

## Computer Education

# Introduction to Computer Science 1 (#5002010) 2016 - 2022

(current)

## Course Standards

Name	Description
SC.K2.CS-CC.1.1:	Identify a variety of digital tools used for communication and collaboration (e.g., online library catalogs and databases).
SC.K2.CS-CC.1.2:	Conduct basic keyword searches, and exchange information and feedback with teachers and other students (e.g., e-mail and text messaging).
SC.K2.CS-CC.1.3:	Collaborate and cooperate with peers, teachers, and others using technology to solve problems.
SC.K2.CS-CC.1.4:	Provide and accept constructive criticism on a collaborative project.
SC.K2.CS-CP.1.1:	Identify different kinds of data (e.g., text, charts, graphs, numbers, pictures, audio, video, and collections of objects).
SC.K2.CS-CP.1.2:	Collect and manipulate data using a variety of computing methods (e.g., sorting, totaling, and averaging).
SC.K2.CS-CP.1.3:	Propose a solution to a problem or question based on an analysis of the data and critical thinking, individually and collaboratively.
SC.K2.CS-CP.1.4:	Create data visualizations (e.g., charts and infographics), individually and collaboratively.
SC.K2.CS-CP.2.1:	Define a computer program as a set of commands created by people to do something.
SC.K2.CS-CP.2.2:	Perform a simple task (e.g., making a sandwich and brushing teeth) breaking it into small steps.
SC.K2.CS-CP.2.3:	Explain that computers only follow the program's instructions.
SC.K2.CS-CP.2.4:	Construct a simple program using tools that do not require a textual programming language (e.g. block-based programming language).
SC.K2.CS-CP.3.1:	Create developmentally appropriate multimedia products with support from teachers, family members, or student partners.
SC.K2.CS-CP.3.2:	Prepare a simple presentation of digital products and applications.
SC.K2.CS-CS.1.1:	Define simulation and identify the concepts illustrated by a simple simulation (e.g., growth, human health, and the butterfly life cycle).
SC.K2.CS-CS.1.2:	Describe how models and simulations can be used to solve real-world issues in science and engineering.
SC.K2.CS-CS.1.3:	Describe how models represent a real-life system (e.g., globe or map).
SC.K2.CS-CS.1.4:	Solve questions individually and collaboratively using models.
SC.K2.CS-CS.2.1:	Arrange or sort information into useful order, such as sorting students by birth date, with or without technology.
SC.K2.CS-CS.2.2:	Solve age-appropriate problems (e.g., puzzles and logical thinking programs) with or without technology (i.e., computational thinking).
SC.K2.CS-CS.2.3:	Solve real life issues in science and engineering using computational thinking.
SC.K2.CS-CS.2.4:	Define an algorithm as a sequence of defined steps.
SC.K2.CS-CS.2.5:	Create a simple algorithm, individually and collaboratively, without using computers to complete the task (e.g., making a sandwich, getting ready for school).
SC.K2.CS-CS.2.6:	Illustrate thoughts, ideas, and stories in a step-by-step manner using writing tools, digital cameras, and drawing tools.
SC.K2.CS-CS.2.7:	Develop and present an algorithm using tangible materials.
SC.K2.CS-CS.2.8:	Gather and organize information using concept-mapping tools.
SC.K2.CS-CS.3.1:	Create a digital artifact (independently and collaboratively) that clearly expresses thoughts and ideas.
SC.K2.CS-CS.3.2:	Create, review, and revise artifacts that include text, images, and audio using digital tools.
SC.K2.CS-CS.4.1:	Recognize different kinds of computing devices in the classroom and other places (e.g., laptops, tablets, smart phones, desktops, printers).
SC.K2.CS-CS.4.2:	Recognize and operate different types of computers, applications and peripherals (e.g., use input/output devices such as a mouse, keyboard, or touch screen; find, navigate, launch a program).
SC.K2.CS-CS.4.3:	Explain that a computer program is running when a program or command is executed.
SC.K2.CS-CS.6.1:	Identify tasks that are made easier because of computers.
SC.K2.CS-PC.1.1:	Demonstrate proper care for electronic devices (e.g., handling devices carefully, logging off or shutting down correctly, and keeping devices away from water/food).
SC.K2.CS-PC.1.2:	Describe the attributes of a good digital citizen: one who protects private information, balances time online, reports cyberbullying, and recognizes inappropriate content/contact.
SC.K2.CS-PC.1.3:	Identify safe and unsafe examples of online communications.
SC.K2.CS-PC.1.4:	Explain that a password helps protect the privacy of information.
SC.K2.CS-PC.2.1:	Identify and describe how people use many types of technologies in their daily work and personal lives.
SC.K2.CS-PC.2.2:	Communicate about technology using developmentally appropriate terminology.
SC.K2.CS-PC.2.3:	Recognize that people use computing technology in the workplace to perform many important tasks and functions.
SC.K2.CS-PC.4.1:	Explain that some information is private and should not be shared online.
MAFS.K12.MP.1.1:	<p><b>Make sense of problems and persevere in solving them.</b></p> <p>Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Reason abstractly and quantitatively.</b></p>

MAFS.K12.MP.2.1:	<p>Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Construct viable arguments and critique the reasoning of others.</b></p>
MAFS.K12.MP.3.1:	<p>Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Model with mathematics.</b></p>
MAFS.K12.MP.4.1:	<p>Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Use appropriate tools strategically.</b></p>
MAFS.K12.MP.5.1:	<p>Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Attend to precision.</b></p>
MAFS.K12.MP.6.1:	<p>Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Look for and make use of structure.</b></p>
MAFS.K12.MP.7.1:	<p>Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see <math>7 \times 8</math> equals the well remembered <math>7 \times 5 + 7 \times 3</math>, in preparation for learning about the distributive property. In the expression <math>x^2 + 9x + 14</math>, older students can see the 14 as <math>2 \times 7</math> and the 9 as <math>2 + 7</math>. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see <math>5 - 3(x - y)^2</math> as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers <math>x</math> and <math>y</math>.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Look for and express regularity in repeated reasoning.</b></p>
MAFS.K12.MP.8.1:	<p>Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through <math>(1, 2)</math> with slope 3, middle school students might abstract the equation <math>(y - 2)/(x - 1) = 3</math>. Noticing the regularity in the way terms cancel when expanding <math>(x - 1)(x + 1)</math>, <math>(x - 1)(x^2 + x + 1)</math>, and <math>(x - 1)(x^3 + x^2 + x + 1)</math> might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.</p> <p><b>Standard Relation to Course: Supporting</b></p>
HE.1.B.4.3:	<p>Describe ways to respond when in an unwanted, threatening, or dangerous situation.</p> <p><b>Clarifications:</b></p>

	Leave, tell a trusted adult, and say “no.”
HE.1.B.5.3:	<p>Explain the consequences of not following rules/practices when making healthy and safe decisions.</p> <p><b>Clarifications:</b> Tooth decay and environmental damage.</p>
HE.2.B.4.3:	<p>Demonstrate ways to respond to unwanted, threatening, or dangerous situations.</p> <p><b>Clarifications:</b> Role playing: “How to tell a trusted adult or how to leave a dangerous situation safely.”</p>
HE.2.B.5.3:	<p>Compare the consequences of not following rules/practices when making healthy and safe decisions.</p> <p><b>Clarifications:</b> Negative emotions, accidents, injuries, and pollution.</p>
HE.K.B.4.3:	<p>Identify the appropriate responses to unwanted and threatening situations.</p> <p><b>Clarifications:</b> Tell a trusted adult, police officer, and/or parent; seek safety and run for help.</p>
HE.K.B.5.3:	<p>Recognize the consequences of not following rules/practices when making healthy and safe decisions.</p> <p><b>Clarifications:</b> Injury to self and/or others.</p>
LAFS.1.SL.1.1:	<p>Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.</p> <p>a. Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion).</p> <p>b. Build on others’ talk in conversations by responding to the comments of others through multiple exchanges.</p> <p>c. Ask questions to clear up any confusion about the topics and texts under discussion.</p>
LAFS.2.SL.1.1:	<p>Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.</p> <p>a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).</p> <p>b. Build on others’ talk in conversations by linking their comments to the remarks of others.</p> <p>c. Ask for clarification and further explanation as needed about the topics and texts under discussion.</p>
LAFS.K.SL.1.2:	Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
LAFS.K.SL.1.3:	Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
SS.1.C.1.1:	<p>Explain the purpose of rules and laws in the school and community.</p> <p><b>Clarifications:</b> Examples are keeping order and ensuring safety.</p>
SS.1.C.1.2:	<p>Give examples of people who have the power and authority to make and enforce rules and laws in the school and community.</p> <p><b>Clarifications:</b> Examples are principals, teachers, parents, government leaders, and police.</p>
SS.K.C.1.2:	<p>Explain the purpose and necessity of rules and laws at home, school, and community.</p> <p><b>Clarifications:</b> Examples are attending school and wearing a seat belt.</p>
ELD.K.12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### GENERAL NOTES

This course should be taught using the appropriate standards/benchmarks for the grade.

The purpose of this course is to enable students to develop basic skills in computer science.

Within appropriate developmental guidelines the content of this course should expose students to:

- Responsible use of technology and information
- The impact of computing resources on local and global society
- Security, privacy, information sharing, ownership, licensure and copyright
- Communication and collaboration
- Modeling and simulations
- Problem solving and algorithms
- Digital tools
- Hardware and software
- Human-Computer interactions and Artificial Intelligence
- Data Analysis
- Computer programming basics
- Programming applications

**Science and Engineering Practices** (NRC *Framework for K-12 Science Education, 2010*)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.

- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

**English Language Development (ELD) Standards Special Notes Section:**

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: <https://cpalmsmediaproduct.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

## QUALIFICATIONS

As well as the certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

## GENERAL INFORMATION

<p><b>Course Number:</b> 5002010</p>    <p><b>Course Status:</b> Course Approved</p>	<p><b>Course Path: Section:</b> Grades PreK to 12 Education          Courses &gt; <b>Grade Group:</b> Grades PreK to 5 Education          Courses &gt; <b>Subject:</b> Computer Education &gt;  <b>SubSubject:</b> General &gt;  <b>Abbreviated Title:</b> INTRO COMPUTER SCI 1  <b>Course Length:</b> Year (Y)</p>
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## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)
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## Course Standards

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MA.K12.MTR.1.1:	<p>Mathematicians who participate in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Analyze the problem in a way that makes sense given the task.</li> <li>Ask questions that will help with solving the task.</li> <li>Build perseverance by modifying methods as needed while solving a challenging task.</li> <li>Stay engaged and maintain a positive mindset when working to solve tasks.</li> <li>Help and support each other when attempting a new method or approach.</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <p><b>Clarifications:</b></p> <p>Teachers who encourage students to participate actively in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Cultivate a community of growth mindset learners.</li> <li>Foster perseverance in students by choosing tasks that are challenging.</li> <li>Develop students' ability to analyze and problem solve.</li> <li>Recognize students' effort when solving challenging problems.</li> </ul> </div> <p>Demonstrate understanding by representing problems in multiple ways.</p> <p>Mathematicians who demonstrate understanding by representing problems in multiple ways:</p>

MA.K12.MTR.2.1:

- Build understanding through modeling and using manipulatives.
- Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
- Progress from modeling problems with objects and drawings to using algorithms and equations.
- Express connections between concepts and representations.
- Choose a representation based on the given context or purpose.

**Clarifications:**

Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:

- Help students make connections between concepts and representations.
- Provide opportunities for students to use manipulatives when investigating concepts.
- Guide students from concrete to pictorial to abstract representations as understanding progresses.
- Show students that various representations can have different purposes and can be useful in different situations.

MA.K12.MTR.3.1:

Complete tasks with mathematical fluency.  
Mathematicians who complete tasks with mathematical fluency:

- Select efficient and appropriate methods for solving problems within the given context.
- Maintain flexibility and accuracy while performing procedures and mental calculations.
- Complete tasks accurately and with confidence.
- Adapt procedures to apply them to a new context.
- Use feedback to improve efficiency when performing calculations.

**Clarifications:**

Teachers who encourage students to complete tasks with mathematical fluency:

- Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
- Offer multiple opportunities for students to practice efficient and generalizable methods.
- Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

MA.K12.MTR.4.1:

Engage in discussions that reflect on the mathematical thinking of self and others.  
Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:

- Communicate mathematical ideas, vocabulary and methods effectively.
- Analyze the mathematical thinking of others.
- Compare the efficiency of a method to those expressed by others.
- Recognize errors and suggest how to correctly solve the task.
- Justify results by explaining methods and processes.
- Construct possible arguments based on evidence.

**Clarifications:**

Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:

- Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
- Create opportunities for students to discuss their thinking with peers.
- Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
- Develop students' ability to justify methods and compare their responses to the responses of their peers.

MA.K12.MTR.5.1:

Use patterns and structure to help understand and connect mathematical concepts.  
Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

- Focus on relevant details within a problem.
- Create plans and procedures to logically order events, steps or ideas to solve problems.
- Decompose a complex problem into manageable parts.
- Relate previously learned concepts to new concepts.
- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

**Clarifications:**

Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

MA.K12.MTR.6.1:

Assess the reasonableness of solutions.  
Mathematicians who assess the reasonableness of solutions:

- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

**Clarifications:**

Teachers who encourage students to assess the reasonableness of solutions:

- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

Apply mathematics to real-world contexts.  
Mathematicians who apply mathematics to real-world contexts:

- Connect mathematical concepts to everyday experiences.
- Use models and methods to understand, represent and solve problems.
- Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.

MA.K12.MTR.7.1:

**Clarifications:**

Teachers who encourage students to apply mathematics to real-world contexts:

- Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
- Challenge students to question the accuracy of their models and methods.
- Support students as they validate conclusions by comparing them to the given situation.
- Indicate how various concepts can be applied to other disciplines.

Cite evidence to explain and justify reasoning.

**Clarifications:**

K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.

2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.

6-8 Students continue with previous skills and use a style guide to create a proper citation.

9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

ELA.K12.EE.1.1:

Read and comprehend grade-level complex texts proficiently.

**Clarifications:**

See Text Complexity for grade-level complexity bands and a text complexity rubric.

ELA.K12.EE.2.1:

Make inferences to support comprehension.

**Clarifications:**

Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

ELA.K12.EE.3.1:

Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

**Clarifications:**

In kindergarten, students learn to listen to one another respectfully.

In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think \_\_\_\_\_ because \_\_\_\_\_." The collaborative conversations are becoming academic conversations.

In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

ELA.K12.EE.4.1:

Use the accepted rules governing a specific format to create quality work.

**Clarifications:**

Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.

ELA.K12.EE.5.1:

Use appropriate voice and tone when speaking or writing.

**Clarifications:**

In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.

ELA.K12.EE.6.1:

Describe ways to respond when in an unwanted, threatening, or dangerous situation.

**Clarifications:**

Leave, tell a trusted adult, and say "no."

HE.1.B.4.3:

Explain the consequences of not following rules/practices when making healthy and safe decisions.

**Clarifications:**

Tooth decay and environmental damage.

HE.1.B.5.3:

Demonstrate ways to respond to unwanted, threatening, or dangerous situations.

**Clarifications:**

Role playing: "How to tell a trusted adult or how to leave a dangerous situation safely."

HE.2.B.4.3:

Compare the consequences of not following rules/practices when making healthy and safe decisions.

**Clarifications:**

Negative emotions, accidents, injuries, and pollution.

HE.2.B.5.3:

Identify the appropriate responses to unwanted and threatening situations.

**Clarifications:**

Tell a trusted adult, police officer, and/or parent; seek safety and run for help.

HE.K.B.4.3:

Recognize the consequences of not following rules/practices when making healthy and safe decisions.

**Clarifications:**

Injury to self and/or others.

HE.K.B.5.3:

SS.1.C.1.1:	<p>Explain the purpose of rules and laws in the school and community.</p> <p><b>Clarifications:</b> Examples are keeping order and ensuring safety.</p>
SS.1.C.1.2:	<p>Give examples of people who have the power and authority to make and enforce rules and laws in the school and community.</p> <p><b>Clarifications:</b> Examples are principals, teachers, parents, government leaders, and police.</p>
SS.K.C.1.2:	<p>Explain the purpose and necessity of rules and laws at home, school, and community.</p> <p><b>Clarifications:</b> Examples are attending school and wearing a seat belt.</p>
ELD.K.12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### GENERAL NOTES

This course should be taught using the appropriate standards/benchmarks for the grade.

