use of a plant growth regulator on a horticultural or nursery crop.
  - 07.06 Identify cultural, mechanical and chemical methods of weed management.
- 08.0 Harvest, transport, and install plant materials--The student will be able to:
  - 08.01 Determine requirements for preserving plant viability.
  - 08.02 Install containerized plant materials.
  - 08.03 Select and prepare plants for transporting and transplanting.
  - 08.04 Select horticultural products according to Florida grades and standards
- 09.0 Operate, repair, and maintain tools and equipment--The student will be able to:
  - 09.01 Perform equipment pre-operational check.
  - 09.02 Identify, maintain, and operate hand tools and power tools.
- 10.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:
  - 10.01 Conduct group meetings using parliamentary procedure and public speaking skills.
  - 10.02 Identify acceptable work habits and personal characteristics.
  - 10.03 Identify acceptable employee hygiene habits.
  - 10.04 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.

- 10.05 Describe the importance of industry certifications.
- 11.0 Describe the principles and requirements of plant growth--The student will be able to:
  - 11.01 Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis.
  - 11.02 Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.
  - 11.03 Explain the process of respiration and the flow of energy in plants.
  - 11.04 Describe the influence of light and temperature on plant growth.
- 12.0 Apply best management practices in horticulture industry--The student will be able to:
  - 12.01 Identify and apply Best Management Practices to reduce pollution and conserve water.
  - 12.02 Identify and apply Best Management Practices for the design and installation of landscapes.
  - 12.03 Identify and apply Best Management Practices on fertilizer recommendations for Florida plants and turf.
  - 12.04 Identify and apply Best Management Practices on the management and handling of pesticides.
- 13.0 Identify safety procedures in the workplace--The student will be able to:
  - 13.01 Identify the common causes of accidents in the horticulture industry.
  - 13.02 Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.
  - 13.03 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 (OSHA) Regulations.
  - 13.04 Identify proper disposal of hazardous waste materials and biohazards specific to the horticulture industry.
  - 13.05 Describe emergency procedures in the horticulture workplace.
- 14.0 Identify emerging technologies in the horticulture industry--The student will be able to:
  - 14.01 Investigate DNA and genetics applications in horticulture including the theory of probability.
  - 14.02 Evaluate advances in biotechnology that impact horticulture. (e.g. transgenic crops, biological controls, micro propagation etc.).
- 15.0 Apply principles of landscape design and maintenance--The student will be able to:
  - 15.01 Explain and demonstrate the use of line, form, texture and color in designing landscapes.
  - 15.02 Explain and demonstrate the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.
  - 15.03 Identify points of emphasis and major design areas in the residential landscape.
  - 15.04 Identify plant selection for a residential landscape using Florida Friendly Landscape Principles

- 15.05 Draw and design a landscape plan for a residential or commercial property.
- 15.06 Calculate materials need according to the identified landscape plan.
- 15.07 Estimate labor requirements and cost-out a landscape plan.
  
- 16.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 16.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 16.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 16.03 Present information formally and informally for specific purposes and audiences. AF2.9
  
- 17.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 17.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 17.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 17.03 Construct charts/tables/graphs using functions and data. AF3.5
  
- 18.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
  
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 19.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 19.02 Locate, organize and reference written information from various sources. CM 3.0
  - 19.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 19.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 19.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 19.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 19.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
  
- 20.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0

- 20.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 21.0 Use information technology tools--The students will be able to:
  - 21.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 21.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 22.01 Describe the nature and types of business organizations. SY 1.0
  - 22.02 Explain the effect of key organizational systems on performance and quality.
  - 22.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 22.04 Explain the impact of the global economy on business organizations
- 23.0 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:
  - 23.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 23.02 Explain emergency procedures to follow in response to workplace accidents.
  - 23.03 Create a disaster and/or emergency response plan. SHE 2.0
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 24.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 24.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 24.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 24.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 25.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 25.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 25.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 25.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 25.04 Interpret and explain written organizational policies and procedures. ELR 2.0

26.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 26.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 26.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 26.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 26.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 26.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 26.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 26.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 26.08 Research the benefits of ongoing professional development. ECD 9.0
- 26.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

27.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 27.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 27.02 Describe the effect of money management on personal and career goals. FL 3.0
- 27.03 Develop a personal budget and financial goals. FL3.1
- 27.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 27.05 Maintain financial records. FL3.3
- 27.06 Read and reconcile financial statements. FL3.4
- 27.07 Research, compare and contrast investment opportunities.

**Course Number: ORH0886**

**Occupational Completion Point: B**

**First-line Supervisor/Managers of Landscaping, Lawn Service and Groundskeeping Workers – 450 hours – SOC Code 37-1012**

28.0 Maintain tools and equipment--The student will be able to:

- 28.01 Maintain oil level in engines of power equipment.
- 28.02 Check and maintain tire air pressure on equipment.
- 28.03 Maintain fuel levels using proper fuel or fuel mixtures.
- 28.04 Operate manual transmissions.
- 28.05 Identify, operate, and maintain tractor and power equipment.
- 28.06 Service and maintain battery and electrical systems.
- 28.07 Perform minor tune-up on engines.
- 28.08 Load, secure, and transport equipment.
- 28.09 Demonstrate safety precautions while working with tools and equipment.

29.0 Apply chemical and calibrate spray equipment--The student will be able to:

- 29.01 Select, mix, and apply a nonrestricted chemical according to the label and local, state, federal, and EPA regulations.
  - 29.02 Calibrate spray and spread equipment.
  - 29.03 Identify and report insect and disease damage.
  - 29.04 Determine chemical compatibility.
  - 29.05 Determine appropriate time frequency and method of chemical application.
- 30.0 Classify plants and turfgrass--The student will be able to:
- 30.01 Classify plants as monocots or dicots.
  - 30.02 Classify plants and turfgrass as annuals, biennials, and perennials.
  - 30.03 Identify plants and turfgrass that are specific to a region.
  - 30.04 Classify plants and turfgrass according to growth habit.
  - 30.05 Identify poisonous plants.
- 31.0 Demonstrate fertilization skills--The students will be able to:
- 31.01 Develop a fertilization schedule.
  - 31.02 Determine rate of fertilizer application and calibration equipment.
  - 31.03 Calibrate fertilizer equipment.
- 32.0 Irrigate plants and turf--The student will be able to:
- 32.01 Identify various types of irrigation systems.
  - 32.02 Install and maintain piping and water distribution components.
  - 32.03 Install valves, timers, rain shut-offs, moisture sensors, and back flow prevention devices.
  - 32.04 Check and evaluate irrigation system performance.
  - 32.05 Maintain irrigation system.
- 33.0 Layout and install landscape and/or interiorscape--The student will be able to:
- 33.01 Prepare final grade.
  - 33.02 Layout plants based on a landscape plan.
  - 33.03 Plant site using sound cultural practices.
  - 33.04 Install mulch and perform final cleanup.
- 34.0 Maintain landscape--The student will be able to:
- 34.01 Perform maintenance inspection of the project.
  - 34.02 Determine water requirements and apply at proper rates.
  - 34.03 Identify weeds and apply herbicides safely.
  - 34.04 Determine fertilization requirements and apply at proper rates.
  - 34.05 Identify plant pest and disease problems and apply corrective measures.
  - 34.06 Trim and prune landscape plants.
  - 34.07 Maintain turf viability; mow at proper height and frequency, blade edge, line trim, and remove trash.
  - 34.08 Explain cause and effect of soil compaction and thatch buildups, and determine appropriate methods of correction.
  - 34.09 Cultivate and mulch plants.
  - 34.10 Prune trees based on ANSI (American National Standard Institute) standards.

- 34.11 Provide protection for plants from adverse weather conditions.
- 34.12 Comply with local, state, and federal regulations regarding landscape maintenance and pesticide applications.
- 34.13 Demonstrate sanitation and safety practices when maintaining landscape.

35.0 Maintain customer relations and observe follow-up procedures--The student will be able to:

- 35.01 Conduct walk-through of project with client to assure satisfaction.
- 35.02 Identify current and future maintenance requirements.
- 35.03 Analyze project records for profitability and employee performance.

**Course Number: ORH0887**

**Occupational Completion Point: C**

**Landscape Architects – 150 hours – SOC Code 17-1012**

36.0 Analyze and design landscape--The student will be able to:

- 36.01 Analyze and interpret plans, specifications, and environmental conditions of the project.
- 36.02 Design the project.
- 36.03 Identify and locate project materials.
- 36.04 Determine personnel and equipment needs and safety requirements for the project.
- 36.05 Establish project schedule.

37.0 Prepare estimates, contracts, and presentation--The student will be able to:

- 37.01 Determine costs of materials, equipment, and labor.
- 37.02 Prepare a price for the project and terms of contract.
- 37.03 Prepare written contract, using standard rules of English, including punctuation, spelling, sentence structure and references.
- 37.04 Prepare and give oral presentation of the project design using standard rules of English, including punctuation and sentence structure.
- 37.05 Maintain job records, daily log sheets, and inventory.

38.0 Lay out and install landscape and/or interiorscape--The student will be able to:

- 38.01 Locate existing utilities and secure a permit.
- 38.02 Prepare and rough grade the site.
- 38.03 Determine procedures for installation of large materials.
- 38.04 Install and test irrigation system.
- 38.05 Describe procedures for constructing hardscape (walls, walks, patios, drives, etc.).

39.0 Conduct final walk-through of landscape installation—The student will be able to:

- 39.01 Conduct walk-through of installation project with client to assure customer satisfaction.
- 39.02 Analyze project records for profitability and employee performance.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Nursery Management  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

PSAV	
Program Number	<b>A010616</b>
CIP Number	0101060602
Grade Level	30, 31
Standard Length	900 hours
Teacher Certification	AGRICULTUR 1 @2 AGRI @2 HORTICULT @7 G
CTSO	N/A
SOC Codes (all applicable)	45-2092, 11-9011.01
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

**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 horticulture and landscape industries 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.



## 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.

When offered at the post secondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ORH0862	Nursery Workers	300 hours	45-2092
B	ORH0863	Nursery and Greenhouse Managers 1	450 Hours	11-9011.01
C	ORH0864	Nursery and Greenhouse Managers 2	150 hours	11-9011.01

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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.

### 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

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 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

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 pursuant to Section 1008.29, F.S.; 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.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

The Certified Horticulture Professional certification has a statewide articulation agreement approved by the Articulation Coordinating Committee. It articulates to the Landscape and Horticulture Technology (0101060500) program for six credits.

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Describe the horticulture industry.
- 02.0 Identify and classify plants.
- 03.0 Propagate plants.
- 04.0 Identify growing media and apply fertilizers.
- 05.0 Irrigate plants and turf.
- 06.0 Describe pest control approaches.
- 07.0 Control plant growth.
- 08.0 Harvest, transport, and install plant materials.
- 09.0 Operate, repair, and maintain tools and equipment.
- 10.0 Demonstrate leadership, employability, communications, and human relations skills.
- 11.0 Describe the principles and requirements of plant growth.
- 12.0 Apply best management practices in horticulture industry.
- 13.0 Identify safety procedures in the workplace.
- 14.0 Identify emerging technologies in the horticulture industry.
- 15.0 Apply principles of landscape design and maintenance.
- 16.0 Demonstrate language arts knowledge and skills.
- 17.0 Demonstrate mathematics knowledge and skills.
- 18.0 Demonstrate science knowledge and skills.
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 20.0 Solve problems using critical thinking skills, creativity and innovation.
- 21.0 Use information technology tools.
- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 23.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 25.0 Describe the importance of professional ethics and legal responsibilities.
- 26.0 Explain the importance of employability skill and entrepreneurship skills.
- 27.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 28.0 Identify and classify plants.
- 29.0 Control pests.
- 30.0 Operate, repair, and maintain tools and equipment.

- 31.0 Prepare growing media.
- 32.0 Irrigate plants.
- 33.0 Fertilize plant materials.
- 34.0 Maintain and analyze records.
- 35.0 Develop irrigation and drainage plan.
- 36.0 Raise crop to point of sale.
- 37.0 Prune and shape nursery stock.
- 38.0 Harvest, process, and ship nursery stock.
- 39.0 Market nursery stock.
- 40.0 Operate, repair, and maintain nursery equipment and facilities.
- 41.0 Identify business principles.

**Florida Department of Education  
Student Performance Standards**

**Program Title: Nursery Management**  
**PSAV Number: A010616**

**Course Number: ORH0862**  
**Occupational Completion Point: A**  
**Nursery Workers – 300 hours – SOC – 45-2092**

01.0 Describe the horticulture industry--The student will be able to:

- 01.01 Describe the importance of horticulture to the American and global economies.
- 01.02 Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.
- 01.03 Describe the importance of horticulture to the environment.
- 01.04 Identify professional organizations and certifications for the horticultural industry.

02.0 Identify and classify plants--The student will be able to:

- 02.01 Identify plants by scientific and common names.
- 02.02 Classify plants botanically.
- 02.03 Describe principles of plant biology and growth.
- 02.04 Explain the functional use of plants.
- 02.05 Describe the major classifications of plants based on life cycle.
- 02.06 Demonstrate the use of scientific and common names of plants including genus and specific epithet and cultivar.
- 02.07 Write scientific names.

03.0 Propagate plants--The student will be able to:

- 03.01 Identify propagating and growing facilities and structures.
- 03.02 Prepare propagation media.
- 03.03 Select and collect propagation materials.
- 03.04 Demonstrate propagation by sexual and asexual methods.
- 03.05 Demonstrate environmental controls for propagation materials.

04.0 Identify growing media and apply fertilizers--The student will be able to:

- 04.01 Identify soil and media materials.
- 04.02 Identify nutritional needs of plants.
- 04.03 Identify symptoms of nutritional deficiencies and toxicities of plants.
- 04.04 Identify types and kinds of fertilizers.
- 04.05 Identify methods of distributing fertilizers.
- 04.06 Interpret information on a label of fertilizer used in Florida.
- 04.07 Apply fertilizer and soil amendments.
- 04.08 Identify materials that are needed to raise pH and the amount to apply to change the pH.
- 04.09 Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.

- 04.10 Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.
- 05.0 Irrigate plants and turf--The student will be able to:
  - 05.01 Identify water needs of plants.
  - 05.02 Irrigate plants at recommended rates.
  - 05.03 Identify the symptoms of excessive water and water stress in plants.
  - 05.04 Describe the basic irrigation systems and principles used in the landscape and nursery.
- 06.0 Describe pest control approaches--The student will be able to:
  - 06.01 Identify common pests of plants.
  - 06.02 Describe life cycles of common pests of plants.
  - 06.03 Classify insects according to feeding habits.
  - 06.04 Describe biological, chemical, and cultural methods of controlling plant pests.
  - 06.05 Diagnose and outline a plan for controlling pests on a horticultural crop.
- 07.0 Control plant growth--The student will be able to:
  - 07.01 Identify methods of pruning plants.
  - 07.02 Identify appropriate time to prune plants.
  - 07.03 Identify and select pruning tools.
  - 07.04 Identify Plant Growth Regulators and their use on horticulture and landscape plants.
  - 07.05 Outline and use a record book for the use of a plant growth regulator on a horticultural or nursery crop.
  - 07.06 Identify cultural, mechanical and chemical methods of weed management.
- 08.0 Harvest, transport, and install plant materials--The student will be able to:
  - 08.01 Determine requirements for preserving plant viability.
  - 08.02 Install containerized plant materials.
  - 08.03 Select and prepare plants for transporting and transplanting.
  - 08.04 Select horticultural products according to Florida grades and standards
- 09.0 Operate, repair, and maintain tools and equipment--The student will be able to:
  - 09.01 Perform equipment pre-operational check.
  - 09.02 Identify, maintain, and operate hand tools and power tools.
- 10.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:
  - 10.01 Conduct group meetings using parliamentary procedure and public speaking skills.
  - 10.02 Identify acceptable work habits and personal characteristics.
  - 10.03 Identify acceptable employee hygiene habits.
  - 10.04 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.

- 10.05 Describe the importance of industry certifications.
- 11.0 Describe the principles and requirements of plant growth--The student will be able to:
  - 11.01 Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis.
  - 11.02 Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.
  - 11.03 Explain the process of respiration and the flow of energy in plants.
  - 11.04 Describe the influence of light and temperature on plant growth.
- 12.0 Apply best management practices in horticulture industry--The student will be able to:
  - 12.01 Identify and apply Best Management Practices to reduce pollution and conserve water.
  - 12.02 Identify and apply Best Management Practices for the design and installation of landscapes.
  - 12.03 Identify and apply Best Management Practices on fertilizer recommendations for Florida plants and turf.
  - 12.04 Identify and apply Best Management Practices on the management and handling of pesticides.
- 13.0 Identify safety procedures in the workplace--The student will be able to:
  - 13.01 Identify the common causes of accidents in the horticulture industry.
  - 13.02 Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.
  - 13.03 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 (OSHA) Regulations.
  - 13.04 Identify proper disposal of hazardous waste materials and biohazards specific to the horticulture industry.
  - 13.05 Describe emergency procedures in the horticulture workplace.
- 14.0 Identify emerging technologies in the horticulture industry--The student will be able to:
  - 14.01 Investigate DNA and genetics applications in horticulture including the theory of probability.
  - 14.02 Evaluate advances in biotechnology that impact horticulture. (e.g. transgenic crops, biological controls, micro propagation etc.).
- 15.0 Apply principles of landscape design and maintenance--The student will be able to:
  - 15.01 Explain and demonstrate the use of line, form, texture and color in designing landscapes.
  - 15.02 Explain and demonstrate the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.
  - 15.03 Identify points of emphasis and major design areas in the residential landscape.
  - 15.04 Identify plant selection for a residential landscape using Florida Friendly Landscape Principles

- 15.05 Draw and design a landscape plan for a residential or commercial property.
- 15.06 Calculate materials need according to the identified landscape plan.
- 15.07 Estimate labor requirements and cost-out a landscape plan.
  
- 16.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 16.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 16.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 16.03 Present information formally and informally for specific purposes and audiences. AF2.9
  
- 17.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 17.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 17.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 17.03 Construct charts/tables/graphs using functions and data. AF3.5
  
- 18.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
  
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 19.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 19.02 Locate, organize and reference written information from various sources. CM 3.0
  - 19.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 19.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 19.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 19.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 19.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
  
- 20.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0



- 20.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 21.0 Use information technology tools--The students will be able to:
  - 21.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 21.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 22.01 Describe the nature and types of business organizations. SY 1.0
  - 22.02 Explain the effect of key organizational systems on performance and quality.
  - 22.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 22.04 Explain the impact of the global economy on business organizations
- 23.0 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:
  - 23.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 23.02 Explain emergency procedures to follow in response to workplace accidents.
  - 23.03 Create a disaster and/or emergency response plan. SHE 2.0
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 24.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 24.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 24.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 24.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 25.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 25.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 25.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 25.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 25.04 Interpret and explain written organizational policies and procedures. ELR 2.0

26.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 26.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 26.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 26.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 26.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 26.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 26.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 26.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 26.08 Research the benefits of ongoing professional development. ECD 9.0
- 26.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

27.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 27.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 27.02 Describe the effect of money management on personal and career goals. FL 3.0
- 27.03 Develop a personal budget and financial goals. FL3.1
- 27.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 27.05 Maintain financial records. FL3.3
- 27.06 Read and reconcile financial statements. FL3.4
- 27.07 Research, compare and contrast investment opportunities.

**Course Number: ORH0863**

**Occupational Completion Point: B**

**Nursery and Greenhouse Managers – 450 hours – SOC – 11-9011.01**

28.0 Identify and classify plants--The student will be able to:

- 28.01 Classify plants as monocots or dicots.
- 28.02 Classify plants as annuals, biennials, and perennials.
- 28.03 Identify plants appropriate to a region.
- 28.04 Classify plants according to growth habit.
- 28.05 Prepare propagation materials (seeds, cuttings, etc.) for planting.
- 28.06 Apply growth stimulants to propagation materials.
- 28.07 Demonstrate sanitation and safety practices when propagating.
- 28.08 Prepare flats and seedbeds and plant seeds.

29.0 Control pests--The student will be able to:

- 29.01 Report insect and disease damage.
- 29.02 Identify chemical spray damage.

- 29.03 Select proper IPM practices (biological, chemical and physical) for control of insects, diseases, vertebrates and weeds.
- 29.04 Evaluate the efficacy and phytotoxicity of a chemical prior to inclusion in a growing program.
- 30.0 Operate, repair, and maintain tools and equipment--The student will be able to:
  - 30.01 Identify, operate, and maintain tractor and power equipment.
  - 30.02 Load, secure, and transport equipment.
- 31.0 Prepare growing media--The student will be able to:
  - 31.01 Sterilize rooting, potting, and growing media.
  - 31.02 Adjust pH and nutritional levels of media.
  - 31.03 Fill and level benches and pots with media.
  - 31.04 Demonstrate sanitation practices when handling and storing plant media materials.
- 32.0 Irrigate plants--The student will be able to:
  - 32.01 Set up an irrigation system for a propagation area.
  - 32.02 Set up an irrigation system for a growing structure.
  - 32.03 Set up an irrigation system for a retail display.
  - 32.04 Maintain and repair an irrigation system.
  - 32.05 Identify and use various types of irrigation systems (low volume, ebb and flow, drip, mat, recirculating, etc.).
- 33.0 Fertilize plant materials--The student will be able to:
  - 33.01 Collect soil and leaf tissue samples for analysis.
  - 33.02 Interpret and evaluate the results of soil and leaf tissue analysis and determine corrective actions.
  - 33.03 Demonstrate proper handling and storage of fertilizers, observing safety precautions.
  - 33.04 Evaluate, operate, and maintain fertilizer distribution equipment.
  - 33.05 Develop a fertilization schedule for various plant species.
  - 33.06 Determine rate of fertilizer application.
- 34.0 Maintain and analyze records--The student will be able to:
  - 34.01 Analyze and maintain production and sales records.
  - 34.02 Determine plant production costs.
  - 34.03 Prepare a budget.
  - 34.04 Prepare and maintain financial records using computer software.
  - 34.05 Maintain current plant inventory.
  - 34.06 Maintain job records, daily log sheets, and inventory.

**Course Number: ORH0864**

**Occupational Completion Point: C**

**Nursery and Greenhouse Managers – 150 hours – SOC – 11-9011.01**

35.0 Develop irrigation and drainage plan--The student will be able to:

- 35.01 Identify drainage components for different types of drainage systems.
- 35.02 Install irrigation systems with control valves and clocks.
- 35.03 Set up an irrigation system for a growing area.
- 35.04 Comply with local, state and federal conservation guidelines.

36.0 Raise crop to point of sale—The student will be able to:

- 36.01 Choose plant, container, media, and growing structure.
- 36.02 Apply sound cultural practices.
- 36.03 Use chemicals to raise crop (i.e. fertilizer, growth retardants, pesticides).
- 36.04 Schedule crop for sale.
- 36.05 Maintain production records

37.0 Prune and shape nursery stock--The student will be able to:

- 37.01 Prune plants to achieve desired growth and shape.
- 37.02 Select and use chemical growth regulators.
- 37.03 Identify techniques for pruning specialty items (topiary, bonsai).
- 37.04 Set up an irrigation system for a growing area.

38.0 Harvest, process, and ship nursery stock--The student will be able to:

- 38.01 Determine customer needs per landscape plan.
- 38.02 Grade and harvest field-grown plants (ball, burlap, bare-root, "grow bags").
- 38.03 Identify mechanical techniques for harvesting field-grown plants (tree spade and mechanical digger).
- 38.04 Select and assemble container-grown plants using industry-accepted grades and standards.
- 38.05 Prepare for shipment, loading, and transporting harvested plant materials.
- 38.06 Comply with regulations regarding the inspection and movement of plant materials.
- 38.07 Demonstrate safety practices when harvesting, processing, and shipping nursery stock.
- 38.08 Determine proper shipping environment.

39.0 Market nursery stock--The student will be able to:

- 39.01 Label and merchandise plants including plant care tags, bar codes, and shipping instructions.
- 39.02 Maintain clean and attractive merchandising and display areas safely.
- 39.03 Use various advertising methods to promote sales.
- 39.04 Take telephone orders.
- 39.05 Use sales catalog.
- 39.06 Greet customers and close sales.
- 39.07 Describe care and use of plants and related products to customers.
- 39.08 Handle customer complaints and problems.

40.0 Operate, repair, and maintain nursery equipment and facilities--The student will be able to:

- 40.01 Determine equipment needs for the job.
- 40.02 Order parts and supplies.
- 40.03 Perform simple electrical repairs.
- 40.04 Build or repair frames, benches, and other greenhouse or nursery facilities.
- 40.05 Demonstrate safety practices when working with equipment and facilities.

41.0 Identify business principles—The student will be able to:

- 41.01 Describe principles of business management.
- 41.02 Describe business organizational structures.
- 41.03 Cite financial management methods.
- 41.04 Interpret laws, regulations, and codes pertinent to the nursery industry.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Sports and Recreational Turf Management  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

PSAV	
Program Number	<b>A020607</b>
CIP Number	0101060702
Grade Level	30, 31
Standard Length	900 hours
Teacher Certification	AGRICULTUR 1 @2 AGRI @2 HORTICULT @7 G
CTSO	N/A
SOC Codes (all applicable)	37-3011, 37-1012
Facility Code	[203] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

### **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 horticulture and landscape industries 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.

## 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.

When offered at the post secondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ORH0885	Landscape Specialist	300 hours	37-3011
B	ORH0886	First-line Supervisors/ Managers of Landscaping, Lawn Service and Groundskeeping Workers 1	450 hours	37-1012
C	ORH0897	First-line Supervisors/ Managers of Landscaping, Lawn Service and Groundskeeping Workers 2	150 hours	37-1012

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. 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.

### 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be

able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

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 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

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 pursuant to Section 1008.29, F.S.; 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.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

The Certified Horticulture Professional certification has a statewide articulation agreement approved by the Articulation Coordinating Committee. It articulates to the Landscape and Horticulture Technology (0101060500) program for six credits.

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Describe the horticulture industry.
- 02.0 Identify and classify plants.
- 03.0 Propagate plants.
- 04.0 Identify growing media and apply fertilizers.
- 05.0 Irrigate plants and turf.
- 06.0 Describe pest control approaches.
- 07.0 Control plant growth.
- 08.0 Harvest, transport, and install plant materials.
- 09.0 Operate, repair, and maintain tools and equipment.
- 10.0 Demonstrate leadership, employability, communications, and human relations skills.
- 11.0 Describe the principles and requirements of plant growth.
- 12.0 Apply best management practices in horticulture industry.
- 13.0 Identify safety procedures in the workplace.
- 14.0 Identify emerging technologies in the horticulture industry.
- 15.0 Apply principles of landscape design and maintenance.
- 16.0 Demonstrate language arts knowledge and skills.
- 17.0 Demonstrate mathematics knowledge and skills.
- 18.0 Demonstrate science knowledge and skills.
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 20.0 Solve problems using critical thinking skills, creativity and innovation.
- 21.0 Use information technology tools.
- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
- 23.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 25.0 Describe the importance of professional ethics and legal responsibilities.
- 26.0 Explain the importance of employability skill and entrepreneurship skills.

- 27.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 28.0 Maintain tools and equipment.
- 29.0 Maintain greens and tees.
- 30.0 Maintain fairways, roughs, and traps.
- 31.0 Fertilize turf.
- 32.0 Establish turfgrass.
- 33.0 Apply chemical and calibrate spray equipment.
- 34.0 Develop recreational areas.
- 35.0 Demonstrate fertilization skills.
- 36.0 Irrigate plants and turf.

**Florida Department of Education  
Student Performance Standards**

**Program Title: Sports and Recreational Turf Management**  
**PSAV Number: A020607**

**Course Number: ORH0885**  
**Occupational Completion Point: A**  
**Landscape Specialist – 300 Hours – SOC Code 37-3011.00**

01.0 Describe the horticulture industry--The student will be able to:

- 01.01 Describe the importance of horticulture to the American and global economies.
- 01.02 Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.
- 01.03 Describe the importance of horticulture to the environment.
- 01.04 Identify professional organizations and certifications for the horticultural industry.

02.0 Identify and classify plants--The student will be able to:

- 02.01 Identify plants by scientific and common names.
- 02.02 Classify plants botanically.
- 02.03 Describe principles of plant biology and growth.
- 02.04 Explain the functional use of plants.
- 02.05 Describe the major classifications of plants based on life cycle.
- 02.06 Demonstrate the use of scientific and common names of plants including genus and specific epithet and cultivar.
- 02.07 Write scientific names.

03.0 Propagate plants--The student will be able to:

- 03.01 Identify propagating and growing facilities and structures.
- 03.02 Prepare propagation media.
- 03.03 Select and collect propagation materials.
- 03.04 Demonstrate propagation by sexual and asexual methods.
- 03.05 Demonstrate environmental controls for propagation materials.

04.0 Identify growing media and apply fertilizers--The student will be able to:

- 04.01 Identify soil and media materials.
- 04.02 Identify nutritional needs of plants.
- 04.03 Identify symptoms of nutritional deficiencies and toxicities of plants.
- 04.04 Identify types and kinds of fertilizers.
- 04.05 Identify methods of distributing fertilizers.
- 04.06 Interpret information on a label of fertilizer used in Florida.
- 04.07 Apply fertilizer and soil amendments.
- 04.08 Identify materials that are needed to raise pH and the amount to apply to change the pH.
- 04.09 Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.

- 04.10 Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.
- 05.0 Irrigate plants and turf--The student will be able to:
  - 05.01 Identify water needs of plants.
  - 05.02 Irrigate plants at recommended rates.
  - 05.03 Identify the symptoms of excessive water and water stress in plants.
  - 05.04 Describe the basic irrigation systems and principles used in the landscape and nursery.
- 06.0 Describe pest control approaches--The student will be able to:
  - 06.01 Identify common pests of plants.
  - 06.02 Describe life cycles of common pests of plants.
  - 06.03 Classify insects according to feeding habits.
  - 06.04 Describe biological, chemical, and cultural methods of controlling plant pests.
  - 06.05 Diagnose and outline a plan for controlling pests on a horticultural crop.
- 07.0 Control plant growth--The student will be able to:
  - 07.01 Identify methods of pruning plants.
  - 07.02 Identify appropriate time to prune plants.
  - 07.03 Identify and select pruning tools.
  - 07.04 Identify Plant Growth Regulators and their use on horticulture and landscape plants.
  - 07.05 Outline and use a record book for the use of a plant growth regulator on a horticultural or nursery crop.
  - 07.06 Identify cultural, mechanical and chemical methods of weed management.
- 08.0 Harvest, transport, and install plant materials--The student will be able to:
  - 08.01 Determine requirements for preserving plant viability.
  - 08.02 Install containerized plant materials.
  - 08.03 Select and prepare plants for transporting and transplanting.
  - 08.04 Select horticultural products according to Florida grades and standards
- 09.0 Operate, repair, and maintain tools and equipment--The student will be able to:
  - 09.01 Perform equipment pre-operational check.
  - 09.02 Identify, maintain, and operate hand tools and power tools.
- 10.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:
  - 10.01 Conduct group meetings using parliamentary procedure and public speaking skills.
  - 10.02 Identify acceptable work habits and personal characteristics.
  - 10.03 Identify acceptable employee hygiene habits.
  - 10.04 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.

- 10.05 Describe the importance of industry certifications.
- 11.0 Describe the principles and requirements of plant growth--The student will be able to:
  - 11.01 Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis.
  - 11.02 Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.
  - 11.03 Explain the process of respiration and the flow of energy in plants.
  - 11.04 Describe the influence of light and temperature on plant growth.
- 12.0 Apply best management practices in horticulture industry--The student will be able to:
  - 12.01 Identify and apply Best Management Practices to reduce pollution and conserve water.
  - 12.02 Identify and apply Best Management Practices for the design and installation of landscapes.
  - 12.03 Identify and apply Best Management Practices on fertilizer recommendations for Florida plants and turf.
  - 12.04 Identify and apply Best Management Practices on the management and handling of pesticides.
- 13.0 Identify safety procedures in the workplace--The student will be able to:
  - 13.01 Identify the common causes of accidents in the horticulture industry.
  - 13.02 Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.
  - 13.03 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 (OSHA) Regulations.
  - 13.04 Identify proper disposal of hazardous waste materials and biohazards specific to the horticulture industry.
  - 13.05 Describe emergency procedures in the horticulture workplace.
- 14.0 Identify emerging technologies in the horticulture industry--The student will be able to:
  - 14.01 Investigate DNA and genetics applications in horticulture including the theory of probability.
  - 14.02 Evaluate advances in biotechnology that impact horticulture. (e.g. transgenic crops, biological controls, micro propagation etc.).
- 15.0 Apply principles of landscape design and maintenance--The student will be able to:
  - 15.01 Explain and demonstrate the use of line, form, texture and color in designing landscapes.
  - 15.02 Explain and demonstrate the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.
  - 15.03 Identify points of emphasis and major design areas in the residential landscape.
  - 15.04 Identify plant selection for a residential landscape using Florida Friendly Landscape Principles

- 15.05 Draw and design a landscape plan for a residential or commercial property.
- 15.06 Calculate materials need according to the identified landscape plan.
- 15.07 Estimate labor requirements and cost-out a landscape plan.
  
- 16.0 Demonstrate language arts knowledge and skills--The students will be able to: AF 2.0
  - 16.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 16.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 16.03 Present information formally and informally for specific purposes and audiences. AF2.9
  
- 17.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0
  - 17.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 17.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 17.03 Construct charts/tables/graphs using functions and data. AF3.5
  
- 18.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0
  - 18.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 18.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
  
- 19.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
  - 19.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 19.02 Locate, organize and reference written information from various sources. CM 3.0
  - 19.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 19.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 19.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 19.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 19.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
  
- 20.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:
  - 20.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 20.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 20.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0

- 20.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 21.0 Use information technology tools--The students will be able to:
  - 21.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 21.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
  - 22.01 Describe the nature and types of business organizations. SY 1.0
  - 22.02 Explain the effect of key organizational systems on performance and quality.
  - 22.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 22.04 Explain the impact of the global economy on business organizations
- 23.0 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:
  - 23.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 23.02 Explain emergency procedures to follow in response to workplace accidents.
  - 23.03 Create a disaster and/or emergency response plan. SHE 2.0
- 24.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
  - 24.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 24.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 24.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 24.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 25.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:
  - 25.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 25.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 25.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 25.04 Interpret and explain written organizational policies and procedures. ELR 2.0

26.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

- 26.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 26.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 26.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 26.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 26.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 26.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 26.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 26.08 Research the benefits of ongoing professional development. ECD 9.0
- 26.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

27.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

- 27.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 27.02 Describe the effect of money management on personal and career goals. FL 3.0
- 27.03 Develop a personal budget and financial goals. FL3.1
- 27.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 27.05 Maintain financial records. FL3.3
- 27.06 Read and reconcile financial statements. FL3.4
- 27.07 Research, compare and contrast investment opportunities.

**Course Number: ORH0886**

**Occupational Completion Point: B**

**First-line Supervisor/Managers of Landscaping, Lawn Service and Groundskeeping Workers – 450 Hours – SOC Code 37-1012.00**

28.0 Maintain tools and equipment--The student will be able to:

- 28.01 Maintain oil level in engines of power equipment.
- 28.02 Check and maintain tire air pressure on equipment.
- 28.03 Maintain fuel levels using proper fuel or fuel mixtures.
- 28.04 Operate manual transmissions.
- 28.05 Identify, operate, and maintain tractor and power equipment.
- 28.06 Service and maintain battery and electrical systems.
- 28.07 Perform minor tune-up on engines.
- 28.08 Load, secure, and transport equipment.
- 28.09 Demonstrate safety precautions while working with tools and equipment.

29.0 Maintain and analyze records--The student will be able to:



- 29.01 Prepare and maintain records using computer software.
- 29.02 Locate and interpret MSDS information.
- 29.03 Maintain chemical logs.
- 29.04 Record information on repair and maintenance logs.

30.0 Maintain greens and tees--The student will be able to:

- 30.01 Mow greens.
- 30.02 Mow collars.
- 30.03 Mow aprons.
- 30.04 Relocate cups.
- 30.05 Replace and relocate markers.
- 30.06 Irrigate greens.
- 30.07 Verticut turf.
- 30.08 Aerate turf.
- 30.09 Repair ball marks on greens.

31.0 Maintain fairways, roughs, and traps--The student will be able to:

- 31.01 Mow roughs.
- 31.02 Irrigate fairways.
- 31.03 Repair divots.
- 31.04 Add sand to traps.
- 31.05 Rake and trim sand traps.
- 31.06 Mow fairways.
- 31.07 Edge sand traps.
- 31.08 Operate blower, sweeper, verticutter, and aerifier.

32.0 Fertilize turf--The student will be able to:

- 32.01 Apply top dressing.
- 32.02 Apply grass seed.
- 32.03 Apply fertilizer to fairways.

33.0 Establish turfgrass--The student will be able to:

- 33.01 Level seedbed.
- 33.02 Plant grass seed.
- 33.03 Establish sod by plugging.
- 33.04 Establish sod by sodding.
- 33.05 Cut sod.

**Course Number: ORH0897**

**Occupational Completion Point: C**

**First-line Supervisor/Managers of Landscaping, Lawn Service and Groundskeeping Workers – 150 Hours – SOC Code 37-1012.00**

34.0 Apply chemical and calibrate spray equipment--The student will be able to:

- 34.01 Select, mix, and apply a nonrestricted chemical according to the label and local, state, federal, and EPA regulations.
  - 34.02 Calibrate spray and spread equipment.
  - 34.03 Identify and report insect and disease damage.
  - 34.04 Determine chemical compatibility.
  - 34.05 Determine appropriate time frequency and method of chemical application.
- 35.0 Develop recreational areas--The student will be able to:
- 35.01 Establish plant beds with annuals, biennials, and perennials.
  - 35.02 Plant accent trees and shrubs in a recreational area.
  - 35.03 Establish sports turf.
  - 35.04 Identify poisonous plants.
- 36.0 Demonstrate fertilization skills--The students will be able to:
- 36.01 Develop a fertilization schedule.
  - 36.02 Determine rate of fertilizer application and calibration equipment.
  - 36.03 Calibrate fertilizer equipment.
- 37.0 Irrigate plants and turf--The student will be able to:
- 37.01 Identify various types of irrigation systems.
  - 37.02 Install and maintain piping and water distribution components.
  - 37.03 Install valves, timers, rain shut-offs, moisture sensors, and back flow prevention devices.
  - 37.04 Check and evaluate irrigation system performance.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Water Distribution Systems Operations  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food & Natural Resources

PSAV	
Program Number	A600100
CIP Number	0715050607
Grade Level	30, 31
Standard Length	275 hours
Teacher Certification	WSP OPER @7 G
CTSO	N/A
SOC Codes (all applicable)	51-8031
Facility Code	[263] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: N/A Language: N/A Reading: N/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 & 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 water/wastewater sector of the Agriculture, Food & Natural Resources career cluster.

The content includes but is not limited to safety, installation, maintenance, and repair of a water distribution system. This will include its structure, appurtenances, and equipment while protecting water quality by using accepted disinfection and monitoring practices to protect the health and welfare of the system's users.

### **Program Structure**

This program is a planned sequence of instruction consisting of three courses and three occupational completion points.

When offered at the post secondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EVS0240	Water System Operator Level 3	100 hours	51-8031
B	EVS0241	Water System Operator Level 2	75 hours	51-8031
C	EVS0242	Water System Operator Level 1	100 hours	51-8031

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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 program-specific OJT framework apply.