The purpose of this course is to enable students to develop basic skills in computer science.

Within appropriate developmental guidelines the content of this course should expose students to:

- Responsible use of technology and information
- The impact of computing resources on local and global society
- Security, privacy, information sharing, ownership, licensure and copyright
- Communication and collaboration
- Modeling and simulations
- Problem solving and algorithms
- Digital tools
- Hardware and software
- Human-Computer interactions and Artificial Intelligence
- Data Analysis
- Computer programming basics
- Programming applications

**Science and Engineering Practices** (NRC *Framework for K-12 Science Education, 2010*)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

**English Language Development (ELD) Standards Special Notes Section:**

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: <https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

**Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards**

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit [https://www.cpalms.org/Standards/BEST\\_Standards.aspx](https://www.cpalms.org/Standards/BEST_Standards.aspx) and select the appropriate B.E.S.T. Standards package.

### QUALIFICATIONS

As well as the certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Path: Section:** Grades PreK to 12 Education

**Course Number:** 5002010

Courses > **Grade Group:** Grades PreK to 5 Education

Courses > **Subject:** Computer Education >

**SubSubject:** General >

**Abbreviated Title:** INTRO COMPUTER SCI 1

**Course Length:** Year (Y)

**Course Status:** State Board Approved

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Introduction to Computer Science 1 (#5002010) 2023 - And

Beyond

## Course Standards

Name	Description
SC.K2.CS-CC.1.1:	Identify a variety of digital tools used for communication and collaboration (e.g., online library catalogs and databases).
SC.K2.CS-CC.1.2:	Conduct basic keyword searches, and exchange information and feedback with teachers and other students (e.g., e-mail and text messaging).
SC.K2.CS-CC.1.3:	Collaborate and cooperate with peers, teachers, and others using technology to solve problems.
SC.K2.CS-CC.1.4:	Provide and accept constructive criticism on a collaborative project.
SC.K2.CS-CP.1.1:	Identify different kinds of data (e.g., text, charts, graphs, numbers, pictures, audio, video, and collections of objects).
SC.K2.CS-CP.1.2:	Collect and manipulate data using a variety of computing methods (e.g., sorting, totaling, and averaging).
SC.K2.CS-CP.1.3:	Propose a solution to a problem or question based on an analysis of the data and critical thinking, individually and collaboratively.
SC.K2.CS-CP.1.4:	Create data visualizations (e.g., charts and infographics), individually and collaboratively.
SC.K2.CS-CP.2.1:	Define a computer program as a set of commands created by people to do something.
SC.K2.CS-CP.2.2:	Perform a simple task (e.g., making a sandwich and brushing teeth) breaking it into small steps.
SC.K2.CS-CP.2.3:	Explain that computers only follow the program's instructions.
SC.K2.CS-CP.2.4:	Construct a simple program using tools that do not require a textual programming language (e.g. block-based programming language).
SC.K2.CS-CP.3.1:	Create developmentally appropriate multimedia products with support from teachers, family members, or student partners.
SC.K2.CS-CP.3.2:	Prepare a simple presentation of digital products and applications.
SC.K2.CS-CS.1.1:	Define simulation and identify the concepts illustrated by a simple simulation (e.g., growth, human health, and the butterfly life cycle).
SC.K2.CS-CS.1.2:	Describe how models and simulations can be used to solve real-world issues in science and engineering.
SC.K2.CS-CS.1.3:	Describe how models represent a real-life system (e.g., globe or map).
SC.K2.CS-CS.1.4:	Solve questions individually and collaboratively using models.
SC.K2.CS-CS.2.1:	Arrange or sort information into useful order, such as sorting students by birth date, with or without technology.
SC.K2.CS-CS.2.2:	Solve age-appropriate problems (e.g., puzzles and logical thinking programs) with or without technology (i.e., computational thinking).
SC.K2.CS-CS.2.3:	Solve real life issues in science and engineering using computational thinking.
SC.K2.CS-CS.2.4:	Define an algorithm as a sequence of defined steps.
SC.K2.CS-CS.2.5:	Create a simple algorithm, individually and collaboratively, without using computers to complete the task (e.g., making a sandwich, getting ready for school).
SC.K2.CS-CS.2.6:	Illustrate thoughts, ideas, and stories in a step-by-step manner using writing tools, digital cameras, and drawing tools.
SC.K2.CS-CS.2.7:	Develop and present an algorithm using tangible materials.
SC.K2.CS-CS.2.8:	Gather and organize information using concept-mapping tools.
SC.K2.CS-CS.3.1:	Create a digital artifact (independently and collaboratively) that clearly expresses thoughts and ideas.
SC.K2.CS-CS.3.2:	Create, review, and revise artifacts that include text, images, and audio using digital tools.
SC.K2.CS-CS.4.1:	Recognize different kinds of computing devices in the classroom and other places (e.g., laptops, tablets, smart phones, desktops, printers).
SC.K2.CS-CS.4.2:	Recognize and operate different types of computers, applications and peripherals (e.g., use input/output devices such as a mouse, keyboard, or touch screen; find, navigate, launch a program).
SC.K2.CS-CS.4.3:	Explain that a computer program is running when a program or command is executed.
SC.K2.CS-CS.6.1:	Identify tasks that are made easier because of computers.
SC.K2.CS-PC.1.1:	Demonstrate proper care for electronic devices (e.g., handling devices carefully, logging off or shutting down correctly, and keeping devices away from water/food).
SC.K2.CS-PC.1.2:	Describe the attributes of a good digital citizen: one who protects private information, balances time online, reports cyberbullying, and recognizes inappropriate content/contact.
SC.K2.CS-PC.1.3:	Identify safe and unsafe examples of online communications.
SC.K2.CS-PC.1.4:	Explain that a password helps protect the privacy of information.
SC.K2.CS-PC.2.1:	Identify and describe how people use many types of technologies in their daily work and personal lives.
SC.K2.CS-PC.2.2:	Communicate about technology using developmentally appropriate terminology.
SC.K2.CS-PC.2.3:	Recognize that people use computing technology in the workplace to perform many important tasks and functions.
SC.K2.CS-PC.4.1:	Explain that some information is private and should not be shared online.
MA.K12.MTR.1.1:	<p>Mathematicians who participate in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Analyze the problem in a way that makes sense given the task.</li> <li>Ask questions that will help with solving the task.</li> <li>Build perseverance by modifying methods as needed while solving a challenging task.</li> <li>Stay engaged and maintain a positive mindset when working to solve tasks.</li> <li>Help and support each other when attempting a new method or approach.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to participate actively in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Cultivate a community of growth mindset learners.</li> <li>Foster perseverance in students by choosing tasks that are challenging.</li> <li>Develop students' ability to analyze and problem solve.</li> <li>Recognize students' effort when solving challenging problems.</li> </ul>

Demonstrate understanding by representing problems in multiple ways.  
Mathematicians who demonstrate understanding by representing problems in multiple ways:

- Build understanding through modeling and using manipulatives.
- Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
- Progress from modeling problems with objects and drawings to using algorithms and equations.
- Express connections between concepts and representations.
- Choose a representation based on the given context or purpose.

MA.K12.MTR.2.1:

**Clarifications:**

Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:

- Help students make connections between concepts and representations.
- Provide opportunities for students to use manipulatives when investigating concepts.
- Guide students from concrete to pictorial to abstract representations as understanding progresses.
- Show students that various representations can have different purposes and can be useful in different situations.

Complete tasks with mathematical fluency.  
Mathematicians who complete tasks with mathematical fluency:

- Select efficient and appropriate methods for solving problems within the given context.
- Maintain flexibility and accuracy while performing procedures and mental calculations.
- Complete tasks accurately and with confidence.
- Adapt procedures to apply them to a new context.
- Use feedback to improve efficiency when performing calculations.

MA.K12.MTR.3.1:

**Clarifications:**

Teachers who encourage students to complete tasks with mathematical fluency:

- Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
- Offer multiple opportunities for students to practice efficient and generalizable methods.
- Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

Engage in discussions that reflect on the mathematical thinking of self and others.  
Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:

- Communicate mathematical ideas, vocabulary and methods effectively.
- Analyze the mathematical thinking of others.
- Compare the efficiency of a method to those expressed by others.
- Recognize errors and suggest how to correctly solve the task.
- Justify results by explaining methods and processes.
- Construct possible arguments based on evidence.

MA.K12.MTR.4.1:

**Clarifications:**

Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:

- Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
- Create opportunities for students to discuss their thinking with peers.
- Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
- Develop students' ability to justify methods and compare their responses to the responses of their peers.

Use patterns and structure to help understand and connect mathematical concepts.  
Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

- Focus on relevant details within a problem.
- Create plans and procedures to logically order events, steps or ideas to solve problems.
- Decompose a complex problem into manageable parts.
- Relate previously learned concepts to new concepts.
- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

MA.K12.MTR.5.1:

**Clarifications:**

Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

Assess the reasonableness of solutions.  
Mathematicians who assess the reasonableness of solutions:

- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

MA.K12.MTR.6.1:

**Clarifications:**

Teachers who encourage students to assess the reasonableness of solutions:

- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

MA.K.12.MTR.7.1:	<p>Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:</p> <ul style="list-style-type: none"> <li>• Connect mathematical concepts to everyday experiences.</li> <li>• Use models and methods to understand, represent and solve problems.</li> <li>• Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to apply mathematics to real-world contexts:</p> <ul style="list-style-type: none"> <li>• Provide opportunities for students to create models, both concrete and abstract, and perform investigations.</li> <li>• Challenge students to question the accuracy of their models and methods.</li> <li>• Support students as they validate conclusions by comparing them to the given situation.</li> <li>• Indicate how various concepts can be applied to other disciplines.</li> </ul>
ELA.K.12.EE.1.1:	<p>Cite evidence to explain and justify reasoning.</p> <p><b>Clarifications:</b> K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.</p>
ELA.K.12.EE.2.1:	<p>Read and comprehend grade-level complex texts proficiently.</p> <p><b>Clarifications:</b> See Text Complexity for grade-level complexity bands and a text complexity rubric.</p>
ELA.K.12.EE.3.1:	<p>Make inferences to support comprehension.</p> <p><b>Clarifications:</b> Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.</p>
ELA.K.12.EE.4.1:	<p>Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.</p> <p><b>Clarifications:</b> In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _____ because _____." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.</p>
ELA.K.12.EE.5.1:	<p>Use the accepted rules governing a specific format to create quality work.</p> <p><b>Clarifications:</b> Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.</p>
ELA.K.12.EE.6.1:	<p>Use appropriate voice and tone when speaking or writing.</p> <p><b>Clarifications:</b> In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.</p>
HE.1.B.4.3:	<p>Describe ways to respond when in an unwanted, threatening, or dangerous situation.</p> <p><b>Clarifications:</b> Leave, tell a trusted adult, and say "no."</p>
HE.1.B.5.3:	<p>Explain the consequences of not following rules/practices when making healthy and safe decisions.</p> <p><b>Clarifications:</b> Tooth decay and environmental damage.</p>
HE.2.B.4.3:	<p>Demonstrate ways to respond to unwanted, threatening, or dangerous situations.</p> <p><b>Clarifications:</b> Role playing: "How to tell a trusted adult or how to leave a dangerous situation safely."</p>
HE.2.B.5.3:	<p>Compare the consequences of not following rules/practices when making healthy and safe decisions.</p> <p><b>Clarifications:</b> Negative emotions, accidents, injuries, and pollution.</p>
HE.K.B.4.3:	<p>Identify the appropriate responses to unwanted and threatening situations.</p> <p><b>Clarifications:</b> Tell a trusted adult, police officer, and/or parent; seek safety and run for help.</p>

	Recognize the consequences of not following rules/practices when making healthy and safe decisions.
HE.K.B.5.3:	<b>Clarifications:</b> Injury to self and/or others.
SS.1.CG.1.1:	Explain the purpose of rules and laws in the home, school and community. <ul style="list-style-type: none"> <li>• Students will explain the role that rules and laws play in their daily life.</li> <li>• Students will explain the difference between rules and laws.</li> </ul>
SS.K.CG.1.2:	Identify people who have the authority and power to make and enforce rules and laws. <ul style="list-style-type: none"> <li>• Students will identify authority figures in their school and community including, but not limited to, parents, teachers and law enforcement officers.</li> </ul>
ELD.K.12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### GENERAL NOTES

This course should be taught using the appropriate standards/benchmarks for the grade.

The purpose of this course is to enable students to develop basic skills in computer science.

Within appropriate developmental guidelines the content of this course should expose students to:

- Responsible use of technology and information
- The impact of computing resources on local and global society
- Security, privacy, information sharing, ownership, licensure and copyright
- Communication and collaboration
- Modeling and simulations
- Problem solving and algorithms
- Digital tools
- Hardware and software
- Human-Computer interactions and Artificial Intelligence
- Data Analysis
- Computer programming basics
- Programming applications

**Science and Engineering Practices** (NRC *Framework for K-12 Science Education, 2010*)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

**English Language Development (ELD) Standards Special Notes Section:**

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: <https://cpalmsmediaproduct.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

**Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards**

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit [https://www.cpalms.org/Standards/BEST\\_Standards.aspx](https://www.cpalms.org/Standards/BEST_Standards.aspx) and select the appropriate B.E.S.T. Standards package.

### QUALIFICATIONS

As well as the certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Path: Section:** Grades PreK to 12 Education

**Course Number:** 5002010

Courses > **Grade Group:** Grades PreK to 5 Education

Courses > **Subject:** Computer Education >

**SubSubject:** General >

**Abbreviated Title:** INTRO COMPUTER SCI 1

**Course Length:** Year (Y)

**Course Status:** Draft - Course Pending Approval

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Introduction to Computer Science 2 (#5002020) 2016 - 2022

(current)

## Course Standards

Name	Description
SC.35.CS-CC.1.1:	Identify technology tools for individual and collaborative data collection, writing, communication, and publishing activities.
SC.35.CS-CC.1.2:	Describe key ideas and details while working individually or collaboratively using digital tools and media-rich resources in a way that informs, persuades, and/or entertains.
SC.35.CS-CC.1.3:	Identify ways that technology can foster teamwork, and collaboration can support problem solving and innovation.
SC.35.CS-CC.1.4:	Describe how collaborating with others can be beneficial to a digital project.
SC.35.CS-CC.1.5:	Explain that providing and receiving feedback from others can improve performance and outcomes for collaborative digital projects.
SC.35.CS-CP.1.1:	Explain that searches may be enhanced by using Boolean logic (e.g., using "not", "or", "and").
SC.35.CS-CP.1.2:	Identify and describe examples of databases from everyday life (e.g., library catalogs, school records, telephone directories, and contact lists).
SC.35.CS-CP.1.3:	Identify, research, and collect a data set on a topic, issue, problem, or question using age-appropriate technologies.
SC.35.CS-CP.1.4:	Collect, organize, graph, and analyze data to answer a question using a database or spreadsheet.
SC.35.CS-CP.2.1:	Perform keyboarding skills for communication and the input of data and information.
SC.35.CS-CP.2.2:	Create, test, and modify a program in a graphical environment (e.g., block-based visual programming language), individually and collaboratively.
SC.35.CS-CP.2.3:	Create a program using arithmetic operators, conditionals, and repetition in programs.
SC.35.CS-CP.2.4:	Explain that programs need known initial conditions (e.g., set initial score to zero in a game, initialize variables, or initial values set by hardware input).
SC.35.CS-CP.2.5:	Detect and correct program errors, including those involving arithmetic operators, conditionals, and repetition, using interactive debugging.
SC.35.CS-CP.3.1:	Write, communicate and publish activities using technology tools.
SC.35.CS-CP.3.2:	Present digitally created products, either individually and collaboratively, where a topic, concept, or skill is carefully analyzed or thoughtfully explored.
SC.35.CS-CS.1.1:	Identify the concepts illustrated by a simulation (e.g., ecosystem, predator/prey, and invasive species).
SC.35.CS-CS.1.2:	Describe how models and simulations can be used to solve real-world issues in science and engineering.
SC.35.CS-CS.1.3:	Answer a question, individually and collaboratively, using data from a simulation.
SC.35.CS-CS.1.4:	Create a simple model of a system (e.g., flower or solar system) and explain what the model shows and does not show.
SC.35.CS-CS.2.1:	Solve age-appropriate problems using information organized using digital graphic organizers (e.g., concept maps and Venn-diagrams).
SC.35.CS-CS.2.2:	Describe how computational thinking can be used to solve real life issues in science and engineering.
SC.35.CS-CS.2.3:	Explain the process of arranging or sorting information into useful order as well as the purpose for doing so.
SC.35.CS-CS.2.4:	Solve real-world problems in science and engineering using computational thinking skills.
SC.35.CS-CS.2.5:	Explain that there are several possible algorithms for searching within a dataset (such as finding a specific word in a word list or card in a deck of cards).
SC.35.CS-CS.2.6:	Write an algorithm to solve a grade-level appropriate problem (e.g., move a character through a maze, instruct a character to draw a specific shape, have a character start, repeat or end activity as required or upon a specific event), individually or collaboratively.
SC.35.CS-CS.2.7:	Identify and correct logical errors in algorithms; written, mapped, live action, or digital.
SC.35.CS-CS.2.8:	Systematically test and identify logical errors in algorithms.
SC.35.CS-CS.2.9:	Explain how to correct logical errors in algorithms; written, mapped, live action, or digital.
SC.35.CS-CS.3.1:	Manipulate and publish multimedia artifacts using digital tools (local and online).
SC.35.CS-CS.3.2:	Create an artifact (independently and collaboratively) that answers a research question clearly communicating thoughts and ideas.
SC.35.CS-CS.4.1:	Identify the basic components of a computer (e.g., monitor, keyboard, mouse, controller, speakers).
SC.35.CS-CS.4.2:	Describe the function and purpose of various input/output devices and peripherals (e.g., monitor, screen, keyboard, controller, speakers).
SC.35.CS-CS.4.3:	Compare and contrast hardware and software.
SC.35.CS-CS.4.4:	Identify and solve simple hardware and software problems that may occur during everyday use (e.g., power, connections, application window or toolbar).
SC.35.CS-CS.6.1:	Describe how hardware applications (e.g., Global Positioning System (GPS) navigation for driving directions, text-to-speech translation, and language translation) can enable everyone to do things they could not do otherwise.
SC.35.CS-CS.6.2:	Compare and contrast human and computer performance on similar tasks (e.g., sorting alphabetically or finding a path across a cluttered room) to understand which is best suited to the task.
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SC.35.CS-PC.1.2:	Describe responsible uses of modern communication media and devices.
SC.35.CS-PC.1.3:	Explain the proper use and operation of security technologies (e.g., passwords, virus protection software, spam filters, pop-up blockers, and cookies).
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SC.35.CS-PC.2.6:	Communicate about technology using appropriate terminology.
SC.35.CS-PC.2.7:	Identify and describe how computing knowledge is essential to performing important tasks and functions.

SC.35.CS-PC.3.1:	Identify digital information resources used to answer research questions (e.g., online library catalog, online encyclopedias, databases, and websites).
SC.35.CS-PC.3.2:	Gather, organize, and analyze information from digital resources.
SC.35.CS-PC.3.3:	Compare digital resources for accuracy, relevancy, and appropriateness.
SC.35.CS-PC.4.1:	Describe the difference between digital artifacts that are open or free and those that are protected by copyright.
SC.35.CS-PC.4.2:	Explain fair use for using copyrighted materials (e.g., images, music, video, and text).
SC.35.CS-PC.4.3:	Describe the purpose of copyright and the possible consequences for inappropriate use of digital materials that are protected by copyright.
SC.35.CS-PC.4.4:	Describe the threats to safe and efficient use of devices (e.g., SPAM, spyware, phishing, and viruses) associated with various forms of technology use (e.g., downloading and executing software programs, following hyperlinks, and opening files).
LAFS.3.L.3.6:	Acquire and use accurately conversational, general academic, and domain specific words and phrases as found in grade appropriate texts, including those that signal spatial and temporal relationships (e.g., After dinner that night we went looking for them).
LAFS.3.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 <i>topics and texts</i> , building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.</li> <li>b. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).</li> <li>c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.</li> <li>d. Explain their own ideas and understanding in light of the discussion.</li> </ul>
LAFS.3.W.3.7:	Conduct short research projects that build knowledge about a topic.
LAFS.4.L.3.6:	Acquire and use accurately general academic and domain-specific words and phrases as found in grade level appropriate texts, including those that signal precise actions, emotions, or states of being (e.g., <i>wildlife, conservation, and endangered</i> when discussing animal preservation).
LAFS.4.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 <i>topics and texts</i> , building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.</li> <li>b. Follow agreed-upon rules for discussions and carry out assigned roles.</li> <li>c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.</li> <li>d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.</li> </ul>
LAFS.4.W.3.7:	Conduct short research projects that build knowledge through investigation of different aspects of a topic.
LAFS.5.L.3.6:	Acquire and use accurately general academic and domain-specific words and phrases as found in grade level appropriate texts, including those that signal contrast, addition, and other logical relationships (e.g., <i>however, although, nevertheless, similarly, moreover, in addition</i> ).
LAFS.5.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 <i>topics and texts</i> , building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.</li> <li>b. Follow agreed-upon rules for discussions and carry out assigned roles.</li> <li>c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.</li> <li>d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.</li> </ul>
LAFS.5.W.3.7:	Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
MAFS.K12.MP.1.1:	<p><b>Make sense of problems and persevere in solving them.</b></p> <p>Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.</p> <p><b>Standard Relation to Course: Supporting</b></p>
MAFS.K12.MP.2.1:	<p><b>Reason abstractly and quantitatively.</b></p> <p>Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.</p> <p><b>Standard Relation to Course: Supporting</b></p>
MAFS.K12.MP.3.1:	<p><b>Construct viable arguments and critique the reasoning of others.</b></p> <p>Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies.</p>

	<p>Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Model with mathematics.</b></p> <p>Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.</p> <p><b>Standard Relation to Course: Supporting</b></p>
MAFS.K12.MP.4.1:	<p><b>Use appropriate tools strategically.</b></p> <p>Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.</p> <p><b>Standard Relation to Course: Supporting</b></p>
MAFS.K12.MP.5.1:	<p><b>Attend to precision.</b></p> <p>Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.</p> <p><b>Standard Relation to Course: Supporting</b></p>
MAFS.K12.MP.6.1:	<p><b>Look for and make use of structure.</b></p> <p>Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see <math>7 \times 8</math> equals the well remembered <math>7 \times 5 + 7 \times 3</math>, in preparation for learning about the distributive property. In the expression <math>x^2 + 9x + 14</math>, older students can see the 14 as <math>2 \times 7</math> and the 9 as <math>2 + 7</math>. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see <math>5 - 3(x - y)^2</math> as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers <math>x</math> and <math>y</math>.</p> <p><b>Standard Relation to Course: Supporting</b></p>
MAFS.K12.MP.7.1:	<p><b>Look for and express regularity in repeated reasoning.</b></p> <p>Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through <math>(1, 2)</math> with slope 3, middle school students might abstract the equation <math>(y - 2)/(x - 1) = 3</math>. Noticing the regularity in the way terms cancel when expanding <math>(x - 1)(x + 1)</math>, <math>(x - 1)(x^2 + x + 1)</math>, and <math>(x - 1)(x^3 + x^2 + x + 1)</math> might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.</p> <p><b>Standard Relation to Course: Supporting</b></p>
HE.3.C.2.6:	<p>Discuss the positive and negative impacts technology may have on health.</p> <p><b>Clarifications:</b> Positives: calling 911, using a pedometer, playing electronic, interactive video games that promote physical activity, medical advances, and collaboration. Negatives: video games that do not promote physical activity, violent video/computer, games, and misuse/overuse cell phone/texting.</p>
HE.4.C.2.6:	<p>Explain how technology influences personal thoughts, feelings, and health behaviors.</p> <p><b>Clarifications:</b> Cyber-bullying, habitual gaming, violent video games, and seat-belt alarm.</p>
HE.5.C.2.6:	<p>Describe ways that technology can influence family health behaviors.</p> <p><b>Clarifications:</b> Seat belt alarms, carbon-monoxide detectors, microwave ovens, and clever advertising.</p>
ELD.K12.ELL.SI.1:	<p>English language learners communicate for social and instructional purposes within the school setting.</p>

## GENERAL NOTES

This course should be taught using the appropriate standards/benchmarks for the grade.

The purpose of this course is to enable students to develop basic skills in computer science.

Within appropriate developmental guidelines the content of this course should expose students to:

- Responsible use of technology and information
- The impact of computing resources on local and global society
- Evaluation of digital information resources
- Security, privacy, information sharing, ownership, licensure and copyright
- Communication and collaboration
- Modeling and simulations
- Problem solving and algorithms
- Digital tools
- Hardware and software
- Human-Computer interactions and Artificial Intelligence
- Data Analysis
- Computer programming basics
- Programming applications

**Science and Engineering Practices** (NRC *Framework for K-12 Science Education, 2010*)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

**English Language Development (ELD) Standards Special Notes Section:**

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: <https://cpalmsmediaproduct.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

## QUALIFICATIONS

As well as the certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

## GENERAL INFORMATION

**Course Number:** 5002020

**Course Path:** Section: Grades PreK to 12 Education  
Courses > **Grade Group:** Grades PreK to 5 Education  
Courses > **Subject:** Computer Education >  
**SubSubject:** General >  
**Abbreviated Title:** INTRO COMPUTER SCI 2  
**Course Length:** Year (Y)

**Course Status:** Course Approved

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Introduction to Computer Science 2 (#5002020) 2022 - And

Beyond

## Course Standards

Name	Description
SC.35.CS-CC.1.1:	Identify technology tools for individual and collaborative data collection, writing, communication, and publishing activities.
SC.35.CS-CC.1.2:	Describe key ideas and details while working individually or collaboratively using digital tools and media-rich resources in a way that informs, persuades, and/or entertains.
SC.35.CS-CC.1.3:	Identify ways that technology can foster teamwork, and collaboration can support problem solving and innovation.
SC.35.CS-CC.1.4:	Describe how collaborating with others can be beneficial to a digital project.
SC.35.CS-CC.1.5:	Explain that providing and receiving feedback from others can improve performance and outcomes for collaborative digital projects.
SC.35.CS-CP.1.1:	Explain that searches may be enhanced by using Boolean logic (e.g., using “not”, “or”, “and”).
SC.35.CS-CP.1.2:	Identify and describe examples of databases from everyday life (e.g., library catalogs, school records, telephone directories, and contact lists).
SC.35.CS-CP.1.3:	Identify, research, and collect a data set on a topic, issue, problem, or question using age-appropriate technologies.
SC.35.CS-CP.1.4:	Collect, organize, graph, and analyze data to answer a question using a database or spreadsheet.
SC.35.CS-CP.2.1:	Perform keyboarding skills for communication and the input of data and information.
SC.35.CS-CP.2.2:	Create, test, and modify a program in a graphical environment (e.g., block-based visual programming language), individually and collaboratively.
SC.35.CS-CP.2.3:	Create a program using arithmetic operators, conditionals, and repetition in programs.
SC.35.CS-CP.2.4:	Explain that programs need known initial conditions (e.g., set initial score to zero in a game, initialize variables, or initial values set by hardware input).
SC.35.CS-CP.2.5:	Detect and correct program errors, including those involving arithmetic operators, conditionals, and repetition, using interactive debugging.
SC.35.CS-CP.3.1:	Write, communicate and publish activities using technology tools.
SC.35.CS-CP.3.2:	Present digitally created products, either individually and collaboratively, where a topic, concept, or skill is carefully analyzed or thoughtfully explored.
SC.35.CS-CS.1.1:	Identify the concepts illustrated by a simulation (e.g., ecosystem, predator/prey, and invasive species).
SC.35.CS-CS.1.2:	Describe how models and simulations can be used to solve real-world issues in science and engineering.
SC.35.CS-CS.1.3:	Answer a question, individually and collaboratively, using data from a simulation.
SC.35.CS-CS.1.4:	Create a simple model of a system (e.g., flower or solar system) and explain what the model shows and does not show.
SC.35.CS-CS.2.1:	Solve age-appropriate problems using information organized using digital graphic organizers (e.g., concept maps and Venn-diagrams).
SC.35.CS-CS.2.2:	Describe how computational thinking can be used to solve real life issues in science and engineering.
SC.35.CS-CS.2.3:	Explain the process of arranging or sorting information into useful order as well as the purpose for doing so.
SC.35.CS-CS.2.4:	Solve real-world problems in science and engineering using computational thinking skills.
SC.35.CS-CS.2.5:	Explain that there are several possible algorithms for searching within a dataset (such as finding a specific word in a word list or card in a deck of cards).
SC.35.CS-CS.2.6:	Write an algorithm to solve a grade-level appropriate problem (e.g., move a character through a maze, instruct a character to draw a specific shape, have a character start, repeat or end activity as required or upon a specific event), individually or collaboratively.
SC.35.CS-CS.2.7:	Identify and correct logical errors in algorithms; written, mapped, live action, or digital.
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SC.35.CS-PC.3.2:	Gather, organize, and analyze information from digital resources.
SC.35.CS-PC.3.3:	Compare digital resources for accuracy, relevancy, and appropriateness.
SC.35.CS-PC.4.1:	Describe the difference between digital artifacts that are open or free and those that are protected by copyright.
SC.35.CS-PC.4.2:	Explain fair use for using copyrighted materials (e.g., images, music, video, and text).
SC.35.CS-PC.4.3:	Describe the purpose of copyright and the possible consequences for inappropriate use of digital materials that are protected by copyright.
SC.35.CS-PC.4.4:	Describe the threats to safe and efficient use of devices (e.g., SPAM, spyware, phishing, and viruses) associated with various forms of technology use (e.g., downloading and executing software programs, following hyperlinks, and opening files).

MA.K12.MTR.1.1:	<p>Mathematicians who participate in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Analyze the problem in a way that makes sense given the task.</li> <li>Ask questions that will help with solving the task.</li> <li>Build perseverance by modifying methods as needed while solving a challenging task.</li> <li>Stay engaged and maintain a positive mindset when working to solve tasks.</li> <li>Help and support each other when attempting a new method or approach.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to participate actively in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Cultivate a community of growth mindset learners.</li> <li>Foster perseverance in students by choosing tasks that are challenging.</li> <li>Develop students' ability to analyze and problem solve.</li> <li>Recognize students' effort when solving challenging problems.</li> </ul>
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MA.K12.MTR.2.1:	<p>Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Build understanding through modeling and using manipulatives.</li> <li>Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.</li> <li>Progress from modeling problems with objects and drawings to using algorithms and equations.</li> <li>Express connections between concepts and representations.</li> <li>Choose a representation based on the given context or purpose.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Help students make connections between concepts and representations.</li> <li>Provide opportunities for students to use manipulatives when investigating concepts.</li> <li>Guide students from concrete to pictorial to abstract representations as understanding progresses.</li> <li>Show students that various representations can have different purposes and can be useful in different situations.</li> </ul>
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MA.K12.MTR.3.1:	<p>Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Select efficient and appropriate methods for solving problems within the given context.</li> <li>Maintain flexibility and accuracy while performing procedures and mental calculations.</li> <li>Complete tasks accurately and with confidence.</li> <li>Adapt procedures to apply them to a new context.</li> <li>Use feedback to improve efficiency when performing calculations.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.</li> <li>Offer multiple opportunities for students to practice efficient and generalizable methods.</li> <li>Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.</li> </ul>
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MA.K12.MTR.4.1:	<p>Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Communicate mathematical ideas, vocabulary and methods effectively.</li> <li>Analyze the mathematical thinking of others.</li> <li>Compare the efficiency of a method to those expressed by others.</li> <li>Recognize errors and suggest how to correctly solve the task.</li> <li>Justify results by explaining methods and processes.</li> <li>Construct possible arguments based on evidence.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.</li> <li>Create opportunities for students to discuss their thinking with peers.</li> <li>Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.</li> <li>Develop students' ability to justify methods and compare their responses to the responses of their peers.</li> </ul>
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	<p>Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:</p> <ul style="list-style-type: none"> <li>Focus on relevant details within a problem.</li> <li>Create plans and procedures to logically order events, steps or ideas to solve problems.</li> <li>Decompose a complex problem into manageable parts.</li> <li>Relate previously learned concepts to new concepts.</li> </ul>
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MA.K12.MTR.5.1:

- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

**Clarifications:**

Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

Assess the reasonableness of solutions.