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Identify professions in the water technology field.
- 02.0 Operate storage facilities.
- 03.0 Operate water distribution system facilities.
- 04.0 Describe water quality consideration in a water distribution system.
- 05.0 Explain water distribution system operations and maintenance needs and techniques.
- 06.0 Describe the principles and practices of disinfection in water distribution systems.
- 07.0 Describe the principles and practices of safety relating to water distribution system operation.
- 08.0 Solve water distribution system mathematical problems.
- 09.0 Apply principles of water distribution system administration.
- 10.0 Identify operational needs and maintenance of storage facilities.
- 11.0 Identify operating and maintenance needs for water distribution system facilities.
- 12.0 Develop and implement pipe-cleaning operations.
- 13.0 Identify water quality concerns and disinfection needs in a water distribution system.
- 14.0 Identify principles and practices of safety relating to water distribution system operations.
- 15.0 Apply principles of water distribution system administration.
- 16.0 Demonstrate and apply supervisory skills.
- 17.0 Demonstrate water distribution system management and organizational skills.
- 18.0 Develop cost effective management.
- 19.0 Prepare water distribution system budgets.
- 20.0 Develop standard operating procedures for training of water distribution system operators.
- 21.0 Demonstrate personnel selection and discipline.
- 22.0 Develop and demonstrate contingency planning.
- 23.0 Demonstrate record-keeping and computer technology applications in planning.
- 24.0 Interpret and apply federal, state and local rules and regulations concerning water distribution systems and employees.
- 25.0 Demonstrate public-relation skills in community interactions.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Water Distribution System Operations**  
**PSAV Number: A600100**

**Course Number: EVSO240**  
**Occupational Completion Point: A**  
**Level 3 Water System Operator – 100 Hours – SOC Code 51-8031**

- 01.0 Identify professions in the water technology field--The student will be able to:
- 01.01 Explain the work done by water distribution system operators.
  - 01.02 Explain the responsibilities of a water distribution system operator.
  - 01.03 Describe where to seek employment in the water distribution profession.
  - 01.04 Find sources of further information on how to do work task performed by water distribution system operators.
  - 01.05 Define what a water supply system is.
  - 01.06 Explain the water sources.
  - 01.07 Demonstrate employability skills.
- 02.0 Operate storage facilities--The student will be able to:
- 02.01 Understand the purpose of storage facilities.
  - 02.02 Identify the various types of storage facilities.
  - 02.03 Understand the application of storage facilities.
  - 02.04 Properly perform storage facility inspections.
  - 02.05 Understand the process of taking a storage facility out of service and retuning it back to service.
  - 02.06 Operate and maintain storage facilities in a safe manner.
  - 02.07 Understand the methods and applications of storage facility corrosion control.
  - 02.08 Apply interior and exterior protective coatings to a storage facility.
  - 02.09 Understand the operation and use of altitude control valves.
  - 02.10 Understand how to maintain water quality in a storage facility.
  - 02.11 Understand how to troubleshoot water quality problems in a storage facility.
  - 02.12 Understand disinfection processes and methods for storage facilities.
  - 02.13 Disinfect a storage facility.
  - 02.14 Collect samples from a storage facility.
  - 02.15 Understand federal, state, and local regulations for storage facilities.
  - 02.16 Understand booster pumping for storage facilities.
  - 02.17 Understand AWWA specifications and standards for storage facilities.
  - 02.18 Maintain landscaping and aesthetics of storage facilities.
  - 02.19 Maintain records for storage facilities.
- 03.0 Operate water distribution system facilities--The student will be able to:
- 03.01 Explain the purpose of a water distribution system.
  - 03.02 Explain distribution system hydraulics.
  - 03.03 Understand water distribution system pressure requirements.
  - 03.04 Understand the causes of friction losses within a distribution system.

- 03.05 Understand water distribution transmission systems.
- 03.06 Explain the different water distribution system layouts.
- 03.07 Understand water main pipe features and requirements.
- 03.08 Explain the different types of piping materials.
- 03.09 Explain the different type of pipe joints and their applications.
- 03.10 Understand the different type of corrosion control used to protect pipe.
- 03.11 Understand and perform water main installation task.
- 03.12 Understand application of pipe fittings.
- 03.13 Install pipe fittings.
- 03.14 Understand the requirements of the "ONE CALL" system.
- 03.15 Explain water main separation requirements.
- 03.16 Understand excavation spoil set backs.
- 03.17 Understand sheeting and shoring requirements.
- 03.18 Understand trenchless technology.
- 03.19 Define a "Competent person".
- 03.20 Understand the responsibilities of a "competent person".
- 03.21 Explain the need and application of thrust blocks.
- 03.22 Properly install harnessed joints.
- 03.23 Understand the correct process of backfilling an excavation.
- 03.24 Perform a hydrostatic pressure and leakage test.
- 03.25 Disinfect a pipeline using accepted standards.
- 03.26 Understand the application and operation of the different type water distribution system valves.
- 03.27 Install water distribution system valves.
- 03.28 Understand inspection and maintenance of distribution valves.
- 03.29 Understand the operation of fire hydrants.
- 03.30 Install a fire hydrant.
- 03.31 Understand inspection and maintenance requirements for fire hydrants.
- 03.32 Repair and maintain fire hydrants.
- 03.33 Understand the process of repairing a water main while it is under pressure.
- 03.34 Understand the process of taking a water main out of service, repairing it and returning it to service.
- 03.35 Explain the purpose of water meters.
- 03.36 Define the different type of meters.
- 03.37 Read a water meter.
- 03.38 Understand the application of water meters.
- 03.39 Understand the need for testing and calibrating water meters.
- 03.40 Understand backflow prevention and cross-connection.
- 03.41 Explain the different type of backflow prevention assemblies.
- 03.42 Explain the application for the different types of backflow prevention assemblies.
- 03.43 Explain what a "Degree of Hazard" is.
- 03.44 Understand the requirements for installing backflow prevention assemblies.
- 03.45 Understand the testing and maintenance requirements of backflow prevention assemblies.
- 03.46 Make a tap on a water main while under pressure.
- 03.47 Safely operate machinery and equipment.
- 03.48 Read and understand the use of gauges:
  - PSIG (gauge).
  - PSIA (Absolute).
  - PSID (Differential).
- 03.49 Install, read, and monitor pressure-recording gauges.

- 03.50 Read and understand water distribution system mapping.
- 04.0 Describe water quality consideration in a water distribution system--The student will be able to:
  - 04.01 Define specific terms used for water quality.
  - 04.02 Understand the importance of water quality.
  - 04.03 Understand water quality standards.
  - 04.04 Understand the types of contaminants that affect water quality.
  - 04.05 Understand the sources of contaminants.
  - 04.06 Understand causes of water quality degradation in water distribution systems.
  - 04.07 Understand how to maintain water quality within a water distribution system.
  - 04.08 Perform water-monitoring test for pH.
  - 04.09 Perform water-monitoring test for disinfectant residuals.
  - 04.10 Understand the process and need for collecting samples from a distribution system.
  - 04.11 Collect samples from a water distribution system.
  - 04.12 Troubleshoot water quality complaints.
  - 04.13 Perform flushing activities for maintaining water quality.
- 05.0 Explain water distribution system operations and maintenance needs and techniques--The student will be able to:
  - 05.01 Explain the need for system operation and maintenance.
  - 05.02 Explain the different types of maintenance.
  - 05.03 Understand water distribution system surveillance programs.
  - 05.04 Understand water quality-monitoring programs for a water distribution system.
  - 05.05 Understand and conduct a cross-connection control inspection.
  - 05.06 Understand and conduct bacteriological sampling.
  - 05.07 Understand lead and copper monitoring and sampling procedures.
  - 05.08 Determine and understand booster-pumping needs in a water distribution system.
  - 05.09 Understand booster pumping maintenance requirements.
  - 05.10 Connect water pipes together using different types of pipe joints.
  - 05.11 Read water distribution maps to locate buried pipes and appurtenances.
  - 05.12 Locate water main leaks.
  - 05.13 Understand and use leak detection equipment.
  - 05.14 Understand the different types of water main repair clamps and fittings.
  - 05.15 Make repairs on water main leaks.
  - 05.16 Flush pipes.
  - 05.17 Set up a flushing program.
  - 05.18 Understand pipe-cleaning operations.
  - 05.19 Understand pipelining technology.
  - 05.20 Understand and use the required equipment for making a service connection to a water main.
  - 05.21 Understand how a water meter is installed.
  - 05.22 Understand testing and calibrating water meters.
  - 05.23 Understand and perform flow testing.
  - 05.24 Explain field disinfection requirements and methods.
  - 05.25 Disinfect a new water main and storage facilities.
  - 05.26 Understand record keeping requirements.



- 05.27 Keep accurate operation and maintenance records of a water distribution system.
- 05.28 Understand and interpret water distribution mapping.
- 05.29 Understand engineering design and profile drawings.
- 05.30 Make accurate "as-built" drawings.
- 05.31 Understand landscaping needs.
- 05.32 Understand restoration requirements.
- 05.33 Develop and use proper public relation skills.
- 05.34 Safely operate and maintain a water distribution system.

06.0 Describe the principles and practices of disinfection in water distribution systems--The student will be able to:

- 06.01 Define technical terms relating to disinfection in water distribution systems.
- 06.02 Understand the purpose of disinfection.
- 06.03 Understand disinfection rules, regulations, and standards.
- 06.04 Describe factors that influence disinfection.
- 06.05 Understand the removal processes for microorganisms.
- 06.06 Understand the formation of disinfection-by-products.
- 06.07 Understand the processes for disinfection-by-product control.
- 06.08 Describe disinfection processes.
- 06.09 Explain accepted practices and standards for disinfection in a distribution system.
- 06.10 Understand hypochlorites.
- 06.11 Describe the properties of chlorine.
- 06.12 Understand the disinfection action of chlorine when added to water.
- 06.13 Describe breakpoint chlorination.
- 06.14 Describe the method for producing chloramines.
- 06.15 Understand nitrification within a distribution system when using chloramines as a disinfectant.
- 06.16 Understand the minimum disinfection requirements in a water distribution system.
- 06.17 Understand disinfection residual testing.
- 06.18 Perform disinfection-monitoring testing in a distribution system.
- 06.19 Calculate chlorine dosages.
- 06.20 Prepare a hypochlorite solution for disinfecting a new main, storage facility, pump, or well.
- 06.21 Disinfect new and existing wells.
- 06.22 Disinfect pumps.
- 06.23 Disinfect new and existing water mains.
- 06.24 Disinfect new and existing storage facilities.
- 06.25 Perform emergency and/or maintenance disinfection.
- 06.26 Understand the operation and maintenance of hypochlorinators.
- 06.27 Troubleshoot disinfection equipment.
- 06.28 Understand the hazards of chlorine and other disinfection chemicals.
- 06.29 Understand the safe handling and storage of disinfection chemicals.
- 06.30 Conduct a chlorine safety inspection.

07.0 Describe the principles and practices of safety relating to water distribution system operation--The student will be able to:

- 07.01 Understand safety programs for a water distribution system.
- 07.02 Safely operate and maintain pumps and wells with attention to the safety of operators and consumers.

- 07.03 Understand “Lock-out” and “Tag-out” requirements.
  - 07.04 Inspect vehicles and equipment for safety features and/or defects.
  - 07.05 Operate vehicles defensively and safely.
  - 07.06 Operate construction equipment in a safe manner.
  - 07.07 Understand and operate pneumatic tools safely.
  - 07.08 Understand and operate hydraulic tools safely.
  - 07.09 Apply proper application and use of personal protective equipment.
  - 07.10 Understand work zone safety.
  - 07.11 Describe an MOT (Maintenance of Traffic) set-up through a work zone.
  - 07.12 Define terms used for work zone traffic control.
  - 07.13 Understand signage requirements for work zone traffic control.
  - 07.14 Understand “Right-To-Know” laws.
  - 07.15 Understand and know what information is obtained from “Material Safety Data Sheets.”
  - 07.16 Understand and use atmosphere-testing equipment.
  - 07.17 Understand what a confined space is.
  - 07.18 Safely enter confined spaces.
  - 07.19 Apply all safety rules and regulations for excavations.
  - 07.20 Understand and use proper sheeting and shoring for trench safety.
  - 07.21 Conduct safety inspections of water distribution facilities.
- 08.0 Understand and solve water distribution system mathematical problems--The student will be able to:
- 08.01 Add, subtract, multiply, and divide whole numbers.
  - 08.02 Add, subtract, multiply, and divide fractions.
  - 08.03 Add, subtract, multiply, and divide decimals.
  - 08.04 Calculate percentages.
  - 08.05 List from memory basic conversion factors.
  - 08.06 List from memory basic formulas used in water distribution.
  - 08.07 Solve basic mathematical formulas used in water distribution for:
    - Areas.
    - Volumes.
    - Circumferences.
    - Flow rates and velocities.
    - Chemical dosages.
    - Temperature conversions.
    - Force, pressures, and head.
  - 08.08 Understand pump characteristics and pump curves.
- 09.0 Understand and apply principles of water distribution system administration--The student will be able to:
- 09.01 Understand the functions of a manager.
  - 09.02 Understand the responsibilities of a supervisor.
  - 09.03 Accurately record information on a work order.
  - 09.04 Describe the benefits of short-term, long-term, and emergency planning.
  - 09.05 Understand how to conduct an employee evaluation.
  - 09.06 Prepare written or oral reports on a distribution system’s operations.
  - 09.07 Communicate effectively within the organization and with the community.

- 09.08 Understand a contingency plan for emergencies.
- 09.09 Understand record keeping requirements.
- 09.10 Understand requirements for disposal of distribution system records.

**Course Number: EVSO241**  
**Occupational Completion Point: B**  
**Level 2 Water System Operator – 75 Hours – SOC Code 51-8031**

- 10.0 Identify operational needs and maintenance of storage facilities--The student will be able to:
  - 10.01 Identify locations for proper placement of storage facilities.
  - 10.02 Take a storage facility off line and put it back on line.
  - 10.03 Identify the standards and specifications for storage facility coatings.
  - 10.04 Identify and take corrective action for water quality problems in storage facilities.
  - 10.05 Develop and implement maintenance schedules for storage facilities.
  - 10.06 Determine and implement corrosion control for storage facilities.
  - 10.07 Inspect the work being performed by contractors on a storage facility.
  - 10.08 Explain federal, state and local rules and regulations operating and maintaining storage facilities.
  
- 11.0 Identify operating and maintenance needs for water distribution system facilities--The student will be able to:
  - 11.01 Explain hydraulic concerns and performance within a distribution system.
  - 11.02 Explain and determine hydraulic gradient lines.
  - 11.03 Determine and implement changes in a distribution system that would improve system hydraulics.
  - 11.04 Develop protocols for “best practice” methods for the installation of system piping and appurtenances.
  - 11.05 Develop and implement programs for inspection and maintenance of fire hydrants.
  - 11.06 Develop and implement programs for inspection, maintenance, and calibration of water meters.
  - 11.07 Develop and implement programs for inspection and maintenance of distribution valves.
  - 11.08 Develop and implement programs for the inspection, testing, and maintenance of backflow prevention assemblies.
  - 11.09 Explain and apply federal, state, and local rules and regulations for distribution facility installation and maintenance.
  - 11.10 Identify equipment needs for operating and maintaining distribution systems.
  - 11.11 Interpret and review engineering design drawings and make field changes when necessary.
  - 11.12 Read and interpret distribution system mapping.
  - 11.13 Train operators in safe practices for maintaining and operating distribution system facilities.
  - 11.14 Develop and implement a water distribution system surveillance program.
  - 11.15 Tests and calibrate a water meter.
  - 11.16 Make proper applications of water meters.
  - 11.17 Determine specifications for equipment used to install and maintain distribution piping and appurtenances.

- 11.18 Develop and implement corrosion control methods for distribution piping.
- 12.0 Develop and implement pipe-cleaning operations--The student will be able to:
  - 12.01 Schedule preventive maintenance activities.
  - 12.02 Develop and implement programs for corrective maintenance activities.
  - 12.03 Direct activities for new pipe line installation.
  - 12.04 Determine material requirements for performing distribution system operations and maintenance activities.
  - 12.05 Determine labor requirements for performing distribution system operations and maintenance activities.
  - 12.06 Determine equipment requirements for performing distribution system operations and maintenance activities.
  - 12.07 Understand the use of Supervisory Control and Data Acquisition systems.
- 13.0 Identify water quality concerns and disinfection needs in a water distribution system--The student will be able to:
  - 13.01 Explain and apply federal, state, and local rules and regulations pertaining to water quality and disinfection in a distribution system.
  - 13.02 Develop and implement a flushing program for maintaining water quality in a distribution system.
  - 13.03 Determine and implement improvements and changes that would improve water quality within a distribution system.
  - 13.04 Develop and implement a bacteriological sampling program.
  - 13.05 Develop and implement a lead and copper sampling program.
  - 13.06 Develop and implement heterotrophic plate count sampling program.
  - 13.07 Develop and implement nitrite and nitrate sampling program.
  - 13.08 Explain the different types of disinfection processes.
  - 13.09 Explain how each disinfection process affects water quality within a distribution system.
  - 13.10 Develop protocols for disinfection of new and existing water mains.
  - 13.11 Develop protocols for disinfection of storage facilities.
  - 13.12 Develop protocols for disinfection of pumps and wells.
  - 13.13 Develop protocols for prevention and control of nitrification in a distribution system when using chloramines as a disinfectant.
  - 13.14 Develop and implement field-testing programs for pH.
  - 13.15 Develop and turbidity, temperature and disinfection residuals.
  - 13.16 Develop and implement programs for the safe handling and use of chemicals used in water distribution.
  - 13.17 Develop and implement a backflow prevention and cross-connection control program.
  - 13.18 Use proper public relation skills when dealing with consumers concerning water quality issues.
  - 13.19 Train operators to prepare for and respond to emergencies that would affect water quality in a distribution system.
- 14.0 Identify principles and practices of safety relating to water distribution system operations--The student will be able to:

- 14.01 Understand and apply federal, state, and local rules and regulations for safe practices when working on water distribution systems.
- 14.02 Develop and implement safety program for a water distribution system.
- 14.03 Install sheeting and shoring for excavation safety.
- 14.04 Perform inspections of work sites for safe conditions.
- 14.05 Perform safety inspection of tools and equipment.
- 14.06 Instruct distribution employees on safe work practices.
- 14.07 Develop plans for follow-up to insure the use of personal protective equipment by employees.
- 14.08 Implement safety-training programs for distribution system operators.
- 14.09 Inspect "Work Zone" set-ups.
- 14.10 Perform the responsibilities of a "Competent Person."
- 14.11 Develop protocols for handling and storage of hazardous chemicals.

15.0 Apply principles of water distribution system administration--The student will be able to:

- 15.01 Understand the utilities organizational chart.
- 15.02 Understand and write job descriptions for a specific position within the utility.
- 15.03 Plan and prepare maintenance and work schedules.
- 15.04 Maintain employee time records.
- 15.05 Conduct employee performance assessments.
- 15.06 Prepare and conduct technical training for distribution system employees.
- 15.07 Review technical specifications for materials.
- 15.08 Review technical specifications for tools and equipment.
- 15.09 Prepare a budget.
- 15.10 Prepare job cost estimates.
- 15.11 Interview job applicants.
- 15.12 Understand and apply federal, state, and local rules and regulations for record keeping.
- 15.13 Maintain water distribution system records.
- 15.14 Prepare written or oral reports on distribution operations.
- 15.15 Describe the financial strength of your distribution system.
- 15.16 Develop and implement contingency plans for emergencies.
- 15.17 Understand the security plans for your utility's facilities.

16.0 Demonstrate and apply supervisory skills--The student will be able to:

- 16.01 Understand and define:
  - Authority.
  - Responsibility.
  - Delegation.
  - Accountability.
  - Unity of Command.
- 16.02 Demonstrate supervisory and leadership skills.
- 16.03 Supervise the activities of assigned work force.
- 16.04 Describe the steps necessary to provide equal and fair treatment to all employees.
- 16.05 Effectively utilize disciplinary actions to correct employee behavior.
- 16.06 Follow proper procedures for disciplining employees.
- 16.07 Delegate responsibility and assign work tasks.

- 16.08 Follow proper process for handling employee grievances.
- 16.09 Identify emergency situations and respond appropriately.
- 16.10 Identify components of the budgeting process.
- 16.11 Demonstrate inventory control procedures.
- 16.12 Identify the supervisor's role in customer relations.
- 16.13 Identify the supervisor's role within the organizational structure.
- 16.14 Communicate effectively within the organization and the community.
- 16.15 Effectively handle conflict resolution.

**Course Number: EVSO242**

**Occupational Completion Point: C**

**Level 3 Water System Operator – 100 Hours – SOC Code 51-8031**

17.0 Demonstrate water distribution system management and organizational skills--The student will be able to:

- 17.01 Describe and implement principles of management and supervision.
- 17.02 Describe the concepts relating to management and supervision.
- 17.03 Demonstrate organizational skills and methods.
- 17.04 Develop an organizational chart.
- 17.05 Develop a staffing pattern.
- 17.06 Identify goals and objectives for the distribution system.
- 17.07 Identify lines of communication within the organization and the community.

18.0 Develop cost effective management--The student will be able to:

- 18.01 Identify and evaluate operational cost for:
  - Personnel staffing.
  - Material warehousing inventory.
  - Equipment inventory.
  - System operations.
  - Equipment maintenance.
  - Safety and training programs.
- 18.02 Perform cost analysis and surveys.
- 18.03 Develop a plan for "best practice" efficient operations.

19.0 Prepare water distribution system budgets--The student will be able to:

- 19.01 Identify budget activities and categorizes expenses related to water distribution systems operation and maintenance.
- 19.02 Develop budget monitoring and control techniques.
- 19.03 Develop long-range capital improvement planning for future budgeting needs.

20.0 Develop standard operating procedures for training of water distribution system operators--The student will be able to:

- 20.01 Develop procedures to ensure employee safety.
- 20.02 Develop a written plan for in-house training of employees for:
  - Safety training;
  - "Right-to-Know" training.

- “M.S.D.S.” training.
  - “Competent Person” training.
  - “Confined Space Entry” training.
  - Technical training.
  - Equipment operation training.
- 20.03 Develop a written plan for employees obtaining certification certificates and licenses.
- 20.04 Develop a written plan for cross training of employees within the utility.
- 20.05 Develop a plan for providing basic employment information to new employees.
- 21.0 Demonstrate personnel selection and discipline--The student will be able to:
- 21.01 Identify appropriate interviewing and hiring practices.
  - 21.02 Develop job descriptions for specific positions.
  - 21.03 Develop job performance task for new positions.
  - 21.04 Identify characteristics important to the role of a supervisor and how they will support the organizations goals.
  - 21.05 Review and analyze job applications to select qualified candidates for interviews.
  - 21.06 Conduct interviews.
  - 21.07 Use appropriate communication skills.
  - 21.08 Train and evaluate employees objectively and fairly.
  - 21.09 Evaluate and apply disciplinary actions objectively and fairly.
  - 21.10 Mediate conflict resolutions objectively and fairly.
  - 21.11 Conduct supervisory performance assessments.
- 22.0 Develop and demonstrate contingency planning--The student will be able to:
- 22.01 Recognize and analyze potential emergency situations that can occur in a water distribution system.
  - 22.02 Develop a written plan for dealing with emergency situations, which would include personnel assignments and equipment requirements.
  - 22.03 Develop protocols for responding to customer complaints and inquiries.
  - 22.04 Develop protocols to ensure continuous coverage of operations and maintenance of a water distribution system, including after hours, holidays, and weekend coverage.
  - 22.05 Develop protocols in the event of natural disasters.
- 23.0 Demonstrate record-keeping and computer technology applications in planning--The student will be able to:
- 23.01 Develop a plan for inventory control.
  - 23.02 Develop a plan to analyze operation and maintenance of the distribution system and equipment.
  - 23.03 Evaluate and develop flow charts for the handling and control of distribution system records.
  - 23.04 Review computer hardware and software, based on record-keeping needs.
- 24.0 Interpret and apply federal, state and local rules and regulations concerning water distribution systems and employees--The student will be able to:

- 24.01 Identify reporting requirements of federal, state and local regulatory agencies.
  - 24.02 Develop a plan for submitting required reports to regulatory agencies in the required time frame.
  - 24.03 Identify permitting requirements for distribution system improvements, expansion, and maintenance of a water distribution system.
  - 24.04 Develop a plan to acquire necessary permitting.
  - 24.05 Develop protocols for conforming to permitting requirements.
  - 24.06 Develop protocols for distribution system mapping.
  - 24.07 Develop protocols for handling liability claims.
  - 24.08 Evaluate results of a sanitary survey.
- 25.0 Demonstrate public-relation skills in community interactions--The student will be able to:
- 25.01 Demonstrate the ability to handle adverse and difficult situations with the public.
  - 25.02 Demonstrate the ability to handle the media and public inquiries appropriately.
  - 25.03 Demonstrate the ability to inform the media and public if a potential emergency situation arises.



2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Water Treatment Technologies  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

PSAV	
Program Number	P150507
CIP Number	0715050603
Grade Level	30, 31
Standard Length	405 hours
Teacher Certification	WSP OPER @7 G
CTSO	N/A
SOC Codes (all applicable)	51-8031
Facility Code	[263] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: N/A Language: N/A Reading: N/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 career 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 Water Treatment sector of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to source water or influent characteristics; treatment facility unit processes and operational techniques; water quality and identification; identifying treatment goals and measuring their achievement; disinfection; process control techniques; sampling, testing, and laboratory analysis; supervision; operation maintenance and inspection of facility equipment; application of current DEP regulations and standards; facility administration

and management techniques; and troubleshooting operational control problems. The emphasis is on skills that are needed for effective treatment process control and troubleshooting.

### **Program Structure**

This program is a planned sequence of instruction consisting of three occupational completion points.

When offered at the post secondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EVS0133	Water Treatment Plant Operator, Level "C"	155 hours	51.8031
B	EVS0143	Water Treatment Plant Operator, Level "B"	130 hours	51.8031
C	EVS0153	Water Treatment Plant Operator, Level "A"	120 hours	51.8031

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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 program-specific OJT framework apply.

#### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Identify professions related to the water technology field.
- 02.0 Identify scientific concepts common in water and wastewater treatment.
- 03.0 Identify safety hazards associated with water technologies.
- 04.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
- 05.0 Solve basic math problems common to water technologies.
- 06.0 Define pumping and basic hydraulic principles.
- 07.0 Define principles of disinfection.
- 08.0 Define sampling techniques.

- 09.0 Define federal, state, and local regulations that apply to water technologies.
- 10.0 Demonstrate employability skills.
- 11.0 Identify sampling techniques and explain the significance of the steps.
- 12.0 Identify chemical, biological, and physical constituents of water entering the water-treatment facility or distribution systems.
- 13.0 Describe the principles, operational and troubleshooting practices of the aeration process.
- 14.0 Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes.
- 15.0 Describe the principles, operational and troubleshooting practices of the sedimentation process.
- 16.0 Describe the principles, operational and troubleshooting practices of the filtration process.
- 17.0 Describe the principles, operational and troubleshooting practices of the water-softening process.
- 18.0 Describe the principles, operational and troubleshooting practices of the stabilization process.
- 19.0 Describe the principles, operational and troubleshooting practices of the corrosion-control process.
- 20.0 Describe the principles, operational and troubleshooting practices of the disinfection process.
- 21.0 Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes.
- 22.0 Describe the principles, operational and troubleshooting practices of the iron-and manganese-removal processes.
- 23.0 Describe the principles, operational and troubleshooting practices for taste and odor control.
- 24.0 Describe the principles, operational and troubleshooting practices of the demineralization processes.
- 25.0 Describe the principles, operational and troubleshooting practices of the fluoridation process.
- 26.0 Identify facility operational problems.
- 27.0 Describe basic hydraulics and pumping operations.
- 28.0 Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable-water facility.
- 29.0 Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management.
- 30.0 Analyze the constituents of water and select the appropriate treatment.
- 31.0 Identify advanced sampling techniques and interpret the results.
- 32.0 Solve algebra, ratio, and proportion problems in the water treatment process.
- 33.0 Demonstrate process optimization for water treatment.
- 34.0 Analyze and correct facility operational problems.
- 35.0 Demonstrate equipment inspection and preventive maintenance for water treatment.
- 36.0 Apply appropriate federal, state and local regulations for operation and management of a public potable water facility.
- 37.0 Apply federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
- 38.0 Describe energy conservation and identify ways to conserve energy in the water treatment facility.
- 39.0 Demonstrate supervisory skills.
- 40.0 Describe theoretical facility management skills.

- 41.0 Demonstrate methods of organization and control.
- 42.0 Develop a plan for cost management.
- 43.0 Prepare budgets and personnel assignments.
- 44.0 Develop standard operating procedures for the training and orientation of new employees.
- 45.0 Demonstrate personnel selection and discipline.
- 46.0 Demonstrate contingency planning.
- 47.0 Develop a plan for energy conservation.
- 48.0 Describe record keeping and use of computer applications in planning.
- 49.0 Explain process optimization for water or wastewater treatment facilities.
- 50.0 Interpret permits and blueprints.
- 51.0 Develop a laboratory plan for process control.
- 52.0 Discuss public-relations skills in community interactions.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Water Treatment Plant Technologies**  
**PSAV Number: P150507**

**Course Number: EVS0133**

**Occupational Completion Point: A**

**Water Treatment Plant Operator C – 155 Hours – SOC Code – 51.8031**

- 01.0 Identify Professions Related To The Water Technology Field--The student will be able to:
- 01.01 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.
  - 01.02 Identify the basic terms and concepts involved in processes used in these professions.
  - 01.03 List potential employers in the water technology field: federal, municipal, county, state and private.
  - 01.04 Identify resources to assist in finding employment in the field.
  - 01.05 Identify professional organizations related to the water technology field.
  - 01.06 Identify career ladder levels in the water technology field: trainee, C Level, B Level, A Level.
- 02.0 Identify scientific concepts common in water and wastewater treatment--The student will be able to:
- 02.01 Identify chemical symbols used in water and wastewater treatment.
  - 02.02 Describe the hydrologic cycle.
  - 02.03 Describe the basic concepts of the pH scale and its importance in the treatment process.
  - 02.04 Identify the differences between mixtures, elements, and compounds, and organic and inorganic chemicals.
  - 02.05 Identify principle states of matter: liquid, solid, and gas.
  - 02.06 Identify the basic nitrogen, phosphorous, and carbon cycles.
- 03.0 Identify safety hazards associated with water technologies--The student will be able to:
- 03.01 Identify the types of hazards common to water technology facilities.
  - 03.02 Recognize unsafe conditions and prescribe corrective measures.
  - 03.03 Identify and safely handle hazardous chemicals common to water technology facilities.
  - 03.04 Recognize electrical hazards.
  - 03.05 Recognize fire hazards, identify types of fires, and describe appropriate extinguishing techniques.
- 04.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials--The student will be able to:

- 04.01 Identify the kinds of information presented on Material Safety Data Sheets.
- 04.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (chapter 442, F.S.).
- 05.0 Solve basic math problems common to water technologies--The student will be able to:
  - 05.01 Perform basic arithmetic problems, including addition, subtraction, multiplication, division, fractions, decimals, percentages, rounding (significant figures), graphing, etc.
  - 05.02 Identify metric measurements and perform conversions.
  - 05.03 Perform calculations that involve areas, volumes, capacities, retention times, pounds, mg/L, velocities, flow rates, pressure, and head.
- 06.0 Define pumping and basic hydraulic principles--The student will be able to:
  - 06.01 Identify types of pumps.
  - 06.02 Discuss application and use of different types of pumps.
  - 06.03 Identify components/characteristics of pumps including pump operation and basic pump curves including centrifugal pumps, positive displacement pumps, and air lift pumps.
  - 06.04 Identify types of pipes, valves, and fittings.
  - 06.05 Define cross connections.
  - 06.06 Identify the appropriate equipment used in the treatment processes.
- 07.0 Define principles of disinfection--The student will be able to:
  - 07.01 List the need/reasons for disinfection (list of waterborne diseases).
  - 07.02 Define concepts related to disinfection.
  - 07.03 List methods and chemicals used in disinfection.
  - 07.04 Define the physical properties of chlorine.
  - 07.05 List kinds of disinfection equipment used.
- 08.0 Define sampling techniques--The student will be able to:
  - 08.01 Define the reasons for sampling and types of samples.
  - 08.02 Define methods of sample collection and handling.
  - 08.03 Define the basic procedure for quality control and quality assurance in sampling.
  - 08.04 Define the chain of custody for samples.
  - 08.05 Perform chlorine residual analysis.
  - 08.06 Perform pH analysis.
- 09.0 Define federal, state, and local regulations that apply to water technologies--The student will be able to:
  - 09.01 List regulatory agencies and their roles in monitoring the water technology field.
  - 09.02 Define regulations associated with the appropriate federal, state or local agencies.
  - 09.03 Define training and certification requirements for water technology workers.
- 10.0 Demonstrate employability 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 for a job application.
  - 10.04 Complete a job application.
  - 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 for the treatment facility environment.
  - 10.10 Identify materials and documents needed for a professional library.
  - 10.11 Demonstrate productive and positive customer interactions.
  - 10.12 Demonstrate effective interpersonal communication skills.
- 11.0 Identify sampling techniques and explain the significance of the steps--The student will be able to:
- 11.01 Identify the laboratory tests that are commonly performed by operators in Florida water-treatment facilities, including those required by the Safe Drinking Water Regulation.
  - 11.02 Define pathogenic organisms, including bacteria, protozoa, and virus, and describe their disease associations.
  - 11.03 Describe the laboratory test performed for the presence of bacteria.
  - 11.04 Describe the correct procedure for obtaining a bacteriological sample.
  - 11.05 Describe correct sample collection procedures for inorganic and organic analyses.
  - 11.06 Describe the laboratory quality-control checks and required documentation.
  - 11.07 Identify the chain of custody for a sample.
- 12.0 Identify chemical, biological, and physical constituents of water entering the water-treatment facility or distribution systems--The student will be able to:
- 12.01 Determine which constituents are inherent to groundwater and/or surface water.
  - 12.02 Describe the relationship between turbidity and the microbiological quality of water.
  - 12.03 Describe the uses of chemical analysis in water-treatment operations.
  - 12.04 Identify symbols and common names for elements and chemical compounds.
  - 12.05 Select the primary constituents to be measured and the most commonly used units of measurement for each.
  - 12.06 Explain the importance of water treatment for the control of coliform bacteria and algae.
- 13.0 Describe the principles, operational and troubleshooting practices of the aeration process--The student will be able to:
- 13.01 Describe the aeration and air stripping processes, and explain how they differ.
  - 13.02 Identify the types of aeration systems.
  - 13.03 Identify the benefits of aeration.
  - 13.04 Describe the components of an air-stripping system.



- 13.05 Troubleshoot aeration and air stripping processes.
- 14.0 Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes--The student will be able to:
- 14.01 Define concepts such as turbidity, color, coagulation, and flocculation.
  - 14.02 Define the difference between sweep and enhanced coagulation.
  - 14.03 Identify the kinds of equipment used in the coagulation process.
  - 14.04 Identify coagulant chemicals used in water-treatment facilities.
  - 14.05 Identify the steps of coagulation, in order.
  - 14.06 Identify the specific sampling locations for process control in a coagulation process.
  - 14.07 Identify factors that would contribute to poor floc formation.
  - 14.08 Compute the feed rate in pounds per day (lbs/d) when the chemical coagulant (mg/l) and flow rate (MGD) are known.
  - 14.09 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.
  - 14.10 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.
  - 14.11 Describe troubleshooting techniques for basic mixing, coagulation, and flocculation processes.
- 15.0 Describe the principles, operational and troubleshooting practices of the sedimentation process--The student will be able to:
- 15.01 Describe an upflow clarifier and basin sedimentation.
  - 15.02 Identify factors that affect efficient sedimentation.
  - 15.03 Identify the measures that would be effective in preventing or controlling algae growth on surfaces of coagulation and sedimentation basins.
  - 15.04 Identify methods of sludge removal from sedimentation basins.
  - 15.05 Describe troubleshooting techniques for sedimentation and upflow clarifier processes.
- 16.0 Describe the principles, operational and troubleshooting practices of the filtration process--The student will be able to:
- 16.01 Explain concepts related to filtration, including types of filters, filter-system components, and the steps for normal filtration operations.
  - 16.02 Explain common problems of filtering systems, including head loss, mudballs, and filter media loss.
  - 16.03 Determine when to backwash a filter.
  - 16.04 Identify the steps for backwashing a filter.
  - 16.05 Describe troubleshooting techniques for filtration processes.
- 17.0 Describe the principles, operational and troubleshooting practices of the water-softening process--The student will be able to:
- 17.01 Describe the two types of hardness.
  - 17.02 Identify the appropriate chemical(s) to use in chemical-precipitation softening processes for the two kinds of hardness.

- 17.03 Describe alkalinity and its components.
  - 17.04 Identify treatment processes used for water softening.
  - 17.05 Calculate the distribution of bicarbonate, carbonate, and/or hydroxide ions when given the total alkalinity and phenolphthalein alkalinity.
  - 17.06 Describe selective carbonate removal.
  - 17.07 Identify the important zones of an upflow clarifier unit.
  - 17.08 Describe the lime soda ash softening process, including its control.
  - 17.09 Compute lime demand from raw-water analyses.
  - 17.10 Describe the reasons for recarbonation.
  - 17.11 Compute carbon dioxide demands for recarbonation.
  - 17.12 Compute hardness removal when the ion-exchange capacity is known.
  - 17.13 Describe troubleshooting techniques for water-softening processes.
- 18.0 Describe the principles, operational and troubleshooting practices of the stabilization process--The student will be able to:
- 18.01 Identify the chemicals used in stabilization.
  - 18.02 Identify two stabilization indices.
  - 18.03 Determine water stability, using the Langelier index and the marble test.
  - 18.04 Troubleshoot stabilization processes.
- 19.0 Describe the principles, operational and troubleshooting practices of the corrosion control process--The student will be able to:
- 19.01 Identify the factors that influence corrosion.
  - 19.02 Describe the problems that can be created by corrosive waters.
  - 19.03 Describe the basic concepts related to electrolysis.
  - 19.04 Define electrochemical reaction.
  - 19.05 Identify the chemicals used in corrosion control.
  - 19.06 Describe the conditions for calcium carbonate film formation.
  - 19.07 Define cathode film formation.
  - 19.08 Define cathodic protection and describe its application in water-treatment facilities.
  - 19.09 Describe troubleshooting techniques for corrosion-control processes.
- 20.0 Describe the principles, operational and troubleshooting practices of the disinfection process--The student will be able to:
- 20.01 Identify the chemicals used in primary disinfection.
  - 20.02 Identify commonly used chlorinators and hypochlorinators.
  - 20.03 Determine the maximum amount of chlorine gas (in pounds) that may be taken from a cylinder in a 24-hour period.
  - 20.04 Identify proper maintenance procedures for equipment chlorination.
  - 20.05 Identify terminology related to chlorination and disinfection.
  - 20.06 Identify common safety problems or emergency situations that might occur during chlorination.
  - 20.07 Identify the properties of chlorine and describe its use in water treatment.
  - 20.08 Explain the points at which chlorine is applied most effectively in water treatment.
  - 20.09 Compute the feed rate (lbs/d) when given the rate of flow (MGD) and dosage of chlorine (mg/l).

- 20.10 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.
  - 20.11 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.
  - 20.12 Compute the feed rate needed to treat a given amount of water when given a chlorine demand and the desired chlorine residual.
  - 20.13 Describe troubleshooting techniques for disinfection processes.
- 21.0 Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes--The student will be able to:
- 21.01 Describe the formation of total trihalomethanes (TTHM).
  - 21.02 Identify the specific procedure for collecting samples to determine trihalomethane levels.
  - 21.03 Compute the quarterly average and the annual TTHM measurements when sample results are given.
  - 21.04 Identify processes that remove trihalomethane precursors.
  - 21.05 Identify processes that remove trihalomethanes after they are formed.
  - 21.06 Identify the benefits of alternate disinfectants.
  - 21.07 Describe chloramination as a control of TTHM.
  - 21.08 Describe troubleshooting techniques for the control and treatment of trihalomethanes.
- 22.0 Describe the principles, operational and troubleshooting practices of the iron- and manganese-removal processes--The student will be able to:
- 22.01 Explain the occurrence of iron and manganese in source water and in treated water.
  - 22.02 Describe the importance of controlling iron and manganese.
  - 22.03 Describe sample-collection and analysis procedures for iron and manganese.
  - 22.04 Describe remedial processes for controlling iron and manganese.
  - 22.05 Compute the potassium permanganate dosage for a known concentration of iron and manganese in the water being treated.
  - 22.06 Describe troubleshooting techniques for iron and manganese-removal processes.
- 23.0 Describe the principles, operational and troubleshooting practices for taste and odor control--The student will be able to:
- 23.01 Identify common types of complaints about water quality.
  - 23.02 Identify causes of tastes and odors.
  - 23.03 Describe how microbial growths affect tastes and odors.
  - 23.04 Describe how eutrophication contributes to surface-water tastes and odors.
  - 23.05 Describe a cross-connection.
  - 23.06 Identify the chemicals used in the control and treatment of tastes and odors.
  - 23.07 Describe the Threshold Odor Number (TON) test.
  - 23.08 Determine the TON when dilution volumes and positive samples are given.
  - 23.09 Describe troubleshooting techniques for taste and odor control.