Mathematicians who assess the reasonableness of solutions:

- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

MA.K12.MTR.6.1:

**Clarifications:**

Teachers who encourage students to assess the reasonableness of solutions:

- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

Apply mathematics to real-world contexts.

Mathematicians who apply mathematics to real-world contexts:

- Connect mathematical concepts to everyday experiences.
- Use models and methods to understand, represent and solve problems.
- Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.

MA.K12.MTR.7.1:

**Clarifications:**

Teachers who encourage students to apply mathematics to real-world contexts:

- Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
- Challenge students to question the accuracy of their models and methods.
- Support students as they validate conclusions by comparing them to the given situation.
- Indicate how various concepts can be applied to other disciplines.

Cite evidence to explain and justify reasoning.

**Clarifications:**

K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.

2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

ELA.K12.EE.1.1:

4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.

6-8 Students continue with previous skills and use a style guide to create a proper citation.

9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

ELA.K12.EE.2.1:

Read and comprehend grade-level complex texts proficiently.

**Clarifications:**

See Text Complexity for grade-level complexity bands and a text complexity rubric.

Make inferences to support comprehension.

**Clarifications:**

Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

ELA.K12.EE.3.1:

Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

**Clarifications:**

In kindergarten, students learn to listen to one another respectfully.

In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think \_\_\_\_\_ because \_\_\_\_\_." The collaborative conversations are becoming academic conversations.

ELA.K12.EE.4.1:

In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

Use the accepted rules governing a specific format to create quality work.

**Clarifications:**

Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.

ELA.K12.EE.5.1:

	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	<b>Clarifications:</b> In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
	Discuss the positive and negative impacts technology may have on health.
HE.3.C.2.6:	<b>Clarifications:</b> Positives: calling 911, using a pedometer, playing electronic, interactive video games that promote physical activity, medical advances, and collaboration. Negatives: video games that do not promote physical activity, violent video/computer, games, and misuse/overuse cell phone/texting.
	Explain how technology influences personal thoughts, feelings, and health behaviors.
HE.4.C.2.6:	<b>Clarifications:</b> Cyber-bullying, habitual gaming, violent video games, and seat-belt alarm.
	Describe ways that technology can influence family health behaviors.
HE.5.C.2.6:	<b>Clarifications:</b> Seat belt alarms, carbon-monoxide detectors, microwave ovens, and clever advertising.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### GENERAL NOTES

This course should be taught using the appropriate standards/benchmarks for the grade.

The purpose of this course is to enable students to develop basic skills in computer science.

Within appropriate developmental guidelines the content of this course should expose students to:

- Responsible use of technology and information
- The impact of computing resources on local and global society
- Evaluation of digital information resources
- Security, privacy, information sharing, ownership, licensure and copyright
- Communication and collaboration
- Modeling and simulations
- Problem solving and algorithms
- Digital tools
- Hardware and software
- Human-Computer interactions and Artificial Intelligence
- Data Analysis
- Computer programming basics
- Programming applications

**Science and Engineering Practices** (NRC *Framework for K-12 Science Education, 2010*)

- Asking questions (for science) and defining problems (for engineering).
- Developing and using models.
- Planning and carrying out investigations.
- Analyzing and interpreting data.
- Using mathematics, information and computer technology, and computational thinking.
- Constructing explanations (for science) and designing solutions (for engineering).
- Engaging in argument from evidence.
- Obtaining, evaluating, and communicating information.

**English Language Development (ELD) Standards Special Notes Section:**

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: <https://cpalmsmediaproduct.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

**Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards**

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit [https://www.cpalms.org/Standards/BEST\\_Standards.aspx](https://www.cpalms.org/Standards/BEST_Standards.aspx) and select the appropriate B.E.S.T. Standards package.

### QUALIFICATIONS

As well as the certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

Any field when certification reflects a bachelor or higher degree.

## GENERAL INFORMATION

**Course Number:** 5002020

**Course Path: Section:** Grades PreK to 12 Education  
Courses > **Grade Group:** Grades PreK to 5 Education  
Courses > **Subject:** Computer Education >  
**SubSubject:** General >  
**Abbreviated Title:** INTRO COMPUTER SCI 2  
**Course Length:** Year (Y)

**Course Status:** State Board Approved

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# M/J Computer Science Discoveries (#0200000) 2018 - 2022

(current)

## Course Standards

Name	Description
SC.68.CS-CC.1.1:	Demonstrate an ability to communicate appropriately through various online tools.
SC.68.CS-CC.1.2:	Apply productivity and or multimedia tools for local and global group collaboration.
SC.68.CS-CC.1.3:	Design, develop, and publish a collaborative digital product using a variety of digital tools and media-rich resources that demonstrate and communicate concepts to inform, persuade, and/or entertain.
SC.68.CS-CP.2.1:	Develop problem solutions using visual representations of problem states, structures and data.
SC.68.CS-CP.2.2:	Evaluate the logical flow of a step-by-step program by acting it out through computer-free activities.
SC.68.CS-CP.2.3:	Develop problem solutions using a block programming language, including all of the following: looping behavior, conditional statements, expressions, variables, and functions.
SC.68.CS-CP.2.4:	Develop problem solutions using a programming language, including all of the following: looping behavior, conditional statements, expressions, variables, and functions.
SC.68.CS-CP.3.1:	Select appropriate tools and technology resources to accomplish a variety of tasks and solve problems.
SC.68.CS-CP.3.2:	Create online content (e.g., webpage, blog, digital portfolio, multimedia), using advanced design tools.
SC.68.CS-CP.3.3:	Create an artifact (independently and collaboratively) that answers a research question and communicates results and conclusions.
SC.68.CS-CS.1.1:	Examine connections between elements of mathematics and computer science including binary numbers, logic, sets, and functions.
SC.68.CS-CS.1.2:	Create or modify and use a simulation to analyze and illustrate a concept in depth (i.e., use a simulation to illustrate a genetic variation), individually and collaboratively.
SC.68.CS-CS.1.3:	Evaluate what kinds of real-world problems can be solved using modeling and simulation.
SC.68.CS-CS.1.4:	Interact with content-specific models and simulations to support learning, research and problem solving (e.g., immigration, international trade, invasive species).
SC.68.CS-CS.2.2:	Solve real-life issues in science and engineering (i.e., generalize a solution to open-ended problems) using computational thinking skills.
SC.68.CS-CS.2.4:	Organize and display information in a variety of ways such as number formats (e.g., scientific notation, percentages, and exponents), charts, tables and graphs.
SC.68.CS-CS.2.5:	Decompose a problem and create a function for one of its parts at a time (e.g., video game, robot obstacle course, making dinner), individually and collaboratively.
SC.68.CS-CS.2.6:	Create a program that implements an algorithm to achieve a given goal, individually and collaboratively.
SC.68.CS-CS.2.7:	Design solutions that use repetition and two-way selection (e.g., for, while, if/else).
SC.68.CS-CS.2.8:	Recognize that boundaries need to be taken into account for an algorithm to produce correct results.
SC.68.CS-CS.2.9:	Identify simple data types and data structures.
SC.68.CS-CS.2.10:	Recognize that more than one algorithm can solve a given problem.
SC.68.CS-CS.2.11:	Predict outputs while showing an understanding of inputs.
SC.68.CS-CS.2.12:	Select the 'best' algorithm based on a given criteria (e.g., time, resource, and accessibility) to solve a problem, individually and collaboratively.
SC.68.CS-CS.2.13:	Explore a problem domain using iterative development and debugging.
SC.68.CS-CS.2.14:	Perform program tracing to predict the behavior of programs.
SC.68.CS-CS.3.1:	Explain why different file types exist (e.g., formats for word processing, images, music, and three-dimensional drawings).
SC.68.CS-CS.3.2:	Identify the kinds of content associated with different file types.
SC.68.CS-CS.3.3:	Integrate information from multiple file formats into a single artifact.
SC.68.CS-CS.4.1:	Identify and describe the function of the main internal parts of a basic computing device (e.g., motherboard, hard drive, Central Processing Unit - CPU).
SC.68.CS-CS.4.2:	Describe the main functions of an operating system and explain how an operating system provides user and system services (e.g., user interface, IO device management, task management).
SC.68.CS-CS.4.3:	Describe the relationships between hardware and software (e.g., BIOS, operating systems and firmware).
SC.68.CS-CS.4.4:	Identify and describe the use of sensors, actuators, and control systems in an embodied system (e.g., a robot, an e-textile, installation art, and a smart room).
SC.68.CS-CS.4.5:	Evaluate a hardware or software problem and construct the steps involved in diagnosing and solving the problem (e.g., power, connections, application window or toolbar, cables, ports, network resources, video, and sound).
SC.68.CS-CS.4.6:	Describe the essential characteristics of a software artifact.
SC.68.CS-CS.4.7:	Describe the major components and functions of computer systems and networks.
SC.68.CS-CS.4.8:	Identify software used to support specialized forms of human-computer interaction.
SC.68.CS-CS.6.1:	Explain why some tasks can be accomplished more easily by computers.
SC.68.CS-CS.6.2:	Describe how humans and machines interact to accomplish tasks that cannot be accomplished by either alone.
SC.68.CS-CS.6.3:	Identify novel ways humans interact with computers, including software, probes, sensors, and handheld devices.
SC.68.CS-CS.6.4:	Describe ways in which computers use models of intelligent behavior (e.g., robot motion, speech and language understanding, and computer vision).
SC.68.CS-CS.6.5:	Identify factors that distinguish humans from machines.
SC.68.CS-CS.6.6:	Design and demonstrate the use of a device (e.g., robot, e-textile) to accomplish a task, individually and collaboratively.
SC.68.CS-PC.1.1:	Recognize and describe legal and ethical behaviors when using information and technology and describe the consequences of misuse.
SC.68.CS-PC.1.2:	Describe and use safe and appropriate practices when participating in online communities (e.g., discussion groups, blogs, and social networking sites).

SC.68.CS-PC.1.3:	Evaluate the proper use and operation of security technologies (e.g., passwords, virus protection software, spam filters, pop-up blockers, and cookies).
SC.68.CS-PC.1.4:	Recognize the impacts and consequences of plagiarism on the development of creative works, projects, publications and online content.
SC.68.CS-PC.2.1:	Analyze the positive and negative impacts of computing, social networking and web technologies on human culture.
SC.68.CS-PC.2.2:	Explain the possible consequences of cyberbullying and inappropriate use of social media on personal life and society.
SC.68.CS-PC.2.3:	Describe the influence of access to information technologies over time and the effects those changes have had on education, the workplace, and the global society.
SC.68.CS-PC.2.4:	Describe how the unequal net-neutrality and distribution of computing resources in a global economy raises issues of equity, access, and power.
SC.68.CS-PC.2.5:	Describe ways in which adaptive technologies can assist users with special needs to function in their daily lives.
SC.68.CS-PC.2.6:	Identify and discuss the technology skills needed in the workplace.
SC.68.CS-PC.2.7:	Interpret writings and/or communications which use developmentally appropriate terminology.
SC.68.CS-PC.2.8:	Identify interdisciplinary careers that are enhanced by computer science.
LAFS.6.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.</li> <li>c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.</li> <li>d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.</li> </ul>
LAFS.6.SL.1.2:	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
LAFS.6.SL.1.3:	<b>Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.</b>
LAFS.6.SL.2.4:	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.6.SL.2.5:	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.4.10:	<b>By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.</b>
LAFS.7.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.</li> <li>c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.</li> <li>d. Acknowledge new information expressed by others and, when warranted, modify their own views.</li> </ul>
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
LAFS.7.SL.1.3:	<b>Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.</b>
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.7.SL.2.5:	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
LAFS.8.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.</li> <li>c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.</li> <li>d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.</li> </ul>
LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.
LAFS.8.SL.1.3:	<b>Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.</b>
LAFS.8.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.8.SL.2.5:	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
MAFS.K12.MP.1.1:	<b>Make sense of problems and persevere in solving them.</b>  Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and

graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

**Standard Relation to Course: Supporting**

**Reason abstractly and quantitatively.**

MAFS.K12.MP.2.1:

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

**Standard Relation to Course: Supporting**

**Construct viable arguments and critique the reasoning of others.**

MAFS.K12.MP.3.1:

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

**Standard Relation to Course: Supporting**

**Model with mathematics.**

MAFS.K12.MP.4.1:

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

**Standard Relation to Course: Supporting**

**Use appropriate tools strategically.**

MAFS.K12.MP.5.1:

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

**Standard Relation to Course: Supporting**

**Attend to precision.**

MAFS.K12.MP.6.1:

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

**Standard Relation to Course: Supporting**

**Look for and make use of structure.**

MAFS.K12.MP.7.1:

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see  $7 \times 8$  equals the well remembered  $7 \times 5 + 7 \times 3$ , in preparation for learning about the distributive property. In the expression  $x^2 + 9x + 14$ , older students can see the 14 as  $2 \times 7$  and the 9 as  $2 + 7$ . They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see  $5 - 3(x - y)^2$  as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers  $x$  and  $y$ .

**Standard Relation to Course: Supporting**

**Look for and express regularity in repeated reasoning.**

MAFS.K12.MP.8.1:

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation  $(y - 2)/(x - 1) = 3$ . Noticing the regularity in the way terms cancel when expanding  $(x - 1)(x + 1)$ ,  $(x - 1)(x^2 + x + 1)$ , and  $(x - 1)(x^3 + x^2 + x + 1)$  might lead them to the general formula for the sum of a geometric series. As they work to solve a

problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

**Standard Relation to Course: Supporting**

ELD.K12.ELL.SI.1: English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### VERSION DESCRIPTION

#### PURPOSE

Computing is so fundamental to understanding and participating in society that it is valuable for every student to learn as part of a modern education. Computer science can be viewed as a liberal art, a subject that provides students with a critical lens for interpreting the world around them. Computer science prepares all students to be active and informed contributors to our increasingly technological society whether they pursue careers in technology or not. Computer science can be life-changing, not just skill training.

Students learn best when they are intrinsically motivated. This course prioritizes learning experiences that are active, relevant to students' lives, and provide students authentic choice. Students are encouraged to be curious, solve personally relevant problems and to express themselves through creation. Learning is an inherently social activity, so the course is designed to interweave lessons with discussions, presentations, peer feedback, and shared reflections. As students proceed through the pathway, the structures increasingly shift responsibility to students to formulate their own questions, develop their own solutions, and critique their work.

It is also critical to diversify the technology workforce. Addressing inequities within the field of computer science is critical to bringing computer science to all students. The tools and strategies in this course will help teachers understand and address well-known equity gaps within the field. All students can succeed in computer science when given the right supports and opportunities, regardless of prior knowledge.

#### OVERVIEW AND GOALS

Computer Science Discoveries introduces students to computer science as a vehicle for problem solving, communication, and personal expression. The course focuses on the visible aspects of computing and computer science and encourages students to see where computer science exists around them and how they can engage with it as a tool for exploration and expression. Centering on the immediately observable and personally applicable elements of computer science, the course asks students to look outward and explore the impact of computer science on society. Students should see how a thorough student-centered design process produces a better application, how data is used to address problems that affect large numbers of people, and how physical computing with circuit boards allows computers to collect, input and return output in a variety of ways.

#### Additional Notes - Pedagogical Approach to Learning: Teacher as Lead Learner

What is the Lead Learner approach?

As the lead learner, the teacher role shifts from being the source of knowledge to that of a leader in seeking knowledge. The lead learner's mantra is: "I may not know the answer, but I know that together we can figure it out."

The philosophy of the lead learner strategy is that students can benefit from having a model to demonstrate the learning process. Being a lead learner doesn't discount the need for a teacher to develop computer science content expertise, but it does allow for an environment of openness with students about the teacher learning process. Modeling and teaching *how to learn* are the most important factors to consider in order to be successful with this style of teaching and learning.

The lead learner technique represents good teaching practice in general. One important role of the teacher in the Computer Science Discoveries classroom is to model excitement about investigating how things work by asking motivating questions about why things work the way they do or are the way they are. With teacher guidance, students will learn how to hypothesize; ask questions of peers; test, evaluate, and refine solutions collaboratively; seek out resources; analyze data; and write clear and cogent code.