- 24.0 Describe the principles, operational and troubleshooting practices of the demineralization processes--The student will be able to:
- 24.01 Define concepts related to demineralization, such as reverse osmosis (RO), flux, feedwater, permeate, and salinity.
  - 24.02 Describe the structure, composition, and performance of an RO membrane.
  - 24.03 Describe feedwater impurities, physical parameters, and conditions potentially harmful to the RO process.
  - 24.04 Identify items included in a typical RO-facility-operation checklist.
  - 24.05 Describe the common causes of membrane damage.
  - 24.06 Describe the procedure for membrane cleaning.
  - 24.07 Compute the percent of recovery when product flow and feed flow are known.
  - 24.08 Compute the percent of mineral rejection when total dissolved solids are known for the feedwater and product water.
  - 24.09 Describe the basic concepts of electrodialysis (ED), such as the cathode and anode relationship and the removal of typical inorganic salts.
  - 24.10 Describe the most common problem of ED operation in a facility.
  - 24.11 Explain how the cation membrane and the anion membrane differ.
  - 24.12 Describe the multi-compartment unit used in the ED process.
  - 24.13 Describe ED operating procedures in detail.
  - 24.14 Describe the two most common chemical solutions used to flush ED stack membranes.
  - 24.15 Describe troubleshooting techniques for demineralization processes.
- 25.0 Describe the principles, operational and troubleshooting practices of the fluoridation process--The student will be able to:
- 25.01 Define the basic concepts related to fluoridation, including its purpose and the kinds of chemicals used.
  - 25.02 Identify the properties of fluoride and describe its use.
  - 25.03 Identify the types of equipment used in fluoridation.
  - 25.04 Describe proper maintenance procedures for fluoridation equipment.
  - 25.05 Describe potential safety problems or emergency situations in the fluoridation process, and ways to avoid them.
  - 25.06 Compute the feed rate of chemicals used in the fluoridation process.
  - 25.07 Describe troubleshooting techniques for the fluoridation processes.
- 26.0 Identify facility operational problems--The student will be able to:
- 26.01 Respond to customer questions about taste or odor in the water.
  - 26.02 Respond to customer questions about red water or rust stains.
  - 26.03 Identify the probable cause(s) for a sudden change in chlorine demand; take corrective action.
- 27.0 Describe basic hydraulics and pumping operations--The student will be able to:
- 27.01 Describe the relationship between the system head and pressure, and make conversions between them.
  - 27.02 Describe three types of head, i.e., pressure, suction, and atmospheric.
  - 27.03 Describe proper operation of centrifugal and displacement pumps.

- 27.04 Describe causes and methods that are effective in preventing “water hammer.”
- 27.05 Troubleshoot pump operations.
  
- 28.0 Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable-water facility--The student will be able to:
  - 28.01 Complete the Drinking Water Bacteriological Analysis Form correctly.
  - 28.02 Complete the DEP daily operation report (DOR) form correctly.
  - 28.03 Complete the DEP monthly operation report (MOR) form correctly.
  - 28.04 Identify the DEP requirements for the operation of standby and emergency equipment.
  - 28.05 Identify the DEP requirements for microbiological monitoring and analyses.
  - 28.06 Identify the DEP requirements for sampling and testing.
  
- 29.0 Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management--The student will be able to:
  - 29.01 Identify the appropriate equipment used in the treatment train, treatment residuals disposal, and solids management.
  - 29.02 Describe a preliminary site inspection of the equipment used in the treatment train, treatment residuals disposal, and solids management.
  - 29.03 Identify the maintenance needs of equipment used in the treatment train, treatment residuals disposal, and solids management, including safe procedures for maintenance.
  - 29.04 Describe proper record keeping for preventive and corrective maintenance.
  - 29.05 Describe preventive and corrective maintenance procedures for equipment used in the treatment process, treatment residuals disposal, and solids management

**Course Number: EVS0143**

**Occupational Completion Point: B**

**Water Treatment Plant Operator B – 130 Hours – SOC Code – 51.8031**

- 30.0 Analyze the constituents of water, and select the appropriate treatment--The student will be able to:
  - 30.01 Describe the water-treatment processes common in Florida.
  - 30.02 Describe those processes that may reduce or control a contaminant for which maximum contaminant levels (MCL) exist.
  
- 31.0 Identify advanced sampling techniques, and interpret the results--The student will be able to:
  - 31.01 Demonstrate the need for chemical analyses in water treatment.
  - 31.02 Select the appropriate treatment for a problem identified through laboratory testing.
  - 31.03 Determine whether the finished water is acceptable or unacceptable according to laboratory results.
  
- 32.0 Solve algebra, ratio, and proportion problems in the water-treatment process--The student will be able to:

- 32.01 Perform advanced math problems including ratio and proportion.
- 32.02 Identify metric measurements and perform conversions.
- 32.03 Perform algebraic calculations essential to water treatment, when given values for components.

33.0 Demonstrate process optimization for water treatment--The student will be able to:

- 33.01 Describe the advanced principles and operational practices of sweep and enhanced coagulation and flocculation.
- 33.02 Describe the advanced principles and operational practices of sedimentation.
- 33.03 Describe the advanced principles and operational practices of disinfection.
- 33.04 Describe the advanced principles and operational practices of filtration.
- 33.05 Describe the advanced principles and operational practices of corrosion control.
- 33.06 Describe the advanced principles and operational practices of taste and odor control.
- 33.07 Describe the advanced principles and operational practices of iron and manganese control.
- 33.08 Describe the advanced principles and operational practices of fluoridation.
- 33.09 Describe the advanced principles and operational practices of softening.
- 33.10 Describe the advanced principles and operational practices of demineralization.
- 33.11 Describe the advanced principles and operational practices of trihalomethanes.
- 33.12 Demonstrate process optimization for coagulation and flocculation.
- 33.13 Demonstrate process optimization for sedimentation.
- 33.14 Demonstrate process optimization for disinfection.
- 33.15 Demonstrate process optimization for filtration.
- 33.16 Demonstrate process optimization for corrosion control.
- 33.17 Demonstrate process optimization for taste and odor control.
- 33.18 Demonstrate process optimization for iron and manganese control.
- 33.19 Demonstrate process optimization for fluoridation.
- 33.20 Demonstrate process optimization for softening.
- 33.21 Demonstrate process optimization for demineralization.
- 33.22 Demonstrate process optimization for trihalomethanes.

34.0 Analyze and correct facility operational problems--The student will be able to:

- 34.01 Demonstrate troubleshooting techniques and corrective action for sweep and enhanced coagulation and flocculation.
- 34.02 Demonstrate troubleshooting techniques and corrective action for sedimentation.
- 34.03 Demonstrate troubleshooting techniques and corrective action for disinfection.
- 34.04 Demonstrate troubleshooting techniques and corrective action for filtration.
- 34.05 Demonstrate troubleshooting techniques and corrective action for corrosion control.
- 34.06 Demonstrate troubleshooting techniques and corrective action for taste and odor control.
- 34.07 Demonstrate troubleshooting techniques and corrective action for iron and manganese control.
- 34.08 Demonstrate troubleshooting techniques and corrective action for fluoridation.
- 34.09 Demonstrate troubleshooting techniques and corrective action for softening.
- 34.10 Demonstrate troubleshooting techniques and corrective action for demineralization.

- 34.11 Demonstrate troubleshooting techniques and corrective action for trihalomethanes.
- 35.0 Demonstrate equipment inspection and preventive maintenance procedures--The student will be able to:
  - 35.01 Identify the components of a preventive maintenance plan.
  - 35.02 Use trend analysis in preventive maintenance.
  - 35.03 Perform a site inspection.
  - 35.04 Develop a training plan (for a new employee) for inspection of equipment.
- 36.0 Apply appropriate federal, state, and local regulations for the operation and maintenance of a public potable-water facility--The student will be able to:
  - 36.01 Explain the regulations in Chapter 62-602, F.A.C., covering duties, responsibilities, certification requirements, testing, renewal, staffing, and facility classification.
  - 36.02 Explain the regulations in Chapter 62-550, F.A.C. concerning samples and analyses at water-treatment facilities.
  - 36.03 Explain DEP regulations that apply to procedures such as reclaiming water and managing residuals.
  - 36.04 Apply regulations concerning facility management.
  - 36.05 Apply regulations concerning samples and analyses.
  - 36.06 Apply regulations concerning laboratory management.
- 37.0 Apply federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials--The student will be able to:
  - 37.01 Identify the reporting requirements as specified in SARA Title III and Chapter 252, F.S.
  - 37.02 Describe the responsibilities toward the community as specified in SARA Title III and Chapter 252, F.S.
- 38.0 Describe energy conservation, and identify ways to conserve energy in the water-treatment facility--The student will be able to:
  - 38.01 Identify the causes of energy loss.
  - 38.02 Rank various pieces of equipment in order of energy consumption.
  - 38.03 Describe procedures for performing an energy survey.
  - 38.04 Describe methods to conserve energy, such as equipment and process adjustments.
- 39.0 Demonstrate supervisory skills--The student will be able to:
  - 39.01 Identify supervisory skills and various leadership styles.
  - 39.02 Delegate responsibility and assign tasks to employees.
  - 39.03 Follow the proper procedure for handling employee grievances.
  - 39.04 Follow the proper procedure for disciplining employees.
  - 39.05 Follow staffing guidelines in planning.
  - 39.06 Conduct an orientation of a new employee, and follow the training program.
  - 39.07 Evaluate employees objectively.

- 39.08 Identify emergency situations and respond appropriately.
- 39.09 Identify the components of the budgeting process.
- 39.10 Demonstrate inventory-control procedures.
- 39.11 Explain the importance of ethics in supervision.
- 39.12 Identify the role of the supervisor in a facility safety program.
- 39.13 Identify the role of the supervisor in customer relations.

**Course Number: EVS0153**

**Occupational Completion Point: C**

**Water Treatment Plant Operator A – 120 Hours – SOC Code – 51.8031**

40.0 Describe theoretical facility-management skills--The student will be able to:

- 40.01 Describe the principles of management and supervision.
- 40.02 Describe concepts related to management and supervision.

41.0 Demonstrate methods of organization and control--The student will be able to:

- 41.01 Demonstrate organizational methods.
- 41.02 Develop an organizational chart.
- 41.03 Develop a staffing pattern.
- 41.04 Identify formal and informal lines of communication.

42.0 Develop a plan for cost management--The student will be able to:

- 42.01 Identify the costs of operation, such as personnel, inventory, operations, energy consumption, and equipment maintenance.
- 42.02 Perform cost surveys.
- 42.03 Develop a plan for efficient operations.
- 42.04 Explain system-efficiency balance.

43.0 Prepare budgets and personnel assignments--The student will be able to:

- 43.01 Identify budget activities and categories of expense accounts related to water- or wastewater-treatment facilities.
- 43.02 Identify techniques of budget control.
- 43.03 Prepare a budget, including long-range projections.
- 43.04 Prepare a staffing schedule, including the appropriate levels of staff for all required shifts.

44.0 Develop standard operating procedures for the training and orientation of new employees--The student will be able to:

- 44.01 Develop a written plan for an in-house orientation program for new employees.
- 44.02 Identify information that a supervisor should give new employees, including leave procedures, insurance procedures, safety procedures, chain of command, etc.
- 44.03 Develop a written plan for an in-house training program that includes safety measures and hazardous or toxic materials in the work place.
- 44.04 Develop a written plan for a cross-training program in facility operations.

45.0 Demonstrate personnel selection and discipline--The student will be able to:



- 45.01 Identify appropriate interviewing and hiring practices.
  - 45.02 Develop a job description.
  - 45.03 Identify control factors that are important in an organizational plan and that set limits on delegated authority.
  - 45.04 Identify appropriate actions of the supervisor, the employee, etc., in a grievance procedure.
  - 45.05 Identify characteristics important to the role of a supervisor.
  - 45.06 Determine requirements for a new position.
  - 45.07 Advertise for the position, including the job description, job responsibilities, education requirements, and job conditions.
  - 45.08 Analyze job applications to select qualified candidates to interview.
  - 45.09 Conduct interviews.
  - 45.10 Notify interviewees of the results, and conduct follow-up activities.
  - 45.11 Use appropriate human-relations and communication skills.
  - 45.12 Train, evaluate, and discipline employees objectively.
  - 45.13 Identify appropriate actions of a supervisor in evaluating personnel performance.
- 46.0 Demonstrate contingency planning--The student will be able to:
- 46.01 Analyze potential emergency situations that can occur in a facility.
  - 46.02 Develop a plan for handling problems caused by emergency situations, including what equipment would be used and what sampling would be needed.
  - 46.03 Develop procedures for responding to customer complaints.
  - 46.04 Develop procedures to ensure employee safety.
  - 46.05 Develop procedures to ensure continuous operations, including preventive maintenance, alternative procedures, etc.
- 47.0 Develop a plan for energy conservation--The student will be able to:
- 47.01 Describe concepts related to energy conservation.
  - 47.02 Identify energy-conservation measures.
- 48.0 Describe record-keeping and use of computer applications in planning--The student will be able to:
- 48.01 Develop a plan for inventory control.
  - 48.02 Develop a plan for an analysis of operation and maintenance (O&M) logs and for the optimum operation of equipment.
  - 48.03 Identify the various types of facility automation.
  - 48.04 Review available hardware and software, based on record-keeping needs.
- 49.0 Describe process optimization for water or wastewater treatment facilities--The student will be able to:
- 49.01 Develop a plan for process control to achieve efficient, energy-saving, cost-effective operation.
  - 49.02 Develop a plan for testing and analyzing the treatment operations for use in long-range facility operations.
  - 49.03 Develop a plan for the systematic troubleshooting of operational problems.

- 49.04 Develop a plan for documenting operations and problems in order to anticipate and avoid potential problems.
- 50.0 Interpret permits and blueprints--The student will be able to:
  - 50.01 Read and interpret blueprints for water and wastewater facilities.
  - 50.02 Read the facility construction and operating permits, and relate permit requirements to facility operations.
- 51.0 Develop a laboratory plan for process control--The student will be able to:
  - 51.01 Identify laboratory equipment for process control.
  - 51.02 Develop a plan for equipment calibration and maintenance.
  - 51.03 Develop a laboratory-staffing plan.
  - 51.04 Determine whether in-house laboratory operations are cost-effective.
  - 51.05 Review procedures for quality assurance/quality control in a facility laboratory.
  - 51.06 Review procedures for obtaining certification for a facility laboratory.
  - 51.07 Develop a sampling/analysis schedule for effective process control.
- 52.0 Employ public-relations skills in community interactions--The student will be able to:
  - 52.01 Plan facility tours for the public.
  - 52.02 Demonstrate how to handle press and public inquiries appropriately.
  - 52.03 Demonstrate how to inform the public if a potential emergency situation arises.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Advanced Water Treatment Technologies  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

PSAV	
Program Number	P150509
CIP Number	0715050606
Grade Level	30, 31
Standard Length	612 hours
Teacher Certification	WSP OPER @7 G TEC CHEM @7 G
CTSO	N/A
SOC Codes (all applicable)	51-8031
Facility Code	[263] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

### **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 water treatment sector of 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 water treatment sector of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to an understanding of various feed waters; various water treatment schemes, power generation, pharmaceutical, biotech, semiconductor and other applications; safety and troubleshooting of water treatment systems; piping and instrumentation diagrams; pumps, valves, gauges and meters; the pretreatment technologies required to produce safe drinking water as well as the pretreated water required for advanced technologies; the theory, process and equipment of common membrane water treatment systems; and the

initial monitoring and troubleshooting skills required to effectively operate and maintain a membrane water treatment system.

### **Program Structure**

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

When offered at the post secondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EVS0355	Membrane Water Treatment Specialist	306 hours	51-8031
B	EVS0357	High Purity Water Treatment Specialist	306 hours	51-8031

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **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 program-specific OJT framework apply.

#### **Basic Skills (if applicable)**

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 9, Language 9, and Reading 9. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

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 pursuant to Section 1008.29, F.S.; 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.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Identify jobs related to the advanced water treatment field.
- 02.0 Identify safety hazards associated with advanced water technologies.
- 03.0 Explain the importance of each section on a Material Safety Data Sheet (MSDS).
- 04.0 Solve basic math problems common to advanced water treatment technologies.
- 05.0 Describe how various pumps work and basic hydraulic principles.
- 06.0 Identify various valves and the differences in different piping materials.
- 07.0 Compare and contrast the characteristics of drinking water, boiler feed water, semiconductor rinse water and pharmaceutical water.
- 08.0 Demonstrate job interviewing skills and resume/cover letter writing skills.
- 09.0 Describe the different types of contaminants in various feed waters.
- 10.0 Demonstrate how to use Piping & Instrumentation Diagrams (P & ID) and Process Flow Diagrams (PFD) to understand a water treatment process.
- 11.0 Describe the theory, equipment, and practice of scaling-control pretreatment technologies.
- 12.0 Describe the theory, equipment, and practice of fouling-control pretreatment technologies.
- 13.0 Describe the theory, equipment, and practice of chemical attack-control pretreatment technologies.
- 14.0 Describe the theory, equipment, and practice of chlorination and chloramination.
- 15.0 Identify where in a water treatment system various contaminants are removed.
- 16.0 Explain how reverse osmosis (RO) works.
- 17.0 Describe the rejection capabilities of each type of membrane.
- 18.0 Explain how to chemically clean a membrane unit.
- 19.0 Explain how to monitor before, during, and after chemical cleaning.
- 20.0 Explain which type, or types, of membrane to use in different water treatment applications.
- 21.0 Describe the pretreatment requirements for different membrane technologies.
- 22.0 Explain why conventional water treatment has difficulty removing Cryptosporidium and Giardia cysts and which membrane technologies to use.
- 23.0 Describe the three most common problems with nanofiltration and RO membranes.
- 24.0 Describe the instruments and the monitoring required to catch performance problems at an early stage.
- 25.0 Describe the common methods used to control scaling, fouling and chemical attack in membrane units.
- 26.0 Explain the differences between designing for well water and designing for surface water.
- 27.0 Demonstrate how to use advanced troubleshooting techniques.
- 28.0 Explain the information on a membrane manufacturer's specification sheet and how to practically use this information at a plant.
- 29.0 Demonstrate how to operate and maintain an RO unit.
- 30.0 Explain why membrane water treatment is becoming common for the production of municipal drinking water.
- 31.0 Describe and perform appropriate water analyses.
- 32.0 Describe and perform appropriate sampling techniques.
- 33.0 Describe the theory, equipment, and operation of aeration, decarbonation, and degasification.
- 34.0 Describe the theory, equipment, and operation of stabilizing water.
- 35.0 Describe the theory, equipment, and operation of corrosion control.
- 36.0 Describe the characteristics and the measurement of silica contaminants.
- 37.0 Describe the characteristics and the measurement of organic contaminants.