#### English Language Arts (ELA) Standards Special Notes Section:

Teachers are required to provide speaking and listening instruction that allows students to communicate information, ideas and concepts for academic success in the content area. Within this course you will find standards specific to the 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grade ranges, the appropriate standards for the grade should be utilized.

#### English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

<https://cpalmsmediaproduct.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

#### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE) will need modifications to meet their needs. Modifications change the outcomes and or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course.

#### Additional Resources

Additional resources and a free curriculum that may be utilized for this course can be found at <https://curriculum.code.org/csd-19/> and <https://codehs.com/info/states/florida>.

## QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

In order for this course to be taught with fidelity teachers without a computer science certification or related postsecondary coursework should, at a minimum, have completed a course in computer science such as those offered through a MOOC from a reputable institution or by attending training such as those offered by code.org.

## GENERAL INFORMATION

**Course Number:** 0200000

**Course Type:** Elective Course

**Course Status:** Course Approved

**Grade Level(s):** 6,7,8

**Course Path: Section:** Grades PreK to 12 Education

Courses > **Grade Group:** Grades 6 to 8 Education

Courses > **Subject:** Computer Education >

**SubSubject:** General >

**Abbreviated Title:** M/J COMP SCI DISC

**Course Length:** Year (Y)

**Course Level:** 2

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

## Course Standards

Name	Description
SC.68.CS-CC.1.1:	Demonstrate an ability to communicate appropriately through various online tools.
SC.68.CS-CC.1.2:	Apply productivity and or multimedia tools for local and global group collaboration.
SC.68.CS-CC.1.3:	Design, develop, and publish a collaborative digital product using a variety of digital tools and media-rich resources that demonstrate and communicate concepts to inform, persuade, and/or entertain.
SC.68.CS-CP.2.1:	Develop problem solutions using visual representations of problem states, structures and data.
SC.68.CS-CP.2.2:	Evaluate the logical flow of a step-by-step program by acting it out through computer-free activities.
SC.68.CS-CP.2.3:	Develop problem solutions using a block programming language, including all of the following: looping behavior, conditional statements, expressions, variables, and functions.
SC.68.CS-CP.2.4:	Develop problem solutions using a programming language, including all of the following: looping behavior, conditional statements, expressions, variables, and functions.
SC.68.CS-CP.3.1:	Select appropriate tools and technology resources to accomplish a variety of tasks and solve problems.
SC.68.CS-CP.3.2:	Create online content (e.g., webpage, blog, digital portfolio, multimedia), using advanced design tools.
SC.68.CS-CP.3.3:	Create an artifact (independently and collaboratively) that answers a research question and communicates results and conclusions.
SC.68.CS-CS.1.1:	Examine connections between elements of mathematics and computer science including binary numbers, logic, sets, and functions.
SC.68.CS-CS.1.2:	Create or modify and use a simulation to analyze and illustrate a concept in depth (i.e., use a simulation to illustrate a genetic variation), individually and collaboratively.
SC.68.CS-CS.1.3:	Evaluate what kinds of real-world problems can be solved using modeling and simulation.
SC.68.CS-CS.1.4:	Interact with content-specific models and simulations to support learning, research and problem solving (e.g., immigration, international trade, invasive species).
SC.68.CS-CS.2.2:	Solve real-life issues in science and engineering (i.e., generalize a solution to open-ended problems) using computational thinking skills.
SC.68.CS-CS.2.4:	Organize and display information in a variety of ways such as number formats (e.g., scientific notation, percentages, and exponents), charts, tables and graphs.
SC.68.CS-CS.2.5:	Decompose a problem and create a function for one of its parts at a time (e.g., video game, robot obstacle course, making dinner), individually and collaboratively.
SC.68.CS-CS.2.6:	Create a program that implements an algorithm to achieve a given goal, individually and collaboratively.
SC.68.CS-CS.2.7:	Design solutions that use repetition and two-way selection (e.g., for, while, if/else).
SC.68.CS-CS.2.8:	Recognize that boundaries need to be taken into account for an algorithm to produce correct results.
SC.68.CS-CS.2.9:	Identify simple data types and data structures.
SC.68.CS-CS.2.10:	Recognize that more than one algorithm can solve a given problem.
SC.68.CS-CS.2.11:	Predict outputs while showing an understanding of inputs.
SC.68.CS-CS.2.12:	Select the 'best' algorithm based on a given criteria (e.g., time, resource, and accessibility) to solve a problem, individually and collaboratively.
SC.68.CS-CS.2.13:	Explore a problem domain using iterative development and debugging.
SC.68.CS-CS.2.14:	Perform program tracing to predict the behavior of programs.
SC.68.CS-CS.3.1:	Explain why different file types exist (e.g., formats for word processing, images, music, and three-dimensional drawings).
SC.68.CS-CS.3.2:	Identify the kinds of content associated with different file types.
SC.68.CS-CS.3.3:	Integrate information from multiple file formats into a single artifact.
SC.68.CS-CS.4.1:	Identify and describe the function of the main internal parts of a basic computing device (e.g., motherboard, hard drive, Central Processing Unit - CPU).
SC.68.CS-CS.4.2:	Describe the main functions of an operating system and explain how an operating system provides user and system services (e.g., user interface, IO device management, task management).
SC.68.CS-CS.4.3:	Describe the relationships between hardware and software (e.g., BIOS, operating systems and firmware).
SC.68.CS-CS.4.4:	Identify and describe the use of sensors, actuators, and control systems in an embodied system (e.g., a robot, an e-textile, installation art, and a smart room).
SC.68.CS-CS.4.5:	Evaluate a hardware or software problem and construct the steps involved in diagnosing and solving the problem (e.g., power, connections, application window or toolbar, cables, ports, network resources, video, and sound).
SC.68.CS-CS.4.6:	Describe the essential characteristics of a software artifact.
SC.68.CS-CS.4.7:	Describe the major components and functions of computer systems and networks.
SC.68.CS-CS.4.8:	Identify software used to support specialized forms of human-computer interaction.
SC.68.CS-CS.6.1:	Explain why some tasks can be accomplished more easily by computers.
SC.68.CS-CS.6.2:	Describe how humans and machines interact to accomplish tasks that cannot be accomplished by either alone.
SC.68.CS-CS.6.3:	Identify novel ways humans interact with computers, including software, probes, sensors, and handheld devices.
SC.68.CS-CS.6.4:	Describe ways in which computers use models of intelligent behavior (e.g., robot motion, speech and language understanding, and computer vision).
SC.68.CS-CS.6.5:	Identify factors that distinguish humans from machines.
SC.68.CS-CS.6.6:	Design and demonstrate the use of a device (e.g., robot, e-textile) to accomplish a task, individually and collaboratively.
SC.68.CS-PC.1.1:	Recognize and describe legal and ethical behaviors when using information and technology and describe the consequences of misuse.
SC.68.CS-PC.1.2:	Describe and use safe and appropriate practices when participating in online communities (e.g., discussion groups, blogs, and social networking sites).
SC.68.CS-PC.1.3:	Evaluate the proper use and operation of security technologies (e.g., passwords, virus protection software, spam filters, pop-up blockers, and cookies).
SC.68.CS-PC.1.4:	Recognize the impacts and consequences of plagiarism on the development of creative works, projects, publications and online content.

SC.68.CS-PC.2.1:	Analyze the positive and negative impacts of computing, social networking and web technologies on human culture.
SC.68.CS-PC.2.2:	Explain the possible consequences of cyberbullying and inappropriate use of social media on personal life and society.
SC.68.CS-PC.2.3:	Describe the influence of access to information technologies over time and the effects those changes have had on education, the workplace, and the global society.
SC.68.CS-PC.2.4:	Describe how the unequal net-neutrality and distribution of computing resources in a global economy raises issues of equity, access, and power.
SC.68.CS-PC.2.5:	Describe ways in which adaptive technologies can assist users with special needs to function in their daily lives.
SC.68.CS-PC.2.6:	Identify and discuss the technology skills needed in the workplace.
SC.68.CS-PC.2.7:	Interpret writings and/or communications which use developmentally appropriate terminology.
SC.68.CS-PC.2.8:	Identify interdisciplinary careers that are enhanced by computer science.
	Mathematicians who participate in effortful learning both individually and with others: <ul style="list-style-type: none"> <li>Analyze the problem in a way that makes sense given the task.</li> <li>Ask questions that will help with solving the task.</li> <li>Build perseverance by modifying methods as needed while solving a challenging task.</li> <li>Stay engaged and maintain a positive mindset when working to solve tasks.</li> <li>Help and support each other when attempting a new method or approach.</li> </ul>
MA.K12.MTR.1.1:	<p><b>Clarifications:</b></p> <p>Teachers who encourage students to participate actively in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Cultivate a community of growth mindset learners.</li> <li>Foster perseverance in students by choosing tasks that are challenging.</li> <li>Develop students' ability to analyze and problem solve.</li> <li>Recognize students' effort when solving challenging problems.</li> </ul>
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: <ul style="list-style-type: none"> <li>Build understanding through modeling and using manipulatives.</li> <li>Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.</li> <li>Progress from modeling problems with objects and drawings to using algorithms and equations.</li> <li>Express connections between concepts and representations.</li> <li>Choose a representation based on the given context or purpose.</li> </ul>
MA.K12.MTR.2.1:	<p><b>Clarifications:</b></p> <p>Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Help students make connections between concepts and representations.</li> <li>Provide opportunities for students to use manipulatives when investigating concepts.</li> <li>Guide students from concrete to pictorial to abstract representations as understanding progresses.</li> <li>Show students that various representations can have different purposes and can be useful in different situations.</li> </ul>
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: <ul style="list-style-type: none"> <li>Select efficient and appropriate methods for solving problems within the given context.</li> <li>Maintain flexibility and accuracy while performing procedures and mental calculations.</li> <li>Complete tasks accurately and with confidence.</li> <li>Adapt procedures to apply them to a new context.</li> <li>Use feedback to improve efficiency when performing calculations.</li> </ul>
MA.K12.MTR.3.1:	<p><b>Clarifications:</b></p> <p>Teachers who encourage students to complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.</li> <li>Offer multiple opportunities for students to practice efficient and generalizable methods.</li> <li>Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.</li> </ul>
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: <ul style="list-style-type: none"> <li>Communicate mathematical ideas, vocabulary and methods effectively.</li> <li>Analyze the mathematical thinking of others.</li> <li>Compare the efficiency of a method to those expressed by others.</li> <li>Recognize errors and suggest how to correctly solve the task.</li> <li>Justify results by explaining methods and processes.</li> <li>Construct possible arguments based on evidence.</li> </ul>
MA.K12.MTR.4.1:	<p><b>Clarifications:</b></p> <p>Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.</li> <li>Create opportunities for students to discuss their thinking with peers.</li> <li>Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.</li> <li>Develop students' ability to justify methods and compare their responses to the responses of their peers.</li> </ul>
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: <ul style="list-style-type: none"> <li>Focus on relevant details within a problem.</li> <li>Create plans and procedures to logically order events, steps or ideas to solve problems.</li> <li>Decompose a complex problem into manageable parts.</li> <li>Relate previously learned concepts to new concepts.</li> </ul>

MA.K12.MTR.5.1:

- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

**Clarifications:**

Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

Assess the reasonableness of solutions.

Mathematicians who assess the reasonableness of solutions:

- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

MA.K12.MTR.6.1:

**Clarifications:**

Teachers who encourage students to assess the reasonableness of solutions:

- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

Apply mathematics to real-world contexts.

Mathematicians who apply mathematics to real-world contexts:

- Connect mathematical concepts to everyday experiences.
- Use models and methods to understand, represent and solve problems.
- Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.

MA.K12.MTR.7.1:

**Clarifications:**

Teachers who encourage students to apply mathematics to real-world contexts:

- Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
- Challenge students to question the accuracy of their models and methods.
- Support students as they validate conclusions by comparing them to the given situation.
- Indicate how various concepts can be applied to other disciplines.

Cite evidence to explain and justify reasoning.

**Clarifications:**

K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.

2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.

6-8 Students continue with previous skills and use a style guide to create a proper citation.

9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

ELA.K12.EE.1.1:

Read and comprehend grade-level complex texts proficiently.

ELA.K12.EE.2.1:

**Clarifications:**

See Text Complexity for grade-level complexity bands and a text complexity rubric.

Make inferences to support comprehension.

ELA.K12.EE.3.1:

**Clarifications:**

Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

ELA.K12.EE.4.1:

**Clarifications:**

In kindergarten, students learn to listen to one another respectfully.

In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think \_\_\_\_\_ because \_\_\_\_\_." The collaborative conversations are becoming academic conversations.

In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

Use the accepted rules governing a specific format to create quality work.

ELA.K12.EE.5.1:

**Clarifications:**

Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.

Use appropriate voice and tone when speaking or writing.

ELA.K12.EE.6.1:

**Clarifications:**

In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.

ELD.K12.ELL.SI.1:

English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### VERSION DESCRIPTION

#### PURPOSE

Computing is so fundamental to understanding and participating in society that it is valuable for every student to learn as part of a modern education. Computer science can be viewed as a liberal art, a subject that provides students with a critical lens for interpreting the world around them. Computer science prepares all students to be active and informed contributors to our increasingly technological society whether they pursue careers in technology or not. Computer science can be life-changing, not just skill training.

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It is also critical to diversify the technology workforce. Addressing inequities within the field of computer science is critical to bringing computer science to all students. The tools and strategies in this course will help teachers understand and address well-known equity gaps within the field. All students can succeed in computer science when given the right supports and opportunities, regardless of prior knowledge.

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#### Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit [https://www.cpalms.org/Standards/BEST\\_Standards.aspx](https://www.cpalms.org/Standards/BEST_Standards.aspx) and select the appropriate B.E.S.T. Standards package.

#### English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

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In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE) will need modifications to meet their needs. Modifications change the outcomes and or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course.

#### Additional Resources

Additional resources and a free curriculum that may be utilized for this course can be found at <https://curriculum.code.org/csd->

## QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

In order for this course to be taught with fidelity teachers without a computer science certification or related postsecondary coursework should, at a minimum, have completed a course in computer science such as those offered through a MOOC from a reputable institution or by attending training such as those offered by code.org.