- 38.0 Describe the characteristics and the measurement of ionic contaminants.
- 39.0 Describe the characteristics and the measurement of non-living particle contaminants.
- 40.0 Describe the characteristics and the measurement of living particle contaminants.
- 41.0 Explain the monitoring and troubleshooting required for media filters.
- 42.0 Explain the monitoring and troubleshooting required for activated carbon beds.
- 43.0 Explain the monitoring and troubleshooting required for membrane units.
- 44.0 Explain the theory, equipment, and practice of probing.
- 45.0 Explain the theory, equipment, and practice of profiling.
- 46.0 Explain the theory, equipment, and practice of membrane element replacement.
- 47.0 Demonstrate how to chemically clean an RO unit.
- 48.0 Demonstrate how to use software programs to trend membrane unit performance.
- 49.0 Demonstrate how to use software programs to check the scaling and fouling characteristics of a membrane unit.
- 50.0 Explain the theory, and describe the function, of ion exchange resin beads and resin sheets.
- 51.0 Explain the concept of selectivity.
- 52.0 Demonstrate an understanding of selectivity.
- 53.0 Describe the normal operation of strong acid cation (SAC) single-bed ion exchange units.
- 54.0 Describe and demonstrate how to regenerate an SAC single bed.
- 55.0 Describe the normal operation of strong base anion (SBA) single-bed ion exchange units.
- 56.0 Describe and demonstrate how to regenerate an SBA single bed.
- 57.0 Describe the normal operation of a SAC and SBA dual-bed ion exchange system.
- 58.0 Describe the normal operation of mixed-bed ion exchange units.
- 59.0 Describe how to regenerate a mixed bed.
- 60.0 Describe the normal operation and regeneration of electrodeionization units.
- 61.0 Describe the normal operation of 254 nm and 185 nm ultraviolet (UV) irradiation units.
- 62.0 Explain the functions of final filters.
- 63.0 Explain the usage of ozone in high purity water treatment systems.
- 64.0 Explain the problems caused by dead legs.
- 65.0 Identify the pieces of equipment that remove feed water contaminants.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:           Advanced Water Treatment Technologies**  
**PSAV Number:           P150509**

**Course Number: EVS0355**  
**Occupational Completion Point: A**  
**Membrane Water Treatment Specialist – 306 Hours – SOC Code 51-8031**

- 01.0 Identify jobs related to the advanced water treatment field--The student will be able to:
- 01.01 List the duties of various advanced water treatment jobs such as operator, service technician, sales rep, lab technician, instrumentation and control technician, and sales engineer.
  - 01.02 List the personality traits that are beneficial for each job.
  - 01.03 List potential employers in the advanced water treatment field, including semiconductor, power generation drinking water, beverage, pharmaceutical, biotech, and governmental agencies.
  - 01.04 Describe how to contact potential employers through websites.
- 02.0 Identify safety hazards associated with advanced water technologies--The student will be able to:
- 02.01 List the tripping hazards in an advanced water treatment plant.
  - 02.02 List the electrocution hazards in an advanced water treatment plant.
  - 02.03 List the chemical hazards in an advanced water treatment plant.
  - 02.04 List the fire hazards in an advanced water treatment plant.
  - 02.05 List the cutting hazards in an advanced water treatment plant.
  - 02.06 List the inhalation hazards in an advanced water treatment plant.
- 03.0 Explain the importance of each section on a material safety data sheet (MSDS)--The student will be able to:
- 03.01 Identify the chemical properties of the chemical.
  - 03.02 Identify the hazards associated with the chemical.
  - 03.03 Identify any fire hazards associated with the chemical.
  - 03.04 Identify any fire fighting procedures recommended.
  - 03.05 Identify the personal protection equipment and procedures required when handling the chemical.
  - 03.06 Identify the toxicological effects of the chemical.
- 04.0 Solve basic math problems common to advanced water treatment technologies--The student will be able to:
- 04.01 Calculate Normalized Permeate Flow.
  - 04.02 Calculate Percent Salt Rejection.
  - 04.03 Calculate Differential Pressures.
  - 04.04 Calculate +/- percentages on water analysis reports.
  - 04.05 Calculate Net Driving Pressure.



- 04.06 Calculate average pressures, salt concentrations, and osmotic pressures.
- 04.07 Calculate water flux in gallons per square foot of membrane per day.
- 05.0 Describe how various pumps work and basic hydraulic principles--The student will be able to:
  - 05.01 Describe how a given example of a positive displacement pump works.
  - 05.02 Describe how a given example of a centrifugal pump works.
  - 05.03 Describe the differences between two different types of well pumps.
  - 05.04 List a minimum of three things to check out on an operating pump.
  - 05.05 Define suction head.
  - 05.06 Define discharge head.
  - 05.07 Describe a pump curve.
  - 05.08 Define gauge pressure versus absolute pressure.
- 06.0 Identify various valves and the differences in piping materials--The student will be able to:
  - 06.01 Identify a globe valve.
  - 06.02 Identify a ball valve.
  - 06.03 Identify a gate valve.
  - 06.04 Identify a needle valve.
  - 06.05 Identify a butterfly valve.
  - 06.06 Identify a plug valve.
  - 06.07 Identify various actuated control valves.
  - 06.08 Identify PVC piping material.
  - 06.09 Identify carbon steel piping material.
  - 06.10 Identify various stainless steel piping materials.
  - 06.11 Identify PVDF piping material.
  - 06.12 Define gauges of pipe.
- 07.0 Compare and contrast the characteristics of drinking water, boiler feed water, semiconductor rinse water and pharmaceutical water--The student will be able to:
  - 07.01 List the order of end-use water quality from drinking water to semiconductor rinse water.
  - 07.02 List the regulatory agencies and their roles in monitoring drinking water.
  - 07.03 Define state and federal regulations concerning drinking water
  - 07.04 Define the training and certification requirements for drinking water operators.
  - 07.05 List the contaminant limitations of 2000 PSI boiler water.
  - 07.06 List the contaminant limitations of purified water.
  - 07.07 List the contaminant limitations of water for Injection.
  - 07.08 List the contaminant limitations for rinse water used to make 0.18 micron semiconductor devices.
- 08.0 Demonstrate job interviewing skills and resume/cover letter writing skills--The student will be able to:
  - 08.01 Describe the job search process.
  - 08.02 Explain the most important characteristics of a good cover letter.
  - 08.03 Explain the most important characteristics of a good resume.

- 08.04 Explain some of the most important considerations during a job interview.
  - 08.05 Explain the employer concerns that the cover letter should address.
  - 08.06 Explain the purpose of a cover letter.
  - 08.07 Explain the purpose of a resume.
  - 08.08 Describe how to dress for an interview.
  - 08.09 Describe how to act at an interview.
- 09.0 Describe the different types of contaminants in various feed waters--The student will be able to:
- 09.01 List the different categories of source water.
  - 09.02 Identify the TDS classification of fresh water, brackish water, highly brackish water, and seawater.
  - 09.03 List common characteristics of surface water.
  - 09.04 List common characteristics of well water.
  - 09.05 List common characteristics of seawater.
  - 09.06 Define the six different categories of water contaminants.
  - 09.07 Compare and contrast the ionic, gaseous, siliceous, organic, non-living and living particulate differences between ground water and surface water.
- 10.0 Demonstrate how to use piping and instrumentation diagrams (P & ID) and process flow diagrams (PFD) to understand a water treatment process--The student will be able to:
- 10.01 Identify the sequence of the main pieces of equipment at a water treatment plant given a PFD.
  - 10.02 Identify the instruments at a water treatment plant given a P & ID.
  - 10.03 Trace lines using a P & ID.
  - 10.04 Define an indicator, transmitter, and indicating controller.
  - 10.05 Identify flaws in given PFD.
- 11.0 Describe the theory, equipment, and practice of scaling-control pretreatment technologies--The student will be able to:
- 11.01 Describe the theory and practice of ion exchange softeners.
  - 11.02 Describe the theory and practice of acid injection.
  - 11.03 Describe the theory and practice of scale inhibitor injection.
  - 11.04 Identify the one scalant that ion exchange softeners cannot handle.
  - 11.05 Describe the limitations of scale inhibitors.
  - 11.06 Describe what acid injection does to calcium carbonate scale potential.
  - 11.07 Describe what acid injection does for non-carbonate scale potential.
- 12.0 Describe the theory, equipment, and practice of fouling-control pretreatment technologies--The student will be able to:
- 12.01 Describe the theory and practice of clarifiers.
  - 12.02 Describe the theory and practice of multimedia filters.
  - 12.03 Describe the theory and practice of sand filters.
  - 12.04 Describe the theory and practice of green sand filters.
  - 12.05 Describe the theory and practice of bag filters.
  - 12.06 Describe the theory and practice of cartridge filters.
  - 12.07 Describe the theory and practice of coagulant injection.

- 12.08 Describe the theory and practice of flocculant injection.
- 12.09 Describe the theory and practice of organic scavengers.
- 12.10 Describe the theory and practice of silt dispersant injection.
  
- 13.0 Describe the theory, equipment, and practice of chemical attack control pretreatment technologies--The student will be able to:
  - 13.01 Describe the theory and practice of activated carbon beds.
  - 13.02 Describe the theory and practice of pH control for cellulosic membranes.
  - 13.03 Describe the theory and practice of sulfite ion injection.
  - 13.04 Describe the theory and practice of ultraviolet irradiation for removal of chlorine and ozone.
  
- 14.0 Describe the theory, equipment, and practice of chlorination and chloramination--The student will be able to:
  - 14.01 Describe the chemical reaction of chlorine with water.
  - 14.02 List free chlorine compounds.
  - 14.03 List the chemical reaction of chlorine and ammonia.
  - 14.04 Describe the relationship among free chlorine, combined chlorine, and total chlorine.
  - 14.05 Explain what happens to the proportion of free chlorine compounds with changes in pH.
  - 14.06 Describe at what pH free chlorine is most biocidal.
  - 14.07 Explain the reason for chloramination as opposed to breakpoint free chlorination.
  - 14.08 Explain the difference in the affect of free chlorine and combined chlorine with polyamide thin film membranes.
  - 14.09 Explain the affects of iron, copper, and cobalt in relationship with chlorine attack of polyamide thin film membranes.
  
- 15.0 Identify where in a water treatment system various contaminants are removed--The student will be able to:
  - 15.01 Identify, given various water treatment schemes, where ionic contaminants are removed.
  - 15.02 Identify, given various water treatment schemes, where organic contaminants are removed.
  - 15.03 Identify, given various water treatment schemes, where siliceous contaminants are removed.
  - 15.04 Identify, given various water treatment schemes, where gaseous contaminants are removed.
  - 15.05 Identify, given various water treatment schemes, where non-living particulate contaminants are removed.
  - 15.06 Identify, given various water treatment schemes, where living particulate contaminants are removed.
  
- 16.0 Explain how reverse osmosis works--The student will be able to:
  - 16.01 Explain the process of osmosis.
  - 16.02 Define a semipermeable membrane.
  - 16.03 Explain the concept of applied pressure.

- 16.04 Explain the concept of osmotic pressure.
  - 16.05 Explain the concept of net osmotic pressure.
  - 16.06 Explain the process of reverse osmosis.
  - 16.07 Explain the relationship of net driving pressure to water flux through a membrane.
  - 16.08 Describe how a membrane element works.
- 17.0 Describe the rejection capabilities of each type of membrane--The student will be able to:
- 17.01 Describe how nanofiltration and reverse osmosis membrane reject ionic contaminants.
  - 17.02 Describe how nanofiltration and reverse osmosis membrane reject non-ionic contaminants.
  - 17.03 Describe the rejection capabilities of microfiltration membranes.
  - 17.04 Describe the rejection capabilities of ultrafiltration membranes.
  - 17.05 Describe the rejection capabilities of nanofiltration membranes.
  - 17.06 Describe the rejection capabilities of hyperfiltration membranes.
- 18.0 Explain how to chemically clean a membrane unit--The student will be able to:
- 18.01 Describe the symptoms of a fouled membrane unit.
  - 18.02 Describe the symptoms of a scaled membrane unit.
  - 18.03 Describe the game plan required to remove scalants.
  - 18.04 Describe the game plan required to remove foulants.
  - 18.05 List generic chemicals used to remove scalants.
  - 18.06 List generic chemicals used to remove foulants.
- 19.0 Explain how to monitor before, during, and after chemical cleaning--The student will be able to:
- 19.01 Identify membrane unit performance trends that indicate the need for cleaning.
  - 19.02 List a minimum of six parameters that should be monitored during a chemical cleaning.
  - 19.03 Explain the problems that cleaning at too high or low a pH may cause.
  - 19.04 Explain the problems that cleaning at too high or low a temperature may cause.
  - 19.05 Explain the problems that cleaning at too high or low a flow rate may cause.
  - 19.06 Describe the data used to indicate when to end a cleaning.
  - 19.07 Describe the monitoring parameters that document how well a cleaning was performed.
- 20.0 Explain which type, or types, of membrane to use in different water treatment applications--The student will be able to:
- 20.01 Identify, given a feed water analysis and end-use requirements, whether microfiltration (MF), ultrafiltration (UF), nanofiltration (NF), and/or reverse osmosis (RO) would produce the desired end-use water.
  - 20.02 Describe the most important parameters for determining which membrane technology to use.
  - 20.03 Define the pore size of MF membranes and provide examples for both municipal and industrial applications.

- 20.04 Define the pore size of UF membranes and provide examples for both municipal and industrial applications.
  - 20.05 Define the pore size of NF membranes and provide examples for both municipal and industrial applications.
  - 20.06 Define the pore size of RO membranes and provide examples for both municipal and industrial applications.
- 21.0 Describe the pretreatment requirements for different membrane technologies--The student will be able to:
- 21.01 Describe the pretreatment requirements for MF.
  - 21.02 Describe the pretreatment requirements for UF.
  - 21.03 Describe the pretreatment requirements for NF and RO to control scaling.
  - 21.04 Describe the pretreatment requirements for NF and RO to control colloidal fouling.
  - 21.05 Describe the pretreatment requirements for NF and RO to control biofouling.
  - 21.06 Describe the pretreatment requirements for NF and RO to control chemical attack.
- 22.0 Explain why conventional water treatment has difficulty removing Cryptosporidium and Giardia cysts and which membrane technologies are effective--The student will be able to:
- 22.01 Define the size of Cryptosporidium and Giardia cysts.
  - 22.02 Define the removal capabilities of coagulation, flocculation, sedimentation, and media filtration.
  - 22.03 Explain why chlorination is not effective enough for inactivation of Cryptosporidium and Giardia cysts.
  - 22.04 Identify which membrane technologies will effectively remove both Cryptosporidium and Giardia cysts.
- 23.0 Describe the three most common problems with nanofiltration and reverse osmosis membranes--The student will be able to:
- 23.01 Describe the mechanisms of scaling in NF and RO units.
  - 23.02 Describe the mechanisms of fouling in NF and RO units.
  - 23.03 Describe the mechanisms of chemical attack of NF and RO membranes.
  - 23.04 Explain why NF membrane units may foul more than RO units.
  - 23.05 Describe design features that reduce the fouling of NF and RO units.
  - 23.06 Explain where fouling is the worst in NF and RO units.
- 24.0 Describe the instruments and the monitoring required to catch nf and ro problems at an early stage--The student will be able to:
- 24.01 List the minimum instrumentation required for effective monitoring.
  - 24.02 Explain why interstage pressure gauges are required.
  - 24.03 Explain the need for a feed water temperature indicator.
  - 24.04 Explain the need for a permeate pressure gauge.
  - 24.05 Demonstrate the ability to collect performance data and input it into the appropriate membrane manufacturer's monitoring software programs.

- 24.06 Demonstrate the ability to produce normalized permeate flow, percent salt rejection, and pressure drop performance trends.
  - 24.07 List the instruments required to calculate net driving pressure.
  - 24.08 List the instruments required to calculate normalized permeate flow.
  - 24.09 List the instruments required to calculate percent salt passage.
  - 24.10 List the instruments required to calculate percent recovery.
  - 24.11 List the instruments required to calculate pressure drops.
  - 24.12 Calculate net driving pressure given performance data from a membrane unit.
  - 24.13 Calculate normalized permeate flow given performance data from a membrane unit.
  - 24.14 Calculate percent salt rejection given performance data from a membrane unit.
  - 24.15 Calculate percent recovery given performance data from a membrane unit.
  - 24.16 Calculate pressure drops given performance data from a membrane unit.
- 25.0 Describe the common methods used to control scaling, fouling, and chemical attack in ro & nf units--The student will be able to:
- 25.01 List a minimum of six treatment steps or design features used to control scaling.
  - 25.02 List a minimum of eight treatment steps or design features used to control colloidal fouling.
  - 25.03 List a minimum of six treatment steps or design features used to control biofouling.
  - 25.04 List a minimum of three treatment steps used to control chemical attack.
- 26.0 Explain the differences between designing membrane units for well water and designing for surface water--The student will be able to:
- 26.01 Explain the concept of GFD (gallons per square foot per day) based on different source waters.
  - 26.02 Explain why well water will typically require less membrane than surface water.
  - 26.03 Describe the common characteristics of shallow well water.
  - 26.04 Describe the common characteristics of deep well water.
  - 26.05 Describe the common characteristics of surface water.
  - 26.06 Describe the common characteristics of seawater.
  - 26.07 Draw three typical treatment schemes for RO and NF units operating on well water.
  - 26.08 Draw three typical treatment schemes for RO and NF units operating on surface water.
- 27.0 Demonstrate how to use advanced troubleshooting techniques--The student will be able to:
- 27.01 Identify scaling given normalized permeate flow, percent salt rejection, and pressure drop performance graphs.
  - 27.02 Identify fouling given normalized permeate flow, percent salt rejection, and pressure drop performance graphs.
  - 27.03 Identify chemical attack given normalized permeate flow, percent salt rejection, and pressure drop performance graphs.
  - 27.04 Determine a calcium carbonate scaling problem using membrane manufacturer's design software.

- 27.05 Determine a calcium sulfate scaling problem using membrane manufacturer's design software.
  - 27.06 Determine a barium sulfate scaling problem using membrane manufacturer's design software.
  - 27.07 Determine a strontium sulfate scaling problem using membrane manufacturer's design software.
  - 27.08 Determine a silica scaling problem using membrane manufacturer's design software.
  - 27.09 Determine that a unit is fouling due to high GFD.
  - 27.10 Determine that a unit is fouling due to low cross flow velocities.
- 28.0 Explain the information on a membrane manufacturer's specification sheet and how to practically use this information at a plant--The student will be able to:
- 28.01 Identify the square footage of membrane per element and explain the significance.
  - 28.02 Identify the test conditions of the membrane elements and explain the significance.
  - 28.03 Identify the allowable normal operating and chemical cleaning temperature ranges of the membrane elements and explain the significance.
  - 28.04 Identify the allowable normal operating and chemical cleaning pH ranges of the membrane elements and explain the significance.
  - 28.05 Identify whether membrane elements are fiberglass wrapped or cage wrapped and explain the significance.
  - 28.06 Identify heat sanitizable membrane elements and explain why and when these elements would be used.
  - 28.07 Identify the pressure drop limitations of membrane elements and explain the significance.
  - 28.08 Describe a minimum of three potential problems that could occur when switching membrane elements.
- 29.0 Demonstrate how to operate and maintain an RO unit--The student will be able to:
- 29.01 Load and unload membrane elements.
  - 29.02 Replace o-rings.
  - 29.03 Replace brine seals.
  - 29.04 Shim a unit.
  - 29.05 Install end-cap adaptors.
  - 29.06 Install interconnectors.
  - 29.07 Replace cartridge filters.
  - 29.08 Dechlorinate the feed water.
  - 29.09 Adjust the pH of the feed water if required.
  - 29.10 Start and stop a unit.
  - 29.11 Adjust the percent recovery by changing the valving.
  - 29.12 Identify an o-ring leak.
  - 29.13 Take conductivity readings.
  - 29.14 Perform the Silt Density Index.
  - 29.15 Profile the unit.
  - 29.16 Perform a probing of a pressure vessel.
  - 29.17 Identify all components of a unit.
  - 29.18 Identify all instruments on a unit.

- 30.0 Explain why membrane water treatment is becoming common for the production of municipal drinking water--The student will be able to:
- 30.01 Describe the hydrological cycle.
  - 30.02 Describe the effect the human population increase has on water quality.
  - 30.03 Describe the problem of Cryptosporidium and Giardia cysts.
  - 30.04 Describe the problem with arsenic.
  - 30.05 Describe the problem with disinfection by-products.
  - 30.06 Describe the basic reasons why conventional water treatment cannot remove certain substances down to current and future regulated levels.
  - 30.07 Describe which problems MF can control.
  - 30.08 Describe which problems UF can control.
  - 30.09 Describe which problems NF can control.
  - 30.10 Describe which problems RO can control.
- 31.0 Describe and perform appropriate water analyses--The student will be able to:
- 31.01 Identify the laboratory tests required for drinking water, boiler feed water, purified water, water for injection and semiconductor rinse water.
  - 31.02 Identify the bacteriological monitoring that must be done for drinking water, boiler feed water, purified water, water for injection and semiconductor rinse water.
  - 31.03 Describe how the heterotrophic plate count (HPC) enumerates bacteria.
  - 31.04 Describe how sulfate-reducing bacteria (SRB), iron-related bacteria (IRB), and slime-forming bacteria (SFB) are enumerated.
  - 31.05 Perform HPC, SRB, IRB, and SFB bacterial analysis.
- 32.0 Describe and perform appropriate sampling techniques--The student will be able to:
- 32.01 Define good sampling techniques for microbiological analysis.
  - 32.02 Perform good sampling techniques for microbiological analysis.
  - 32.03 Define good sampling techniques for chemical analysis.
  - 32.04 Perform good sampling techniques for chemical analysis.
- 33.0 Describe the theory, equipment, and operation of aeration, decarbonation, and degasification--The student will be able to:
- 33.01 Describe the theory, equipment, and operation of induced draft aeration/decarbonation.
  - 33.02 Describe the theory, equipment, and operation of forced draft aeration/decarbonation.
- 34.0 Describe the theory, equipment, and operation of stabilizing water--The student will be able to:
- 34.01 List the chemicals used to stabilize drinking water.
  - 34.02 Describe how to measure the stability of drinking water.
  - 34.03 Calculate Langelier Saturation Index (LSI) using software programs.



35.0 Describe the theory, equipment, and operation of corrosion control--The student will be able to:

35.01 Describe the process of corrosion.

35.02 Describe the problems caused by corrosion for drinking water, boiler feed water, purified water, water for injection and semiconductor rinse water.

35.03 Identify chemicals used for corrosion control.

35.04 Describe cathodic protection.

2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Wastewater Treatment Technologies  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food and Natural Resources

PSAV	
Program Number	P150527
CIP Number	0715050604
Grade Level	30, 31
Standard Length	405 hours
Teacher Certification	WSP OPER @7 G
CTSO	N/A
SOC Codes (all applicable)	51-8031
Facility Code	[263] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: N/A Language: N/A Reading: N/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 career 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 Wastewater Treatment sector of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to source water or influent characteristics; treatment facility unit processes and operational techniques; water quality and identification; identifying treatment goals and measuring their achievement; disinfection; process control techniques; sampling, testing, and laboratory analysis; supervision; operation maintenance and inspection of facility equipment; application of current DEP regulations and standards; facility administration and management techniques; and troubleshooting operational control problems. The emphasis is on skills that are needed for effective treatment process control and troubleshooting.

## Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

When offered at the post secondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EVS0333	Wastewater Treatment Plant Operator, Level "C"	155 hours	51.8031
B	EVS0343	Wastewater Treatment Plant Operator, Level "B"	130 hours	51.8031
C	EVS0350	Wastewater Treatment Plant Operator, Level "A"	120 hours	51.8031

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Identify professions related to the water technology field.
- 02.0 Identify scientific concepts common in water and wastewater treatment.
- 03.0 Identify safety hazards associated with water technologies.
- 04.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
- 05.0 Solve basic math problems common to water technologies.
- 06.0 Define pumping and basic hydraulic principles.
- 07.0 Define principles of disinfection.
- 08.0 Define sampling techniques.
- 09.0 Define federal, state, and local regulations that apply to water technologies.
- 10.0 Demonstrate employability skills.

- 11.0 Identify the basic characteristics and principles of wastewater treatment.
- 12.0 Identify sampling techniques and interpret the results.
- 13.0 Describe the sources of wastewater and the types of collection systems.
- 14.0 Describe the process and the operational principles for the preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal; and solids management.
- 15.0 Perform treatment-process control and troubleshooting for the treatment train, effluent disposal, and solids management.
- 16.0 Perform equipment inspection, and identify basic maintenance for the treatment train, effluent disposal, and solids management.
- 17.0 Identify and correct facility operational problems.
- 18.0 Identify federal, state, and local regulations governing wastewater technologies.
- 19.0 Describe federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
- 20.0 Identify the constituents of influent and its effects on the treatment process.
- 21.0 Identify the constituents of wastewater and select the appropriate treatment.
- 22.0 Demonstrate advanced sampling techniques and interpret results.
- 23.0 Describe process optimization for preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal, and solids management.
- 24.0 Describe advanced treatment process control for the treatment train, effluent disposal, and solids management.
- 25.0 Describe advanced equipment inspection and preventive maintenance for the treatment train, effluent disposal, and solids management.
- 26.0 Describe and correct facility operational problems.
- 27.0 Apply federal, state, and local regulations governing wastewater technologies.
- 28.0 Apply federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
- 29.0 Describe energy conservation and identify ways to conserve energy in the wastewater treatment facility.
- 30.0 Demonstrate supervisory skills.
- 31.0 Discuss facility management skills.
- 32.0 Demonstrate methods of organization and control.
- 33.0 Develop a plan for cost management.
- 34.0 Prepare budgets and personnel assignments.
- 35.0 Develop standard operating procedures for the training and orientation of new employees.
- 36.0 Demonstrate personnel selection and discipline.
- 37.0 Demonstrate contingency planning.
- 38.0 Develop a plan for energy conservation.
- 39.0 Demonstrate record keeping and use of computer applications in planning.
- 40.0 Demonstrate process optimization for water or wastewater treatment facilities.
- 41.0 Interpret permits and blueprints.
- 42.0 Develop a laboratory plan for process control.
- 43.0 Employ public-relations skills in community interactions.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Wastewater Treatment Technologies**  
**PSAV Number: P150527**

**Course Number: EVS0333**  
**Occupational Completion Point: A**  
**Wastewater Treatment Plant Operator Level C – 155 Hours – SOC Code – 51.8031**

- 01.0 Identify professions related to the water technology field--The student will be able to:
- 01.01 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.
  - 01.02 Identify the basic terms and concepts involved in processes used in these professions.
  - 01.03 List potential employers in the water technology field: federal, municipal, county, state and private.
  - 01.04 Identify resources to assist in finding employment in the field.
  - 01.05 Identify professional organizations related to the water technology field.
  - 01.06 Identify career ladder levels in the water technology field: trainee, C Level, B Level, A Level.
- 02.0 Identify scientific concepts common in water and wastewater treatment--The student will be able to:
- 02.01 Identify chemical symbols used in water and wastewater treatment.
  - 02.02 Describe the hydrologic cycle.
  - 02.03 Describe the basic concepts of the pH scale and its importance in the treatment process.
  - 02.04 Identify the differences between mixtures, elements, and compounds, and organic and inorganic chemicals.
  - 02.05 Identify principle states of matter: liquid, solid, and gas.
  - 02.06 Identify the basic nitrogen, phosphorous, and carbon cycles.
- 03.0 Identify safety hazards associated with water technologies--The student will be able to:
- 03.01 Identify the types of hazards common to water technology facilities.
  - 03.02 Recognize unsafe conditions and prescribe corrective measures.
  - 03.03 Identify and safely handle hazardous chemicals common to water technology facilities.
  - 03.04 Recognize electrical hazards.
  - 03.05 Recognize fire hazards, identify types of fires, and describe appropriate extinguishing techniques.
- 04.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials--The student will be able to:

- 04.01 Identify the kinds of information presented on Material Safety Data Sheets (MSDS).
- 04.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (chapter 442, F.S.).
- 05.0 Solve basic math problems common to water technologies--The student will be able to:
  - 05.01 Perform basic arithmetic problems, including addition, subtraction, multiplication, division, fractions, decimals, percentages, rounding (significant figures), graphing, etc.
  - 05.02 Identify metric measurements and perform conversions.
  - 05.03 Perform calculations that involve areas, volumes, capacities, retention times, pounds, mg/L, velocities, flow rates, pressure, and head.
- 06.0 Define pumping and basic hydraulic principles--The student will be able to:
  - 06.01 Identify types of pumps.
  - 06.02 Discuss application and use of different types of pumps.
  - 06.03 Identify components/characteristics of pumps including pump operation and basic pump curves including centrifugal pumps, positive displacement pumps, and air lift pumps.
  - 06.04 Identify types of pipes, valves, and fittings.
  - 06.05 Define cross connections.
  - 06.06 Identify the appropriate equipment used in the treatment processes.
- 07.0 Define principles of disinfection--The student will be able to:
  - 07.01 List the need/reasons for disinfection (list of waterborne diseases).
  - 07.02 Define concepts related to disinfection.
  - 07.03 List methods and chemicals used in disinfection.
  - 07.04 Define the physical properties of chlorine.
  - 07.05 List kinds of disinfection equipment used.
- 08.0 Define sampling techniques--The student will be able to:
  - 08.01 Define the reasons for sampling and types of samples.
  - 08.02 Define methods of sample collection and handling.
  - 08.03 Define the basic procedure for quality control and quality assurance in sampling.
  - 08.04 Define the chain of custody for samples.
  - 08.05 Perform chlorine residual analysis.
  - 08.06 Perform pH analysis.
- 09.0 Define federal, state, and local regulations that apply to water technologies--The student will be able to:
  - 09.01 List regulatory agencies and their roles in monitoring the water technology field.
  - 09.02 Define regulations associated with the appropriate federal, state or local agencies.
  - 09.03 Define training and certification requirements for water technology workers.
- 10.0 Demonstrate employability 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 for a job application.
  - 10.04 Complete a job application.
  - 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 for the treatment facility environment.
  - 10.10 Identify materials and documents needed for a professional library.
  - 10.11 Demonstrate productive and positive customer interactions.
  - 10.12 Demonstrate effective interpersonal communication skills.
- 11.0 Identify the basic characteristics and principles of wastewater treatment--The student will be able to:
- 11.01 Identify the sources of wastewater and the objectives of wastewater treatment.
  - 11.02 Identify terms used in wastewater treatment.
  - 11.03 Identify the impact of wastewater on receiving bodies of water.
  - 11.04 Identify biological organisms present in treatment processes.
  - 11.05 Identify waterborne diseases.
  - 11.06 Identify commonly measured wastewater parameters.
  - 11.07 Identify factors affecting raw wastewater.
  - 11.08 Correlate treatment processes to types of facility influent and solids.
- 12.0 Identify sampling techniques and interpret the results--The student will be able to:
- 12.01 Identify the reasons for sampling and the types of samples (e.g., simple, representative, grab, composite).
  - 12.02 Describe methods of sample collection and handling.
  - 12.03 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.
  - 12.04 Identify representative sampling points.
  - 12.05 Identify the significance of the flow measurement on process control.
- 13.0 Describe the sources of wastewater and the types of collection systems--The student will be able to:
- 13.01 Describe the types of wastewater collection systems.
  - 13.02 Identify flow variations and conditions that affect plant treatment, including infiltration, inflow, and lift stations.
  - 13.03 Identify methods to detect and correct infiltration.
  - 13.04 Identify dissolved gases in wastewater and the effect of their presence/absence on treatment.



- 14.0 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:
- 14.01 Describe concepts related to preliminary and primary treatment.
  - 14.02 Describe the types of preliminary treatment equipment, the way they function, and the relationship of each to the treatment train.
  - 14.03 Describe the types of primary treatment equipment, the way they function, and the relationship of each to the treatment train.
  - 14.04 Describe concepts related to secondary treatment, including attached growth processes, suspended growth processes, aeration, and clarification.
  - 14.05 Describe the types of secondary treatment equipment, the way they function, and the relationship of each to the treatment train.
  - 14.06 Describe concepts related to tertiary treatment processes, including sand filtration, nitrification/denitrification, oxic/anoxic, activated carbon, and artificial wetlands.
  - 14.07 Describe the types of tertiary treatment equipment, the way they function, and the relationship of each to the treatment train.
  - 14.08 Describe concepts related to disinfection and effluent disposal, including surface water, reuse reclamation, deep well, and ocean outfall.
  - 14.09 Describe the types of disinfection and the types of effluent-disposal equipment, the way they function, and the relationship of each to the system.
  - 14.10 Describe concepts related to solids management, including thickening, aerobic and anaerobic digestion, stabilization, de-watering, and reuse.
  - 14.11 Describe the types of solids-management equipment, the way they function, and the relationship of each to the system.
- 15.0 Perform treatment-process control and troubleshooting for the treatment train, effluent disposal, and solids management--The student will be able to:
- 15.01 Describe the grit-removal process and the operational efficiency of each step.
  - 15.02 Describe the laboratory tests performed on influent.
  - 15.03 Describe the primary-clarifier removal efficiencies, including settleable solids, suspended solids, total solids, BOD, and bacteria.
  - 15.04 Describe sampling points, frequency of sampling, and the laboratory tests and results that are used for the proper operation of the primary clarifier.
  - 15.05 Select and plot on a trend chart the parameters for primary clarification.
  - 15.06 Use the operational data required to evaluate the performance of secondary-treatment processes, including attached growth, suspended growth, aeration, and clarification.
  - 15.07 Describe sampling points, the frequency of sampling, and the laboratory tests and results used for proper operation of the secondary-treatment processes.
  - 15.08 Select and plot on a trend chart the parameters for secondary clarification.
  - 15.09 Describe how nitrification affects secondary processes and clarification.
  - 15.10 Describe how denitrification affects secondary processes and clarification.
  - 15.11 Use operational data to evaluate the performance of sand filtration.
  - 15.12 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.
  - 15.13 Use operational data to evaluate the nitrification/denitrification process.

- 15.14 Use operational data to evaluate the performance of effluent-disposal processes, including disinfection and dechlorination.
  - 15.15 Describe sampling points, the frequency of sampling, and the laboratory tests used for checking the proper operation of effluent disposal.
  - 15.16 Select and plot on a trend chart the parameters for effluent disposal.
  - 15.17 Describe various methods of effluent disinfection including UV, chlorination, and ozonation.
  - 15.18 Describe the chemical and physical properties of chlorine, and describe the reactions of chlorine with water, ammonia compounds, and sulfides.
  - 15.19 Describe the safe storage and handling of chlorine, including the use of testing compounds.
  - 15.20 Explain the points of application of chlorine in wastewater treatment.
  - 15.21 Describe the methods of dechlorination.
  - 15.22 Describe the methods commonly used to dispose of wastewater effluents, including reuse applications.
  - 15.23 Describe the laboratory tests commonly used on the reuse of effluent.
  - 15.24 Describe the types of sludge and their characteristics.
  - 15.25 Use operational data to evaluate the performance of solids management, including sludge thickening, digestion, de-watering, and disposal processes.
  - 15.26 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.
- 16.0 Perform equipment inspection, and identify basic maintenance for the treatment train, effluent disposal, and solids management--The student will be able to:
- 16.01 Identify the appropriate equipment used in the treatment train, effluent disposal, and solids management.
  - 16.02 Describe a preliminary site inspection of the equipment used in the treatment train, effluent disposal, and solids management.
  - 16.03 Identify the maintenance needs of equipment used in the treatment train, effluent disposal, and solids management, including safe procedures for maintenance.
  - 16.04 Describe proper record keeping for preventive and corrective maintenance.
  - 16.05 Describe preventive and corrective maintenance procedures for equipment used in the treatment process, effluent disposal, and solids management.
- 17.0 Identify and correct facility operational problems--The student will be able to:
- 17.01 Describe common facility operational problems in the treatment train, effluent disposal, and solids management.
  - 17.02 Describe methods to evaluate operational problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.
  - 17.03 Select appropriate corrective actions for common problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.
  - 17.04 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.
- 18.0 Identify appropriate federal, state, and local regulations--The student will be able to:

- 18.01 Identify federal, state and local regulations that apply to the operation of a wastewater-treatment facility.
  - 18.02 Describe the operator's duties and responsibilities, certification requirements, testing, renewal, staffing, and facility classification (sections of Chapter 62-602 F.A.C.).
  - 18.03 Explain and describe the contents of an operating permit.
  - 18.04 Identify state regulations that apply to procedures such as reclaimed water, reuse, and residuals management.
- 19.0 Describe federal, state, and local laws for the handling, storage, and use of toxic and hazardous materials--The student will be able to:
- 19.01 Identify the kinds of information presented on the MSDS.
  - 19.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (Chapter 442, F.S.).
  - 19.03 Identify the reporting requirements as specified in SARA Title III and Chapter 252, F.S.
  - 19.04 Describe the responsibilities toward the community as specified in SARA Title III and Chapter 252, F.S.

**Course Number: EVS0343**

**Occupational Completion Point: B**

**Wastewater Treatment Plant Operator Level B – 130 Hours – SOC Code – 51.8031**

- 20.0 Identify the constituents of influent and its effects on the treatment process--The student will be able to:
- 20.01 Explain the significance of dissolved gases in the influent and the effects of dissolved gases on treatments.
  - 20.02 Explain the sources of infiltration and inflow, and discuss the effects of infiltration and inflow on treatment processes.
  - 20.03 Explain the effect of lift-station performance on the overall treatment process.
  - 20.04 Describe solutions for lift-station problems, such as surging flows, septic conditions, and power outages.
- 21.0 Identify the constituents of wastewater, and select the appropriate treatment--The student will be able to:
- 21.01 Identify the specific physical, chemical, and biological characteristics of wastewater.
  - 21.02 Describe respiration, gas production, aerobic and anaerobic conditions, different methods of effluent disposal, and solids management.
  - 21.03 Identify levels of wastewater treatment and limits on facility discharges.
- 22.0 Demonstrate advanced sampling techniques and interpret the results--The student will be able to:
- 22.01 Develop standard operating procedures for taking samples for process quality control, for compliance with standards, and for reporting requirements.
  - 22.02 Identify microorganisms present in wastewater, and discuss the significance of changes in their populations.

- 22.03 Demonstrate laboratory quality-control/quality-assurance procedures and required documentation.
- 22.04 Demonstrate the reasons for measuring the flows of treated and untreated wastewater, and the effects of those flows on process control.
- 23.0 Describe process optimization for preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal; and solids management--The student will be able to:
  - 23.01 Interpret laboratory data commonly obtained on incoming wastewater to monitor the efficiency of the selected treatment.
  - 23.02 Describe possible adjustments to achieve process optimization for handling influent.
  - 23.03 Interpret laboratory data commonly obtained on wastewater during primary treatment to monitor the efficiency of the selected treatment.
  - 23.04 Describe possible adjustments to achieve process optimization for handling primary treatment.
  - 23.05 Interpret laboratory data commonly obtained on wastewater during secondary treatment to monitor the efficiency of the selected treatment.
  - 23.06 Describe possible adjustments to achieve process optimization for secondary treatment.
  - 23.07 Interpret laboratory data commonly obtained on wastewater during tertiary treatment to monitor the efficiency of the selected treatment.
  - 23.08 Describe possible adjustments to achieve process optimization for tertiary treatment.
  - 23.09 Interpret laboratory data commonly obtained on reclaimed water during disinfection and disposal to monitor the efficiency of the selected treatment.
  - 23.10 Describe possible adjustments to achieve process optimization for disinfection and disposal processes.
  - 23.11 Interpret laboratory data commonly obtained during solids management, including solids-content tests, to monitor the efficiency of the selected treatment.
  - 23.12 Describe possible adjustments to achieve process optimization in solids management.
  - 23.13 Describe options for solids disposal, based on the analysis of constituents, including all accountability records, and the costs.
- 24.0 Describe advanced treatment process control for the treatment train, effluent disposal, and solids management--The student will be able to:
  - 24.01 Describe concepts related to advanced laboratory tests taken in the secondary-treatment processes.
  - 24.02 Describe concepts related to advanced laboratory tests taken in advanced or tertiary treatment.
  - 24.03 Describe concepts related to advanced laboratory tests for disinfection, effluent disposal, and solids management.
- 25.0 Describe advanced equipment inspection and preventive maintenance for the treatment train, effluent disposal, and solids management--The student will be able to:
  - 25.01 Describe a preventive maintenance plan for a specific piece of equipment and/or unit process.

- 25.02 Describe trends analysis used in preventive maintenance planning.
- 25.03 Describe the monitoring of facility equipment operation and usage with remote sensing equipment.
- 26.0 Describe and correct facility operational problems--The student will be able to:
  - 26.01 Describe troubleshooting techniques to locate operational problems.
  - 26.02 Select appropriate corrective actions for advanced operational problems.
  - 26.03 Describe advanced methods of monitoring results of corrective actions taken.
  - 26.04 Describe actions that should be taken to prevent recurrence of identified advanced operational problems.
- 27.0 Apply federal, state, and local regulations governing wastewater technologies--The student will be able to:
  - 27.01 Describe supervisory tasks related to duties, responsibilities, certification requirements, testing, renewal, staffing, and facility classification (Chapter 62-602 F.A.C.).
  - 27.02 Apply rules concerning samples and analyses at wastewater-treatment facilities (Chapter 62-601, F.A.C.).
  - 27.03 Complete the DEP Monthly Operating Report (MOR) Form correctly.
  - 27.04 Complete a National Pollution Discharge Elimination System (NPDES) MOR form.
  - 27.05 Follow DEP rules that apply to procedures such as reclaiming and reusing water and managing residuals.
  - 27.06 Follow federal rules that apply to the operation of a wastewater-treatment facility.
- 28.0 Apply federal, state, and local laws for the handling, storage, and use of toxic and hazardous materials--The student will be able to:
  - 28.01 Identify the kinds of information presented on the MSDS.
  - 28.02 Demonstrate requirements for in-plant training and the accessibility of information on hazardous and toxic substances (Chapter 442, F.S.).
  - 28.03 Identify the reporting requirements as specified in SARA Title III and Chapter 252, F.S.
  - 28.04 Describe the responsibilities toward the community as specified in SARA Title III and Chapter 252, F.S.
- 29.0 Describe energy conservation, and demonstrate ways to conserve energy in the wastewater-treatment facility--The student will be able to:
  - 29.01 Identify the causes of energy loss.
  - 29.02 Rank various pieces of equipment in order of energy consumption.
  - 29.03 Demonstrate procedures for performing an energy survey.
  - 29.04 Demonstrate methods to conserve energy, such as equipment and process adjustments.
- 30.0 Demonstrate supervisory skills--The student will be able to:
  - 30.01 Identify supervisory skills and various leadership styles.
  - 30.02 Delegate responsibility and assign tasks to employees.