## GENERAL INFORMATION

**Course Number:** 0200000

**Course Type:** Elective Course

**Course Status:** State Board Approved

**Grade Level(s):** 6,7,8

**Course Path: Section:** Grades PreK to 12 Education

Courses > **Grade Group:** Grades 6 to 8 Education

Courses > **Subject:** Computer Education >

**SubSubject:** General >

**Abbreviated Title:** M/J COMP SCI DISC

**Course Length:** Year (Y)

**Course Level:** 2

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# M/J Computer Science Discoveries 1 (#0200010) 2018 - 2022

(current)

## Course Standards

Name	Description
SC.68.CS-CC.1.1:	Demonstrate an ability to communicate appropriately through various online tools.
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SC.68.CS-CP.3.2:	Create online content (e.g., webpage, blog, digital portfolio, multimedia), using advanced design tools.
SC.68.CS-CP.3.3:	Create an artifact (independently and collaboratively) that answers a research question and communicates results and conclusions.
SC.68.CS-CS.1.1:	Examine connections between elements of mathematics and computer science including binary numbers, logic, sets, and functions.
SC.68.CS-CS.1.2:	Create or modify and use a simulation to analyze and illustrate a concept in depth (i.e., use a simulation to illustrate a genetic variation), individually and collaboratively.
SC.68.CS-CS.1.3:	Evaluate what kinds of real-world problems can be solved using modeling and simulation.
SC.68.CS-CS.2.5:	Decompose a problem and create a function for one of its parts at a time (e.g., video game, robot obstacle course, making dinner), individually and collaboratively.
SC.68.CS-CS.2.6:	Create a program that implements an algorithm to achieve a given goal, individually and collaboratively.
SC.68.CS-CS.2.7:	Design solutions that use repetition and two-way selection (e.g., for, while, if/else).
SC.68.CS-CS.2.8:	Recognize that boundaries need to be taken into account for an algorithm to produce correct results.
SC.68.CS-CS.2.10:	Recognize that more than one algorithm can solve a given problem.
SC.68.CS-CS.2.11:	Predict outputs while showing an understanding of inputs.
SC.68.CS-CS.2.13:	Explore a problem domain using iterative development and debugging.
SC.68.CS-CS.6.1:	Explain why some tasks can be accomplished more easily by computers.
SC.68.CS-CS.6.2:	Describe how humans and machines interact to accomplish tasks that cannot be accomplished by either alone.
SC.68.CS-CS.6.3:	Identify novel ways humans interact with computers, including software, probes, sensors, and handheld devices.
SC.68.CS-CS.6.4:	Describe ways in which computers use models of intelligent behavior (e.g., robot motion, speech and language understanding, and computer vision).
SC.68.CS-CS.6.5:	Identify factors that distinguish humans from machines.
SC.68.CS-CS.6.6:	Design and demonstrate the use of a device (e.g., robot, e-textile) to accomplish a task, individually and collaboratively.
SC.68.CS-PC.1.1:	Recognize and describe legal and ethical behaviors when using information and technology and describe the consequences of misuse.
SC.68.CS-PC.1.2:	Describe and use safe and appropriate practices when participating in online communities (e.g., discussion groups, blogs, and social networking sites).
SC.68.CS-PC.1.3:	Evaluate the proper use and operation of security technologies (e.g., passwords, virus protection software, spam filters, pop-up blockers, and cookies).
SC.68.CS-PC.1.4:	Recognize the impacts and consequences of plagiarism on the development of creative works, projects, publications and online content.
SC.68.CS-PC.2.1:	Analyze the positive and negative impacts of computing, social networking and web technologies on human culture.
SC.68.CS-PC.2.2:	Explain the possible consequences of cyberbullying and inappropriate use of social media on personal life and society.
SC.68.CS-PC.2.3:	Describe the influence of access to information technologies over time and the effects those changes have had on education, the workplace, and the global society.
SC.68.CS-PC.2.8:	Identify interdisciplinary careers that are enhanced by computer science.
LAFS.6.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.</li> <li>c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.</li> <li>d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.</li> </ul>
LAFS.6.SL.1.2:	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
LAFS.6.SL.1.3:	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.
LAFS.6.SL.2.4:	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.6.SL.2.5:	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.4.10:	By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.
LAFS.7.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others’ ideas and expressing their own clearly. <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.</li> <li>c. Pose questions that elicit elaboration and respond to others’ questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.</li> <li>d. Acknowledge new information expressed by others and, when warranted, modify their own views.</li> </ul>
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
LAFS.7.SL.1.3:	Delineate a speaker’s argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.7.SL.2.5:	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
LAFS.8.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others’ ideas and expressing their own clearly. <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.</li> <li>c. Pose questions that connect the ideas of several speakers and respond to others’ questions and comments with relevant evidence, observations, and ideas.</li> <li>d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.</li> </ul>
LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.
LAFS.8.SL.1.3:	Delineate a speaker’s argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.
LAFS.8.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.8.SL.2.5:	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
MAFS.K12.MP.1.1:	<p><b>Make sense of problems and persevere in solving them.</b></p> <p>Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Reason abstractly and quantitatively.</b></p> <p>Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.</p> <p><b>Standard Relation to Course: Supporting</b></p>
MAFS.K12.MP.2.1:	<p><b>Construct viable arguments and critique the reasoning of others.</b></p> <p>Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Model with mathematics.</b></p> <p>Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In</p>

MAFS.K12.MP.4.1:	<p>early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.</p> <p><b>Standard Relation to Course: Supporting</b>  <b>Use appropriate tools strategically.</b></p>
MAFS.K12.MP.5.1:	<p>Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.</p> <p><b>Standard Relation to Course: Supporting</b>  <b>Attend to precision.</b></p>
MAFS.K12.MP.6.1:	<p>Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.</p> <p><b>Standard Relation to Course: Supporting</b>  <b>Look for and make use of structure.</b></p>
MAFS.K12.MP.7.1:	<p>Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see <math>7 \times 8</math> equals the well remembered <math>7 \times 5 + 7 \times 3</math>, in preparation for learning about the distributive property. In the expression <math>x^2 + 9x + 14</math>, older students can see the 14 as <math>2 \times 7</math> and the 9 as <math>2 + 7</math>. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see <math>5 - 3(x - y)^2</math> as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers <math>x</math> and <math>y</math>.</p> <p><b>Standard Relation to Course: Supporting</b>  <b>Look for and express regularity in repeated reasoning.</b></p>
MAFS.K12.MP.8.1:	<p>Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through <math>(1, 2)</math> with slope 3, middle school students might abstract the equation <math>(y - 2)/(x - 1) = 3</math>. Noticing the regularity in the way terms cancel when expanding <math>(x - 1)(x + 1)</math>, <math>(x - 1)(x^2 + x + 1)</math>, and <math>(x - 1)(x^3 + x^2 + x + 1)</math> might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.</p> <p><b>Standard Relation to Course: Supporting</b></p>
ELD.K12.ELL.SI.1:	<p>English language learners communicate for social and instructional purposes within the school setting.</p>

## General Course Information and Notes

### VERSION DESCRIPTION

#### PURPOSE

Computing is so fundamental to understanding and participating in society that it is valuable for every student to learn as part of a modern education. Computer science can be viewed as a liberal art, a subject that provides students with a critical lens for interpreting the world around them. Computer science prepares all students to be active and informed contributors to our increasingly technological society whether they pursue careers in technology or not. Computer science can be life-changing, not just skill training.

Students learn best when they are intrinsically motivated. This course prioritizes learning experiences that are active, relevant to students' lives, and provide students authentic choice. Students are encouraged to be curious, solve personally relevant problems and to express themselves through creation. Learning is an inherently social activity, so the course is designed to interweave lessons with discussions, presentations, peer feedback, and shared reflections. As students proceed through the pathway, the structures increasingly shift responsibility to students to formulate their own questions, develop their own solutions, and critique their work.

It is also critical to diversify the technology workforce. Addressing inequities within the field of computer science is critical to bringing computer science to all students. The tools and strategies in this course will help teachers understand and address well-known equity gaps within the field. All students can succeed in computer science when given the right supports and opportunities, regardless of prior knowledge.

#### OVERVIEW AND GOALS

Computer Science Discoveries 1 introduces students to computer science as a vehicle for problem solving, communication, and personal expression. The course focuses

on the visible aspects of computing and computer science and encourages students to see where computer science exists around them and how they can engage with it as a tool for exploration and expression.

#### Additional Notes - Pedagogical Approach to Learning: Teacher as Lead Learner

What is the Lead Learner approach?

As the lead learner, the teacher role shifts from being the source of knowledge to that of a leader in seeking knowledge. The lead learner's mantra is: "I may not know the answer, but I know that together we can figure it out."

The philosophy of the lead learner strategy is that students can benefit from having a model to demonstrate the learning process. Being a lead learner doesn't discount the need for a teacher to develop computer science content expertise, but it does allow for an environment of openness with students about the teacher learning process. Modeling and teaching *how to learn* are the most important factors to consider in order to be successful with this style of teaching and learning.

The lead learner technique represents good teaching practice in general. One important role of the teacher in the Computer Science Discoveries classroom is to model excitement about investigating how things work by asking motivating questions about why things work the way they do or are the way they are. With teacher guidance, students will learn how to hypothesize; ask questions of peers; test, evaluate, and refine solutions collaboratively; seek out resources; analyze data; and write clear and cogent code.

#### English Language Arts (ELA) Standards Special Notes Section:

Teachers are required to provide speaking and listening instruction that allows students to communicate information, ideas and concepts for academic success in the content area. Within this course you will find standards specific to the 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grade ranges, the appropriate standards for the grade should be utilized.

#### English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

<https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

#### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE) will need modifications to meet their needs. Modifications change the outcomes and or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course.

#### Additional Resources

Additional resources and a free curriculum that may be utilized for this course can be found at <https://curriculum.code.org/csd-18/> and <https://codehs.com/info/states/florida>.

## QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

In order for this course to be taught with fidelity teachers without a computer science certification or related postsecondary coursework should, at a minimum, have completed a course in computer science such as those offered through a MOOC from a reputable institution or by attending training such as those offered by code.org.

## GENERAL INFORMATION

**Course Number:** 0200010

**Course Path: Section:** Grades PreK to 12 Education

Courses > **Grade Group:** Grades 6 to 8 Education

Courses > **Subject:** Computer Education >

**SubSubject:** General >

**Abbreviated Title:** M/J COMP SCI DISC 1

**Course Length:** Semester (S)

**Course Type:** Elective Course

**Course Level:** 2

**Course Status:** Course Approved

**Grade Level(s):** 6,7,8

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)



# M/J Computer Science Discoveries 1 (#0200010) 2022 - And

Beyond

## Course Standards

Name	Description
SC.68.CS-CC.1.1:	Demonstrate an ability to communicate appropriately through various online tools.
SC.68.CS-CC.1.2:	Apply productivity and or multimedia tools for local and global group collaboration.
SC.68.CS-CC.1.3:	Design, develop, and publish a collaborative digital product using a variety of digital tools and media-rich resources that demonstrate and communicate concepts to inform, persuade, and/or entertain.
SC.68.CS-CP.2.1:	Develop problem solutions using visual representations of problem states, structures and data.
SC.68.CS-CP.2.2:	Evaluate the logical flow of a step-by-step program by acting it out through computer-free activities.
SC.68.CS-CP.2.3:	Develop problem solutions using a block programming language, including all of the following: looping behavior, conditional statements, expressions, variables, and functions.
SC.68.CS-CP.2.4:	Develop problem solutions using a programming language, including all of the following: looping behavior, conditional statements, expressions, variables, and functions.
SC.68.CS-CP.3.1:	Select appropriate tools and technology resources to accomplish a variety of tasks and solve problems.
SC.68.CS-CP.3.2:	Create online content (e.g., webpage, blog, digital portfolio, multimedia), using advanced design tools.
SC.68.CS-CP.3.3:	Create an artifact (independently and collaboratively) that answers a research question and communicates results and conclusions.
SC.68.CS-CS.1.1:	Examine connections between elements of mathematics and computer science including binary numbers, logic, sets, and functions.
SC.68.CS-CS.1.2:	Create or modify and use a simulation to analyze and illustrate a concept in depth (i.e., use a simulation to illustrate a genetic variation), individually and collaboratively.
SC.68.CS-CS.1.3:	Evaluate what kinds of real-world problems can be solved using modeling and simulation.
SC.68.CS-CS.2.5:	Decompose a problem and create a function for one of its parts at a time (e.g., video game, robot obstacle course, making dinner), individually and collaboratively.
SC.68.CS-CS.2.6:	Create a program that implements an algorithm to achieve a given goal, individually and collaboratively.
SC.68.CS-CS.2.7:	Design solutions that use repetition and two-way selection (e.g., for, while, if/else).
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SC.68.CS-CS.2.11:	Predict outputs while showing an understanding of inputs.
SC.68.CS-CS.2.13:	Explore a problem domain using iterative development and debugging.
SC.68.CS-CS.6.1:	Explain why some tasks can be accomplished more easily by computers.
SC.68.CS-CS.6.2:	Describe how humans and machines interact to accomplish tasks that cannot be accomplished by either alone.
SC.68.CS-CS.6.3:	Identify novel ways humans interact with computers, including software, probes, sensors, and handheld devices.
SC.68.CS-CS.6.4:	Describe ways in which computers use models of intelligent behavior (e.g., robot motion, speech and language understanding, and computer vision).
SC.68.CS-CS.6.5:	Identify factors that distinguish humans from machines.
SC.68.CS-CS.6.6:	Design and demonstrate the use of a device (e.g., robot, e-textile) to accomplish a task, individually and collaboratively.
SC.68.CS-PC.1.1:	Recognize and describe legal and ethical behaviors when using information and technology and describe the consequences of misuse.
SC.68.CS-PC.1.2:	Describe and use safe and appropriate practices when participating in online communities (e.g., discussion groups, blogs, and social networking sites).
SC.68.CS-PC.1.3:	Evaluate the proper use and operation of security technologies (e.g., passwords, virus protection software, spam filters, pop-up blockers, and cookies).
SC.68.CS-PC.1.4:	Recognize the impacts and consequences of plagiarism on the development of creative works, projects, publications and online content.
SC.68.CS-PC.2.1:	Analyze the positive and negative impacts of computing, social networking and web technologies on human culture.
SC.68.CS-PC.2.2:	Explain the possible consequences of cyberbullying and inappropriate use of social media on personal life and society.
SC.68.CS-PC.2.3:	Describe the influence of access to information technologies over time and the effects those changes have had on education, the workplace, and the global society.
SC.68.CS-PC.2.8:	Identify interdisciplinary careers that are enhanced by computer science.
MA.K12.MTR.1.1:	<p>Mathematicians who participate in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Analyze the problem in a way that makes sense given the task.</li> <li>Ask questions that will help with solving the task.</li> <li>Build perseverance by modifying methods as needed while solving a challenging task.</li> <li>Stay engaged and maintain a positive mindset when working to solve tasks.</li> <li>Help and support each other when attempting a new method or approach.</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <p><b>Clarifications:</b></p> <p>Teachers who encourage students to participate actively in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Cultivate a community of growth mindset learners.</li> <li>Foster perseverance in students by choosing tasks that are challenging.</li> <li>Develop students' ability to analyze and problem solve.</li> <li>Recognize students' effort when solving challenging problems.</li> </ul> </div>
	<p>Demonstrate understanding by representing problems in multiple ways.</p> <p>Mathematicians who demonstrate understanding by representing problems in multiple ways:</p>

MA.K12.MTR.2.1:

- Build understanding through modeling and using manipulatives.
- Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
- Progress from modeling problems with objects and drawings to using algorithms and equations.
- Express connections between concepts and representations.
- Choose a representation based on the given context or purpose.

**Clarifications:**

Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:

- Help students make connections between concepts and representations.
- Provide opportunities for students to use manipulatives when investigating concepts.
- Guide students from concrete to pictorial to abstract representations as understanding progresses.
- Show students that various representations can have different purposes and can be useful in different situations.

MA.K12.MTR.3.1:

Complete tasks with mathematical fluency.  
Mathematicians who complete tasks with mathematical fluency:

- Select efficient and appropriate methods for solving problems within the given context.
- Maintain flexibility and accuracy while performing procedures and mental calculations.
- Complete tasks accurately and with confidence.
- Adapt procedures to apply them to a new context.
- Use feedback to improve efficiency when performing calculations.

**Clarifications:**

Teachers who encourage students to complete tasks with mathematical fluency:

- Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
- Offer multiple opportunities for students to practice efficient and generalizable methods.
- Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

MA.K12.MTR.4.1:

Engage in discussions that reflect on the mathematical thinking of self and others.  
Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:

- Communicate mathematical ideas, vocabulary and methods effectively.
- Analyze the mathematical thinking of others.
- Compare the efficiency of a method to those expressed by others.
- Recognize errors and suggest how to correctly solve the task.
- Justify results by explaining methods and processes.
- Construct possible arguments based on evidence.

**Clarifications:**

Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:

- Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
- Create opportunities for students to discuss their thinking with peers.
- Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
- Develop students' ability to justify methods and compare their responses to the responses of their peers.

MA.K12.MTR.5.1:

Use patterns and structure to help understand and connect mathematical concepts.  
Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

- Focus on relevant details within a problem.
- Create plans and procedures to logically order events, steps or ideas to solve problems.
- Decompose a complex problem into manageable parts.
- Relate previously learned concepts to new concepts.
- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

**Clarifications:**

Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

MA.K12.MTR.6.1:

Assess the reasonableness of solutions.  
Mathematicians who assess the reasonableness of solutions:

- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

**Clarifications:**

Teachers who encourage students to assess the reasonableness of solutions:

- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

Apply mathematics to real-world contexts.  
Mathematicians who apply mathematics to real-world contexts:

MA.K12.MTR.7.1:	<ul style="list-style-type: none"> <li>• Connect mathematical concepts to everyday experiences.</li> <li>• Use models and methods to understand, represent and solve problems.</li> <li>• Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to apply mathematics to real-world contexts:</p> <ul style="list-style-type: none"> <li>• Provide opportunities for students to create models, both concrete and abstract, and perform investigations.</li> <li>• Challenge students to question the accuracy of their models and methods.</li> <li>• Support students as they validate conclusions by comparing them to the given situation.</li> <li>• Indicate how various concepts can be applied to other disciplines.</li> </ul>
ELA.K12.EE.1.1:	<p>Cite evidence to explain and justify reasoning.</p> <p><b>Clarifications:</b> K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.</p>
ELA.K12.EE.2.1:	<p>Read and comprehend grade-level complex texts proficiently.</p> <p><b>Clarifications:</b> See Text Complexity for grade-level complexity bands and a text complexity rubric.</p>
ELA.K12.EE.3.1:	<p>Make inferences to support comprehension.</p> <p><b>Clarifications:</b> Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.</p>
ELA.K12.EE.4.1:	<p>Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.</p> <p><b>Clarifications:</b> In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _____ because _____." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.</p>
ELA.K12.EE.5.1:	<p>Use the accepted rules governing a specific format to create quality work.</p> <p><b>Clarifications:</b> Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.</p>
ELA.K12.EE.6.1:	<p>Use appropriate voice and tone when speaking or writing.</p> <p><b>Clarifications:</b> In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.</p>
ELD.K12.ELL.SI.1:	<p>English language learners communicate for social and instructional purposes within the school setting.</p>

## General Course Information and Notes

### VERSION DESCRIPTION

#### PURPOSE

Computing is so fundamental to understanding and participating in society that it is valuable for every student to learn as part of a modern education. Computer science can be viewed as a liberal art, a subject that provides students with a critical lens for interpreting the world around them. Computer science prepares all students to be active and informed contributors to our increasingly technological society whether they pursue careers in technology or not. Computer science can be life-changing, not just skill training.

Students learn best when they are intrinsically motivated. This course prioritizes learning experiences that are active, relevant to students' lives, and provide students authentic choice. Students are encouraged to be curious, solve personally relevant problems and to express themselves through creation. Learning is an inherently social activity, so the course is designed to interweave lessons with discussions, presentations, peer feedback, and shared reflections. As students proceed through the pathway, the structures increasingly shift responsibility to students to formulate their own questions, develop their own solutions, and critique their work.

It is also critical to diversify the technology workforce. Addressing inequities within the field of computer science is critical to bringing computer science to all students. The tools and strategies in this course will help teachers understand and address well-known equity gaps within the field. All students can succeed in computer science when

given the right supports and opportunities, regardless of prior knowledge.

## OVERVIEW AND GOALS

Computer Science Discoveries 1 introduces students to computer science as a vehicle for problem solving, communication, and personal expression. The course focuses on the visible aspects of computing and computer science and encourages students to see where computer science exists around them and how they can engage with it as a tool for exploration and expression.

### Additional Notes - Pedagogical Approach to Learning: Teacher as Lead Learner

What is the Lead Learner approach?

As the lead learner, the teacher role shifts from being the source of knowledge to that of a leader in seeking knowledge. The lead learner's mantra is: "I may not know the answer, but I know that together we can figure it out."

The philosophy of the lead learner strategy is that students can benefit from having a model to demonstrate the learning process. Being a lead learner doesn't discount the need for a teacher to develop computer science content expertise, but it does allow for an environment of openness with students about the teacher learning process. Modeling and teaching *how to learn* are the most important factors to consider in order to be successful with this style of teaching and learning.

The lead learner technique represents good teaching practice in general. One important role of the teacher in the Computer Science Discoveries classroom is to model excitement about investigating how things work by asking motivating questions about why things work the way they do or are the way they are. With teacher guidance, students will learn how to hypothesize; ask questions of peers; test, evaluate, and refine solutions collaboratively; seek out resources; analyze data; and write clear and cogent code.

### Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit [https://www.cpalms.org/Standards/BEST\\_Standards.aspx](https://www.cpalms.org/Standards/BEST_Standards.aspx) and select the appropriate B.E.S.T. Standards package.

### English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

<https://cpalmsmediaproduct.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE) will need modifications to meet their needs. Modifications change the outcomes and or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course.

### Additional Resources

Additional resources and a free curriculum that may be utilized for this course can be found at <https://curriculum.code.org/csd-18/> and <https://codehs.com/info/states/florida>.

## QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

### Any field when certification reflects a bachelor or higher degree.

In order for this course to be taught with fidelity teachers without a computer science certification or related postsecondary coursework should, at a minimum, have completed a course in computer science such as those offered through a MOOC from a reputable institution or by attending training such as those offered by code.org.

## GENERAL INFORMATION

**Course Number:** 0200010

**Course Path: Section:** Grades PreK to 12 Education  
Courses > **Grade Group:** Grades 6 to 8 Education  
Courses > **Subject:** Computer Education >  
**SubSubject:** General >  
**Abbreviated Title:** M/J COMP SCI DISC 1  
**Course Length:** Semester (S)  
**Course Level:** 2

**Course Type:** Elective Course

**Course Status:** State Board Approved

**Grade Level(s):** 6,7,8

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# M/J Computer Science Discoveries 2 (#0200020) 2018 - 2022

(current)

## Course Standards

Name	Description
SC.68.CS-CC.1.3:	Design, develop, and publish a collaborative digital product using a variety of digital tools and media-rich resources that demonstrate and communicate concepts to inform, persuade, and/or entertain.
SC.68.CS-CP.2.1:	Develop problem solutions using visual representations of problem states, structures and data.
SC.68.CS-CP.2.2:	Evaluate the logical flow of a step-by-step program by acting it out through computer-free activities.
SC.68.CS-CP.3.1:	Select appropriate tools and technology resources to accomplish a variety of tasks and solve problems.
SC.68.CS-CP.3.2:	Create online content (e.g., webpage, blog, digital portfolio, multimedia), using advanced design tools.
SC.68.CS-CP.3.3:	Create an artifact (independently and collaboratively) that answers a research question and communicates results and conclusions.
SC.68.CS-CS.1.1:	Examine connections between elements of mathematics and computer science including binary numbers, logic, sets, and functions.
SC.68.CS-CS.1.2:	Create or modify and use a simulation to analyze and illustrate a concept in depth (i.e., use a simulation to illustrate a genetic variation), individually and collaboratively.
SC.68.CS-CS.1.3:	Evaluate what kinds of real-world problems can be solved using modeling and simulation.
SC.68.CS-CS.1.4:	Interact with content-specific models and simulations to support learning, research and problem solving (e.g., immigration, international trade, invasive species).
SC.68.CS-CS.2.2:	Solve real-life issues in science and engineering (i.e., generalize a solution to open-ended problems) using computational thinking skills.
SC.68.CS-CS.2.4:	Organize and display information in a variety of ways such as number formats (e.g., scientific notation, percentages, and exponents), charts, tables and graphs.
SC.68.CS-CS.2.6:	Create a program that implements an algorithm to achieve a given goal, individually and collaboratively.
SC.68.CS-CS.2.7:	Design solutions that use repetition and two-way selection (e.g., for, while, if/else).
SC.68.CS-CS.2.9:	Identify simple data types and data structures.
SC.68.CS-CS.2.12:	Select the 'best' algorithm based on a given criteria (e.g., time, resource, and accessibility) to solve a problem, individually and collaboratively.
SC.68.CS-CS.2.13:	Explore a problem domain using iterative development and debugging.
SC.68.CS-CS.2.14:	Perform program tracing to predict the behavior of programs.
SC.68.CS-CS.3.1:	Explain why different file types exist (e.g., formats for word processing, images, music, and three-dimensional drawings).
SC.68.CS-CS.3.2:	Identify the kinds of content associated with different file types.
SC.68.CS-CS.3.3:	Integrate information from multiple file formats into a single artifact.
SC.68.CS-CS.4.1:	Identify and describe the function of the main internal parts of a basic computing device (e.g., motherboard, hard drive, Central Processing Unit - CPU).
SC.68.CS-CS.4.2:	Describe the main functions of an operating system and explain how an operating system provides user and system services (e.g., user interface, IO device management, task management).
SC.68.CS-CS.4.3:	Describe the relationships between hardware and software (e.g., BIOS, operating systems and firmware).
SC.68.CS-CS.4.4:	Identify and describe the use of sensors, actuators, and control systems in an embodied system (e.g., a robot, an e-textile, installation art, and a smart room).
SC.68.CS-CS.4.5:	Evaluate a hardware or software problem and construct the steps involved in diagnosing and solving the problem (e.g., power, connections, application window or toolbar, cables, ports, network resources, video, and sound).
SC.68.CS-CS.4.6:	Describe the essential characteristics of a software artifact.
SC.68.CS-CS.4.7:	Describe the major components and functions of computer systems and networks.
SC.68.CS-CS.4.8:	Identify software used to support specialized forms of human-computer interaction.
SC.68.CS-CS.6.1:	Explain why some tasks can be accomplished more easily by computers.
SC.68.CS-CS.6.2:	Describe how humans and machines interact to accomplish tasks that cannot be accomplished by either alone.
SC.68.CS-CS.6.3:	Identify novel ways humans interact with computers, including software, probes, sensors, and handheld devices.
SC.68.CS-CS.6.4:	Describe ways in which computers use models of intelligent behavior (e.g., robot motion, speech and language understanding, and computer vision).
SC.68.CS-CS.6.5:	Identify factors that distinguish humans from machines.
SC.68.CS-CS.6.6:	Design and demonstrate the use of a device (e.g., robot, e-textile) to accomplish a task, individually and collaboratively.
SC.68.CS-PC.1.1:	Recognize and describe legal and ethical behaviors when using information and technology and describe the consequences of misuse.
SC.68.CS-PC.1.2:	Describe and use safe and appropriate practices when participating in online communities (e.g., discussion groups, blogs, and social networking sites).
SC.68.CS-PC.1.3:	Evaluate the proper use and operation of security technologies (e.g., passwords, virus protection software, spam filters, pop-up blockers, and cookies).
SC.68.CS-PC.1.4:	Recognize the impacts and consequences of plagiarism on the development of creative works, projects, publications and online content.
SC.68.CS-PC.2.4:	Describe how the unequal net-neutrality and distribution of computing resources in a global economy raises issues of equity, access, and power.
SC.68.CS-PC.2.5:	Describe ways in which adaptive technologies can assist users with special needs to function in their daily lives.
SC.68.CS-PC.2.6:	Identify and discuss the technology skills needed in the workplace.
SC.68.CS-PC.2.7:	Interpret writings and/or communications which use developmentally appropriate terminology.
	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. <ol style="list-style-type: none"> <li>a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> </ol>

LAFS.6.SL.1.1:	<ul style="list-style-type: none"> <li>b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.</li> <li>c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.</li> <li>d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.</li> </ul>
LAFS.6.SL.1.2:	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
LAFS.6.SL.1.3:	<b>Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.</b>
LAFS.6.SL.2.4:	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.6.SL.2.5:	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.RST.4.10:	<b>By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.</b>
LAFS.7.SL.1.1:	<p>Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.</p> <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.</li> <li>c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.</li> <li>d. Acknowledge new information expressed by others and, when warranted, modify their own views.</li> </ul>
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
LAFS.7.SL.1.3:	<b>Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.</b>
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.7.SL.2.5:	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
LAFS.8.SL.1.1:	<p>Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.</p> <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.</li> <li>c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.</li> <li>d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.</li> </ul>
LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.
LAFS.8.SL.1.3:	<b>Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.</b>
LAFS.8.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.8.SL.2.5:	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
MAFS.K12.MP.1.1:	<p><b>Make sense of problems and persevere in solving them.</b></p> <p>Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Reason abstractly and quantitatively.</b></p> <p>Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Construct viable arguments and critique the reasoning of others.</b></p> <p>Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing</p>
MAFS.K12.MP.2.1:	

MAFS.K12.MP.3.1:	<p>arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Model with mathematics.</b></p>
MAFS.K12.MP.4.1:	<p>Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Use appropriate tools strategically.</b></p>
MAFS.K12.MP.5.1:	<p>Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Attend to precision.</b></p>
MAFS.K12.MP.6.1:	<p>Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Look for and make use of structure.</b></p>
MAFS.K12.MP.7.1:	<p>Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see <math>7 \times 8</math> equals the well remembered <math>7 \times 5 + 7 \times 3</math>, in preparation for learning about the distributive property. In the expression <math>x^2 + 9x + 14</math>, older students can see the 14 as <math>2 \times 7</math> and the 9 as <math>2 + 7</math>. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see <math>5 - 3(x - y)^2</math> as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers <math>x</math> and <math>y</math>.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Look for and express regularity in repeated reasoning.</b></p>
MAFS.K12.MP.8.1:	<p>Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through <math>(1, 2)</math> with slope 3, middle school students might abstract the equation <math>(y - 2)/(x - 1) = 3</math>. Noticing the regularity in the way terms cancel when expanding <math>(x - 1)(x + 1)</math>, <math>(x - 1)(x^2 + x + 1)</math>, and <math>(x - 1)(x^3 + x^2 + x + 1)</math> might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.</p> <p><b>Standard Relation to Course: Supporting</b></p>
ELD.K12.ELL.SI.1:	<p>English language learners communicate for social and instructional purposes within the school setting.</p>

## General Course Information and Notes

### VERSION DESCRIPTION

#### PURPOSE

Computing is so fundamental to understanding and participating in society that it is valuable for every student to learn as part of a modern education. Computer science can be viewed as a liberal art, a subject that provides students with a critical lens for interpreting the world around them. Computer science prepares all students to be

active and informed contributors to our increasingly technological society whether they pursue careers in technology or not. Computer science can be life-changing, not just skill training.

Students learn best when they are intrinsically motivated. This course prioritizes learning experiences that are active, relevant to students' lives, and provide students authentic choice. Students are encouraged to be curious, solve personally relevant problems and to express themselves through creation. Learning is an inherently social activity, so the course is designed to interweave lessons with discussions, presentations, peer feedback, and shared reflections. As students proceed through the pathway, the structures increasingly shift responsibility to students to formulate their own questions, develop their own solutions, and critique their work.

It is also critical to diversify the technology workforce. Addressing inequities within the field of computer science is critical to bringing computer science to all students. The tools and strategies in this course will help teachers understand and address well-known equity gaps within the field. All students can succeed in computer science when given the right supports and opportunities, regardless of prior knowledge.

## OVERVIEW AND GOALS

Computer Science Discoveries 2 introduces students to computer science as a vehicle for problem solving, communication, and personal expression. The course focuses on the visible aspects of computing and computer science and encourages students to see where computer science exists around them and how they can engage with it as a tool for exploration and expression. Centering on the immediately observable and personally applicable elements of computer science, the course asks students to look outward and explore the impact of computer science on society. Students should see how a thorough student-centered design process produces a better application, how data is used to address problems that affect large numbers of people, and how physical computing with circuit boards allows computers to collect, input and return output in a variety of ways.

### Additional Notes - Pedagogical Approach to Learning: Teacher as Lead Learner

What is the Lead Learner approach?

As the lead learner, the teacher role shifts from being the source of knowledge to that of a leader in seeking knowledge. The lead learner's mantra is: "I may not know the answer, but I know that together we can figure it out."

The philosophy of the lead learner strategy is that students can benefit from having a model to demonstrate the learning process. Being a lead learner doesn't discount the need for a teacher to develop computer science content expertise, but it does allow for an environment of openness with students about the teacher learning process. Modeling and teaching *how to learn* are the most important factors to consider in order to be successful with this style of teaching and learning.

The lead learner technique represents good teaching practice in general. One important role of the teacher in the Computer Science Discoveries classroom is to model excitement about investigating how things work by asking motivating questions about why things work the way they do or are the way they are. With teacher guidance, students will learn how to hypothesize; ask questions of peers; test, evaluate, and refine solutions collaboratively; seek out resources; analyze data; and write clear and cogent code.

### English Language Arts (ELA) Standards Special Notes Section:

Teachers are required to provide speaking and listening instruction that allows students to communicate information, ideas and concepts for academic success in the content area. Within this course you will find standards specific to the 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grade ranges, the appropriate standards for the grade should be utilized.

### English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

<https://cpalmsmediaproduct.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE) will need modifications to meet their needs. Modifications change the outcomes and or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course.

### Additional Resources

Additional resources and a free curriculum that may be utilized for this course can be found at <https://curriculum.code.org/csd-18/> and <https://codehs.com/info/states/florida>.

## QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

In order for this course to be taught with fidelity teachers without a computer science certification or related postsecondary coursework should, at a minimum, have completed a course in computer science such as those offered through a MOOC from a reputable institution or by attending training such as those offered by code.org.