- 30.03 Follow the proper procedure for handling employee grievances.
- 30.04 Follow the proper procedure for disciplining employees.
- 30.05 Follow staffing guidelines in planning.
- 30.06 Conduct an orientation of a new employee, and follow the training program.
- 30.07 Evaluate employees objectively.
- 30.08 Identify emergency situations and respond appropriately.
- 30.09 Identify the components of the budgeting process.
- 30.10 Demonstrate inventory control procedures.
- 30.11 Explain the importance of ethics in supervision.
- 30.12 Identify the role of the supervisor in a facility safety program.
- 30.13 Identify the role of the supervisor in customer relations

**Course Number: EVS0353**

**Occupational Completion Point: C**

**Wastewater Treatment Plant Operator Level A – 120 Hours – SOC Code – 51.8031**

- 31.0 Discuss facility-management skills--The student will be able to:
  - 31.01 Describe the principles of management and supervision.
  - 31.02 Describe concepts related to management and supervision.
  
- 32.0 Demonstrate methods of organization and control--The student will be able to:
  - 32.01 Demonstrate organizational methods.
  - 32.02 Develop an organizational chart.
  - 32.03 Develop a staffing pattern.
  - 32.04 Identify formal and informal lines of communication.
  
- 33.0 Develop a plan for cost management--The student will be able to:
  - 33.01 Identify the costs of operation such as personnel, inventory, operations, energy consumption, and equipment maintenance.
  - 33.02 Perform cost surveys.
  - 33.03 Develop a plan for efficient operations.
  - 33.04 Explain system-efficiency balance.
  
- 34.0 Prepare budgets and personnel assignments--The student will be able to:
  - 34.01 Identify budget activities and categories of expense accounts related to water- or wastewater-treatment facilities.
  - 34.02 Identify techniques of budget control.
  - 34.03 Prepare a budget, including long-range projections.
  - 34.04 Prepare a staffing schedule, including the appropriate levels of staff for all required shifts.
  
- 35.0 Develop standard operating procedures for the training and orientation of new employees--The student will be able to:
  - 35.01 Develop a written plan for an in-house orientation program for new employees.
  - 35.02 Identify information that a supervisor should give new employees, including leave procedures, insurance procedures, safety procedures, chain of command, etc.

- 35.03 Develop a written plan for an in-house training program that includes safety measures and hazardous or toxic materials in the work place.
- 35.04 Develop a written plan for a cross-training program in facility operations.
- 36.0 Demonstrate personnel selection and discipline--The student will be able to:
  - 36.01 Identify appropriate interviewing and hiring practices.
  - 36.02 Develop a job description.
  - 36.03 Identify control factors that are important in an organizational plan and that set limits on delegated authority.
  - 36.04 Identify appropriate actions of the supervisor, the employee, etc., in a grievance procedure.
  - 36.05 Identify characteristics important to the role of a supervisor.
  - 36.06 Determine requirements for a new position.
  - 36.07 Advertise for the position, including the job description, job responsibilities, education requirements, and job conditions.
  - 36.08 Analyze job applications to select qualified candidates to interview.
  - 36.09 Conduct interviews.
  - 36.10 Notify interviewees of the results, and conduct follow-up activities.
  - 36.11 Use appropriate human-relations and communication skills.
  - 36.12 Train, evaluate, and discipline employees objectively.
  - 36.13 Identify appropriate actions of a supervisor in evaluating personnel performance.
- 37.0 Demonstrate contingency planning--The student will be able to:
  - 37.01 Analyze potential emergency situations that can occur in a facility.
  - 37.02 Develop a plan for handling problems caused by emergency situations, including what equipment would be used and what sampling would be needed.
  - 37.03 Develop procedures for responding to customer complaints.
  - 37.04 Develop procedures to ensure employee safety.
  - 37.05 Develop procedures to ensure continuous operations, including preventive maintenance, alternative procedures, etc.
- 38.0 Develop a plan for energy conservation--The student will be able to:
  - 38.01 Describe concepts related to energy conservation.
  - 38.02 Identify energy-conservation measures.
- 39.0 Demonstrate record-keeping and use of computer applications in planning--The student will be able to:
  - 39.01 Develop a plan for inventory control.
  - 39.02 Develop a plan for an analysis of operation and maintenance (O&M) logs and for the optimum operation of equipment.
  - 39.03 Identify the various types of facility automation.
  - 39.04 Review available hardware and software, based on record-keeping needs.
- 40.0 Demonstrate process optimization for water or wastewater treatment facilities--The student will be able to:

- 40.01 Develop a plan for process control to achieve efficient, energy-saving, cost-effective operation.
  - 40.02 Develop a plan for testing and analyzing the treatment operations for use in long-range facility operations.
  - 40.03 Develop a plan for the systematic troubleshooting of operational problems.
  - 40.04 Develop a plan for documenting operations and problems in order to anticipate and avoid potential problems.
- 41.0 Interpret permits and blueprints--The student will be able to:
- 41.01 Read and interpret blueprints for water and wastewater facilities.
  - 41.02 Read the facility construction and operating permits, and relate permit requirements to facility operations.
- 42.0 Develop a laboratory plan for process control--The student will be able to:
- 42.01 Identify laboratory equipment for process control.
  - 42.02 Develop a plan for equipment calibration and maintenance.
  - 42.03 Develop a laboratory-staffing plan.
  - 42.04 Determine whether in-house laboratory operations are cost-effective.
  - 42.05 Review procedures for quality assurance/quality control in a facility laboratory.
  - 42.06 Review procedures for obtaining certification for a facility laboratory.
  - 42.07 Develop a sampling/analysis schedule for effective process control.
- 43.0 Employ public-relations skills in community interactions--The student will be able to:
- 43.01 Plan facility tours for the public.
  - 43.02 Demonstrate how to handle press and public inquiries appropriately.
  - 43.03 Demonstrate how to inform the public if a potential emergency situation arises.



2011 - 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Solid Waste Disposal Operation  
**Program Type:** Career Preparatory  
**Career Cluster:** Agriculture, Food & Natural Resources

PSAV	
Program Number	P440699
CIP Number	0744060100
Grade Level	30, 31
Standard Length	140 hours
Teacher Certification	WSP OPER @7 G WASTE MGMT G
CTSO	N/A
SOC Codes (all applicable)	19-4091
Facility Code	[264] <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: N/A Language: N/A Reading: N/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 solid waste disposal sector of the Agriculture, Food & 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 solid waste disposal sector of the Agriculture, Food & Natural Resources career cluster.

The content includes but is not limited to the role of sanitary landfills in municipal solid waste management, mathematics for landfill operations, state regulations, proposed federal regulations; waste acceptance at the site, basics of site selection, waste decomposition, landfill economics, control processes for landfill gas and leachate; complying with permit requirements, operational techniques; and site closure and post closure considerations.

## Program Structure

This program is a planned sequence of instruction consisting of one occupational completion point.

When offered at the post secondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EVS0055	Landfill Managers	140 hours	19-4091

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 (ESE) will need modifications to meet their special 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 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(s)/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).

### **Articulation**

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Identify the basic characteristics of solid waste treatment.
- 02.0 Comply with Department of Environmental Protection rules and relevant state and federal statutes and local ordinances.
- 03.0 Perform mathematic calculations related to landfill operations.
- 04.0 Describe process of waste acceptance on site.
- 05.0 Describe the basics of site selection.
- 06.0 Describe the process of waste decomposition as it relates to waste management.
- 07.0 Participate in the analysis of a case study which details the economics of sanitary landfills.
- 08.0 Describe control processes for landfill gas and leachate.
- 09.0 Demonstrate knowledge of design requirements for sanitary landfills.
- 10.0 Demonstrate knowledge of standard operational techniques for sanitary landfills.
- 11.0 Demonstrate knowledge of the various types of equipment used in sanitary landfills.
- 12.0 Demonstrate knowledge of site closure methods and post-closure considerations.
- 13.0 Participate in field exercise which will familiarize the student with existing real life conditions prevalent in a sanitary landfill.

2011 - 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Solid Waste Disposal Operation**  
**PSAV Number: P440699**

**Course Number: EVS0055**  
**Occupational Completion Point: A**  
**Landfill Managers – 140 Hours – SOC Code 19-4091**

01.0 Identify the basic characteristics of solid waste treatment--The student will be able to:

- 01.01 Define solid waste.
- 01.02 List sources of solid waste.
- 01.03 Identify types of solid waste.
- 01.04 Identify physical and chemical compositions of waste.
- 01.05 Correlate typical source with locations and type of solid waste.
- 01.06 Describe landfill alternatives (reduction, separation, processing, waste to energy).
- 01.07 Describe characteristics of a sanitary landfill.
- 01.08 List the three most significant reactions that occur as a landfill matures.
- 01.09 List characteristics of hazardous waste.

02.0 Comply with Department of Environmental Regulation rules and relevant state and federal statutes and local ordinances--The student will be able to:

- 02.01 Demonstrate knowledge of the 1976 Resource Conservation and Recovery Act (RCRA) as amended 1984 [Vol. 53 No. 168 p. 33405 Federal Register].
- 02.02 List characteristics of an effective monitoring program.
- 02.03 Demonstrate knowledge of Florida Resource Recovery and Management Act of 1988 [Chapter 88-130 F.S.].
- 02.04 Demonstrate knowledge of permit requirements as it relates to leachate production and control.
- 02.05 Demonstrate knowledge of permit requirements as they relate to vector control, landfill gas and settlement.
- 02.06 Identify techniques for responding to site inspection under relevant rules and statutes.
- 02.07 Demonstrate knowledge of construction/demolition disposal techniques under relevant rules and statutes.
- 02.08 Demonstrate knowledge of tire processing/storage under relevant rules and statutes.

03.0 Perform mathematic calculations related to landfill operations--The student will be able to:

- 03.01 Convert such readings to real distance using a set of plans drawn to scale within a reasonable period of time.
- 03.02 Calculate the area of a square, rectangle and trapezoid within a reasonable period of time.
- 03.03 Demonstrate the ability to read and understand slopes.

- 03.04 Calculate the volume of a square, rectangular and trapezoidal figure within a reasonable period of time.
- 04.0 Describe process of waste acceptance on site--The student will be able to:
- 04.01 Identify wastes which are not acceptable to be put in the landfill.
  - 04.02 Demonstrate appropriate action which would prevent unacceptable waste from entering the landfill.
  - 04.03 Develop a plan to identify and manage the parts of the waste stream.
  - 04.04 List factors which determine waste acceptability.
  - 04.05 Define hazardous waste.
  - 04.06 Identify liquids which may be excluded from landfill.
  - 04.07 Describe management options for lead acid batteries, used oil, sludge and infectious waste.
  - 04.08 Define radioactive waste.
  - 04.09 Describe operational/equipment limitations which would prevent materials from going into the landfill and disposal options.
- 05.0 Describe the basics of site selection--The student will be able to:
- 05.01 List typical factors which may restrict or eliminate a potential location from consideration as a future landfill site.
  - 05.02 List regulations which may further restrict or eliminate a potential location from consideration.
- 06.0 Describe the process of waste decomposition as it relates to waste management--The student will be able to:
- 06.01 List categories of waste by method of decomposition and by products created.
  - 06.02 List factors which affect the rate of decomposition.
  - 06.03 List three events which will occur in a landfill as a result of decomposition.
  - 06.04 Define subsidence.
  - 06.05 Define differential settlement.
  - 06.06 Describe settlement control and how to determine whether settlement is occurring.
  - 06.07 Define landfill gas operation.
  - 06.08 Describe composition of landfill gas and gas generation cycle.
  - 06.09 Define landfill gas migration.
  - 06.10 List items that intercept migration routes.
  - 06.11 Describe techniques for recognition and control of landfill migration.
  - 06.12 Define leachate generation.
  - 06.13 List characteristics of leachate and describe leachate impact.
  - 06.14 List controlling factors in establishing leachate quality.
- 07.0 Participate in the analysis of a case study which details the economics of sanitary landfills--The student will be able to:
- 07.01 List expenses for a landfill.
  - 07.02 Describe the impact of new regulations on landfill costs.
  - 07.03 Estimate the cost of regulatory requirements.
  - 07.04 Describe what impact size has on landfill economics.

08.0 Describe control processes for landfill gas and leachate--The student will be able to:

- 08.01 Review decomposition, leachate and landfill gas characteristics.
- 08.02 Describe process for determining the potential for landfill gas.
- 08.03 Describe process for locating test wells.
- 08.04 List two types of test wells.
- 08.05 Describe monitoring process used to detect the presence of methane.
- 08.06 Describe control methods for landfill gas.
- 08.07 Define and list active control systems for landfill gas.
- 08.08 Define and list passive control systems for landfill gas.
- 08.09 Describe methods for landfill gas recovery and use.
- 08.10 Review definition of leachate.
- 08.11 Describe process which prevents leachate contact with groundwater.
- 08.12 Describe control process of surface water.
- 08.13 Define leachate migration.
- 08.14 List characteristics of migration.
- 08.15 Describe controls for surface discharge of leachate.
- 08.16 Describe methods for detecting leachate discharge to groundwater.
- 08.17 List and describe methods for control of leachate migration.
- 08.18 Describe remedial actions which may be taken where leachate is contaminating groundwater.
- 08.19 List seven types of leachate treatment systems.
- 08.20 Describe methods of leachate recirculation.
- 08.21 List representative leachate treatment technologies both biological and physical/chemical and give characteristics of each.
- 08.22 List characteristics of an effective groundwater monitoring program.

09.0 Demonstrate knowledge of design requirements for sanitary landfills--The student will be able to:

- 09.01 Describe how specifications are used in the construction of landfills.
- 09.02 List the four (4) basic types of plans necessary to show how a facility is to be developed and describe each one.
- 09.03 Demonstrate the use of plan scale in reading plans.
- 09.04 Define contour lines and demonstrate how they are used in plan reading.
- 09.05 List items essential to following facility plans.
- 09.06 Demonstrate three (3) methods of measuring horizontal distance determining compliance with a facility plan.
- 09.07 Identify the tools needed and describe the steps necessary to measure elevations.
- 09.08 Define slope verification.
- 09.09 Demonstrate the steps necessary to perform slope determination.

10.0 Demonstrate knowledge of standard operational techniques for sanitary landfills--The student will be able to:

- 10.01 Identify the three basic elements which dictate facility operations.
- 10.02 Demonstrate the ability to read plans.
- 10.03 Identify the elements of a design plan.
- 10.04 Define Operational Plan.

- 10.05 List items in the daily plan which will contribute to success of the operational plan.
  - 10.06 List two (2) major items an operator must control for a successful operation.
  - 10.07 Identify three (3) methods for controlling moisture.
  - 10.08 List three (3) methods for controlling run-off.
  - 10.09 List three (3) methods for controlling waste.
  - 10.10 Define confinement and list five (5) methods for facilitating confinement.
  - 10.11 Define compaction and list three (3) methods which will accomplish this.
  - 10.12 Demonstrate ratio of slope to compaction in an ideal landfill situation.
  - 10.13 Describe the advantages of using proper soil for use as cover.
  - 10.14 List three (3) types of cover and explain their functions.
  - 10.15 Demonstrate knowledge of the operation of a lined sanitary landfill.
  - 10.16 List (6) general items that must be accomplished to ensure a lined system will function.
  - 10.17 Describe operational problems which are exacerbated by wet weather and list four (4) solutions.
  - 10.18 Describe operational problems which are exacerbated by winter and list ten (10) coping strategies.
  - 10.19 Describe operational problems which are exacerbated by hard to handle wastes.
  - 10.20 List ten (10) hard to handle wastes and describe how they can best be handled.
  - 10.21 List six (6) failures of site operation principles which could result in environmental and health problems.
  - 10.22 List eight (8) major nuisance and health problems which may occur and discuss causes and potential controls that can be used to reduce the problem.
- 11.0 Demonstrate knowledge of the various types of equipment used in sanitary landfills--The student will be able to:
- 11.01 List nine (9) uses for equipment in the operation of a sanitary landfill.
  - 11.02 List six (6) types of machines and describe their advantages and disadvantages in the operation of a sanitary landfill.
  - 11.03 Describe maintenance of equipment program and list nine (9) items to be performed daily.
  - 11.04 Describe shutdown procedures.
  - 11.05 Describe a periodic maintenance program.
  - 11.06 Discuss the role of accurate records of maintenance in the decision to depreciate and replace equipment.
  - 11.07 List five (5) costs which are common in the use of equipment to maintain a sanitary landfill and define each.
  - 11.08 Demonstrate knowledge of bid process.
  - 11.09 List methods of equipment financing.
  - 11.10 Perform a total cost evaluation (TCE) of equipment considered for purchase or lease-purchase.
- 12.0 Demonstrate knowledge of site closure methods and post-closure considerations--The student will be able to:
- 12.01 List two (2) basic goals which must be met for successful site closure.
  - 12.02 List the six (6) steps in preplanning the closures.
  - 12.03 Describe the process which should occur three (3) months prior to closure.
  - 12.04 List four (4) steps which should occur at closure.

- 12.05 List give (5) things which need to be done three months after closure.
  - 12.06 Describe landfill gas control systems and explain their usefulness in long-term maintenance of a closed landfill.
  - 12.07 Describe leachate control system and explain the purpose of this system.
  - 12.08 Describe landfill gas and leachate monitoring systems and explain how the data gathered is used.
  - 12.09 Describe how surface water and settlement can effect the containment of waste in a closed landfill.
  - 12.10 Discuss some end uses for closed sites.
  - 12.11 Describe each layer in the final cover: buffer layer, gas channel, filter layer, barrier, topsoil and vegetation.
  - 12.12 List five (5) guidelines for constructing the final cover system.
  - 12.13 List six (6) desirable characteristics for vegetation on final cover.
  - 12.14 Describe how to determine soil suitability for planting and detail plant requirement for nutrients.
  - 12.15 Describe method for planting and protecting the seed.
  - 12.16 List seven (7) methods for controlling run-on and run-off on a closed site.
  - 12.17 List information normally recorded with the parcel of land in local county recorder's office which will be used by inspectors at closure to determine acceptability of closure.
  - 12.18 Describe methods of financing closure and post closure activities.
  - 12.19 Demonstrate knowledge of all site safety requirements including fire safety and first aid.
- 13.0 Participate in field exercise which will familiarize the student with existing real life conditions prevalent in a sanitary landfill--The student will be able to:
- 13.01 List four (4) aspects of site security.
  - 13.02 Discuss the importance of excluding unacceptable waste from the landfill.
  - 13.03 Describe the careful execution of a monitoring permit.
  - 13.04 List eleven (11) safety rules and discuss the importance of each.
  - 13.05 List ten (10) individual safety items which may be found necessary for landfill personnel to be appropriately equipped.
  - 13.06 Observe the size of working face at the operations field station.
  - 13.07 Observe access for vehicles at operations field station.
  - 13.08 Observe safety at work face at operation field station including traffic flow, spotter skills, equipment operation and safety equipment use.
  - 13.09 Observe landfill equipment available at operation field station.
  - 13.10 Observe compaction practices at operations field station.
  - 13.11 Observe waste types received at operations field station, including liquids, hazardous wastes, and special wastes.
  - 13.12 Observe slope of work face at operations field station.
  - 13.13 Observe nuisance conditions at operations field station including litter control, odors, noise.
  - 13.14 Observe cover at operations field station and classify as daily, intermediate and final.
  - 13.15 Observe drainage control (i.e. run-on, run-off, depressions, and erosions) at operations field station.
  - 13.16 Observe liner integrity at field operations site including vegetation, sand blanket, erosion, waste placement and traffic.



- 13.17 Observe other factors at field operations site including leachate seeps and vegetation screening.
- 13.18 Observe sampling of monitoring well at field operations site including the purging of a well.
- 13.19 Complete laboratory analysis form.
- 13.20 List five (5) recommended procedures for maintaining monitoring well.
- 13.21 Complete chain of custody record for equipment at operations field station.
- 13.22 Observe an area of the field operations site which will illustrate the type of soil which is best for different methods of operation.
- 13.23 List various types of soil and their best use.
- 13.24 Observe the use of equipment used in soil sampling.
- 13.25 Observe use of gas sampling equipment at operations field site and demonstrate understanding of the meter readings.