## GENERAL INFORMATION

Course Path: Section: Grades PreK to 12 Education

**Course Number:** 0200020

Courses > **Grade Group:** Grades 6 to 8 Education

Courses > **Subject:** Computer Education >

**SubSubject:** General >

**Abbreviated Title:** M/J COMP SCI DISC 2

**Course Length:** Semester (S)

**Course Level:** 2

**Course Type:** Elective Course

**Course Status:** Course Approved

**Grade Level(s):** 6,7,8

## **Educator Certifications**

Computer Science (Elementary and Secondary Grades K-12)

# M/J Computer Science Discoveries 2 (#0200020) 2022 - And

Beyond

## Course Standards

Name	Description
SC.68.CS-CC.1.3:	Design, develop, and publish a collaborative digital product using a variety of digital tools and media-rich resources that demonstrate and communicate concepts to inform, persuade, and/or entertain.
SC.68.CS-CP.2.1:	Develop problem solutions using visual representations of problem states, structures and data.
SC.68.CS-CP.2.2:	Evaluate the logical flow of a step-by-step program by acting it out through computer-free activities.
SC.68.CS-CP.3.1:	Select appropriate tools and technology resources to accomplish a variety of tasks and solve problems.
SC.68.CS-CP.3.2:	Create online content (e.g., webpage, blog, digital portfolio, multimedia), using advanced design tools.
SC.68.CS-CP.3.3:	Create an artifact (independently and collaboratively) that answers a research question and communicates results and conclusions.
SC.68.CS-CS.1.1:	Examine connections between elements of mathematics and computer science including binary numbers, logic, sets, and functions.
SC.68.CS-CS.1.2:	Create or modify and use a simulation to analyze and illustrate a concept in depth (i.e., use a simulation to illustrate a genetic variation), individually and collaboratively.
SC.68.CS-CS.1.3:	Evaluate what kinds of real-world problems can be solved using modeling and simulation.
SC.68.CS-CS.1.4:	Interact with content-specific models and simulations to support learning, research and problem solving (e.g., immigration, international trade, invasive species).
SC.68.CS-CS.2.2:	Solve real-life issues in science and engineering (i.e., generalize a solution to open-ended problems) using computational thinking skills.
SC.68.CS-CS.2.4:	Organize and display information in a variety of ways such as number formats (e.g., scientific notation, percentages, and exponents), charts, tables and graphs.
SC.68.CS-CS.2.6:	Create a program that implements an algorithm to achieve a given goal, individually and collaboratively.
SC.68.CS-CS.2.7:	Design solutions that use repetition and two-way selection (e.g., for, while, if/else).
SC.68.CS-CS.2.9:	Identify simple data types and data structures.
SC.68.CS-CS.2.12:	Select the 'best' algorithm based on a given criteria (e.g., time, resource, and accessibility) to solve a problem, individually and collaboratively.
SC.68.CS-CS.2.13:	Explore a problem domain using iterative development and debugging.
SC.68.CS-CS.2.14:	Perform program tracing to predict the behavior of programs.
SC.68.CS-CS.3.1:	Explain why different file types exist (e.g., formats for word processing, images, music, and three-dimensional drawings).
SC.68.CS-CS.3.2:	Identify the kinds of content associated with different file types.
SC.68.CS-CS.3.3:	Integrate information from multiple file formats into a single artifact.
SC.68.CS-CS.4.1:	Identify and describe the function of the main internal parts of a basic computing device (e.g., motherboard, hard drive, Central Processing Unit - CPU).
SC.68.CS-CS.4.2:	Describe the main functions of an operating system and explain how an operating system provides user and system services (e.g., user interface, IO device management, task management).
SC.68.CS-CS.4.3:	Describe the relationships between hardware and software (e.g., BIOS, operating systems and firmware).
SC.68.CS-CS.4.4:	Identify and describe the use of sensors, actuators, and control systems in an embodied system (e.g., a robot, an e-textile, installation art, and a smart room).
SC.68.CS-CS.4.5:	Evaluate a hardware or software problem and construct the steps involved in diagnosing and solving the problem (e.g., power, connections, application window or toolbar, cables, ports, network resources, video, and sound).
SC.68.CS-CS.4.6:	Describe the essential characteristics of a software artifact.
SC.68.CS-CS.4.7:	Describe the major components and functions of computer systems and networks.
SC.68.CS-CS.4.8:	Identify software used to support specialized forms of human-computer interaction.
SC.68.CS-CS.6.1:	Explain why some tasks can be accomplished more easily by computers.
SC.68.CS-CS.6.2:	Describe how humans and machines interact to accomplish tasks that cannot be accomplished by either alone.
SC.68.CS-CS.6.3:	Identify novel ways humans interact with computers, including software, probes, sensors, and handheld devices.
SC.68.CS-CS.6.4:	Describe ways in which computers use models of intelligent behavior (e.g., robot motion, speech and language understanding, and computer vision).
SC.68.CS-CS.6.5:	Identify factors that distinguish humans from machines.
SC.68.CS-CS.6.6:	Design and demonstrate the use of a device (e.g., robot, e-textile) to accomplish a task, individually and collaboratively.
SC.68.CS-PC.1.1:	Recognize and describe legal and ethical behaviors when using information and technology and describe the consequences of misuse.
SC.68.CS-PC.1.2:	Describe and use safe and appropriate practices when participating in online communities (e.g., discussion groups, blogs, and social networking sites).
SC.68.CS-PC.1.3:	Evaluate the proper use and operation of security technologies (e.g., passwords, virus protection software, spam filters, pop-up blockers, and cookies).
SC.68.CS-PC.1.4:	Recognize the impacts and consequences of plagiarism on the development of creative works, projects, publications and online content.
SC.68.CS-PC.2.4:	Describe how the unequal net-neutrality and distribution of computing resources in a global economy raises issues of equity, access, and power.
SC.68.CS-PC.2.5:	Describe ways in which adaptive technologies can assist users with special needs to function in their daily lives.
SC.68.CS-PC.2.6:	Identify and discuss the technology skills needed in the workplace.
SC.68.CS-PC.2.7:	Interpret writings and/or communications which use developmentally appropriate terminology.
	Mathematicians who participate in effortful learning both individually and with others: <ul style="list-style-type: none"> <li>Analyze the problem in a way that makes sense given the task.</li> <li>Ask questions that will help with solving the task.</li> <li>Build perseverance by modifying methods as needed while solving a challenging task.</li> </ul>

MA.K12.MTR.1.1:	<ul style="list-style-type: none"> <li>Stay engaged and maintain a positive mindset when working to solve tasks.</li> <li>Help and support each other when attempting a new method or approach.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to participate actively in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Cultivate a community of growth mindset learners.</li> <li>Foster perseverance in students by choosing tasks that are challenging.</li> <li>Develop students' ability to analyze and problem solve.</li> <li>Recognize students' effort when solving challenging problems.</li> </ul>
MA.K12.MTR.2.1:	<p>Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Build understanding through modeling and using manipulatives.</li> <li>Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.</li> <li>Progress from modeling problems with objects and drawings to using algorithms and equations.</li> <li>Express connections between concepts and representations.</li> <li>Choose a representation based on the given context or purpose.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Help students make connections between concepts and representations.</li> <li>Provide opportunities for students to use manipulatives when investigating concepts.</li> <li>Guide students from concrete to pictorial to abstract representations as understanding progresses.</li> <li>Show students that various representations can have different purposes and can be useful in different situations.</li> </ul>
MA.K12.MTR.3.1:	<p>Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Select efficient and appropriate methods for solving problems within the given context.</li> <li>Maintain flexibility and accuracy while performing procedures and mental calculations.</li> <li>Complete tasks accurately and with confidence.</li> <li>Adapt procedures to apply them to a new context.</li> <li>Use feedback to improve efficiency when performing calculations.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.</li> <li>Offer multiple opportunities for students to practice efficient and generalizable methods.</li> <li>Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.</li> </ul>
MA.K12.MTR.4.1:	<p>Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Communicate mathematical ideas, vocabulary and methods effectively.</li> <li>Analyze the mathematical thinking of others.</li> <li>Compare the efficiency of a method to those expressed by others.</li> <li>Recognize errors and suggest how to correctly solve the task.</li> <li>Justify results by explaining methods and processes.</li> <li>Construct possible arguments based on evidence.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.</li> <li>Create opportunities for students to discuss their thinking with peers.</li> <li>Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.</li> <li>Develop students' ability to justify methods and compare their responses to the responses of their peers.</li> </ul>
MA.K12.MTR.5.1:	<p>Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:</p> <ul style="list-style-type: none"> <li>Focus on relevant details within a problem.</li> <li>Create plans and procedures to logically order events, steps or ideas to solve problems.</li> <li>Decompose a complex problem into manageable parts.</li> <li>Relate previously learned concepts to new concepts.</li> <li>Look for similarities among problems.</li> <li>Connect solutions of problems to more complicated large-scale situations.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:</p> <ul style="list-style-type: none"> <li>Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.</li> <li>Support students to develop generalizations based on the similarities found among problems.</li> <li>Provide opportunities for students to create plans and procedures to solve problems.</li> <li>Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.</li> </ul>
	<p>Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:</p> <ul style="list-style-type: none"> <li>Estimate to discover possible solutions.</li> <li>Use benchmark quantities to determine if a solution makes sense.</li> </ul>

MA.K12.MTR.6.1:	<ul style="list-style-type: none"> <li>• Check calculations when solving problems.</li> <li>• Verify possible solutions by explaining the methods used.</li> <li>• Evaluate results based on the given context.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to assess the reasonableness of solutions:</p> <ul style="list-style-type: none"> <li>• Have students estimate or predict solutions prior to solving.</li> <li>• Prompt students to continually ask, "Does this solution make sense? How do you know?"</li> <li>• Reinforce that students check their work as they progress within and after a task.</li> <li>• Strengthen students' ability to verify solutions through justifications.</li> </ul>
MA.K12.MTR.7.1:	<p>Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:</p> <ul style="list-style-type: none"> <li>• Connect mathematical concepts to everyday experiences.</li> <li>• Use models and methods to understand, represent and solve problems.</li> <li>• Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to apply mathematics to real-world contexts:</p> <ul style="list-style-type: none"> <li>• Provide opportunities for students to create models, both concrete and abstract, and perform investigations.</li> <li>• Challenge students to question the accuracy of their models and methods.</li> <li>• Support students as they validate conclusions by comparing them to the given situation.</li> <li>• Indicate how various concepts can be applied to other disciplines.</li> </ul>
ELA.K12.EE.1.1:	<p>Cite evidence to explain and justify reasoning.</p> <p><b>Clarifications:</b> K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.</p>
ELA.K12.EE.2.1:	<p>Read and comprehend grade-level complex texts proficiently.</p> <p><b>Clarifications:</b> See Text Complexity for grade-level complexity bands and a text complexity rubric.</p>
ELA.K12.EE.3.1:	<p>Make inferences to support comprehension.</p> <p><b>Clarifications:</b> Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.</p>
ELA.K12.EE.4.1:	<p>Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.</p> <p><b>Clarifications:</b> In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _____ because _____." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.</p>
ELA.K12.EE.5.1:	<p>Use the accepted rules governing a specific format to create quality work.</p> <p><b>Clarifications:</b> Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.</p>
ELA.K12.EE.6.1:	<p>Use appropriate voice and tone when speaking or writing.</p> <p><b>Clarifications:</b> In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.</p>
ELD.K12.ELL.SI.1:	<p>English language learners communicate for social and instructional purposes within the school setting.</p>

## General Course Information and Notes

### VERSION DESCRIPTION

## PURPOSE

Computing is so fundamental to understanding and participating in society that it is valuable for every student to learn as part of a modern education. Computer science can be viewed as a liberal art, a subject that provides students with a critical lens for interpreting the world around them. Computer science prepares all students to be active and informed contributors to our increasingly technological society whether they pursue careers in technology or not. Computer science can be life-changing, not just skill training.

Students learn best when they are intrinsically motivated. This course prioritizes learning experiences that are active, relevant to students' lives, and provide students authentic choice. Students are encouraged to be curious, solve personally relevant problems and to express themselves through creation. Learning is an inherently social activity, so the course is designed to interweave lessons with discussions, presentations, peer feedback, and shared reflections. As students proceed through the pathway, the structures increasingly shift responsibility to students to formulate their own questions, develop their own solutions, and critique their work.

It is also critical to diversify the technology workforce. Addressing inequities within the field of computer science is critical to bringing computer science to all students. The tools and strategies in this course will help teachers understand and address well-known equity gaps within the field. All students can succeed in computer science when given the right supports and opportunities, regardless of prior knowledge.

## OVERVIEW AND GOALS

Computer Science Discoveries 2 introduces students to computer science as a vehicle for problem solving, communication, and personal expression. The course focuses on the visible aspects of computing and computer science and encourages students to see where computer science exists around them and how they can engage with it as a tool for exploration and expression. Centering on the immediately observable and personally applicable elements of computer science, the course asks students to look outward and explore the impact of computer science on society. Students should see how a thorough student-centered design process produces a better application, how data is used to address problems that affect large numbers of people, and how physical computing with circuit boards allows computers to collect, input and return output in a variety of ways.

### Additional Notes - Pedagogical Approach to Learning: Teacher as Lead Learner

What is the Lead Learner approach?

As the lead learner, the teacher role shifts from being the source of knowledge to that of a leader in seeking knowledge. The lead learner's mantra is: "I may not know the answer, but I know that together we can figure it out."

The philosophy of the lead learner strategy is that students can benefit from having a model to demonstrate the learning process. Being a lead learner doesn't discount the need for a teacher to develop computer science content expertise, but it does allow for an environment of openness with students about the teacher learning process. Modeling and teaching *how to learn* are the most important factors to consider in order to be successful with this style of teaching and learning.

The lead learner technique represents good teaching practice in general. One important role of the teacher in the Computer Science Discoveries classroom is to model excitement about investigating how things work by asking motivating questions about why things work the way they do or are the way they are. With teacher guidance, students will learn how to hypothesize; ask questions of peers; test, evaluate, and refine solutions collaboratively; seek out resources; analyze data; and write clear and cogent code.

### Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit [https://www.cpalms.org/Standards/BEST\\_Standards.aspx](https://www.cpalms.org/Standards/BEST_Standards.aspx) and select the appropriate B.E.S.T. Standards package.

### English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

<https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE) will need modifications to meet their needs. Modifications change the outcomes and or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course.

### Additional Resources

Additional resources and a free curriculum that may be utilized for this course can be found at <https://curriculum.code.org/csd-18/> and <https://codehs.com/info/states/florida>.

## QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

### Any field when certification reflects a bachelor or higher degree.

In order for this course to be taught with fidelity teachers without a computer science certification or related postsecondary coursework should, at a minimum, have completed a course in computer science such as those offered through a MOOC from a reputable institution or by attending training such as those offered by code.org.

## GENERAL INFORMATION

**Course Number:** 0200020

**Course Path: Section:** Grades PreK to 12 Education

Courses > **Grade Group:** Grades 6 to 8 Education

Courses > **Subject:** Computer Education >

**SubSubject:** General >

**Abbreviated Title:** M/J COMP SCI DISC 2

**Course Length:** Semester (S)

**Course Level:** 2

**Course Type:** Elective Course

**Course Status:** State Board Approved

**Grade Level(s):** 6,7,8

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# M/J Computer Education Transfer (#0200220) 2015 - 2022 (current)

## Course Standards

Name	Description
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### GENERAL NOTES

#### SUBJECT AREA TRANSFER NUMBERS

Each course transferred into a Florida public school by an out-of-state or non-public school student should be matched with a course title and number when such course provides substantially the same content. However, a few transfer courses may not be close enough in content to be matched. For those courses a subject area transfer number is provided.

### QUALIFICATIONS

NA

## GENERAL INFORMATION

**Course Number:** 0200220

**Course Path: Section:** Grades PreK to 12 Education  
Courses > **Grade Group:** Grades 6 to 8 Education  
Courses > **Subject:** Computer Education >  
**SubSubject:** General >  
**Abbreviated Title:** M/J CPTR TRAN  
**Course Length:** Year (Y)  
**Course Level:** 2

**Course Status:** Course Approved

**Grade Level(s):** 6,7,8

## Course Standards

Name	Description
MA.K12.MTR.1.1:	<p>Mathematicians who participate in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Analyze the problem in a way that makes sense given the task.</li> <li>Ask questions that will help with solving the task.</li> <li>Build perseverance by modifying methods as needed while solving a challenging task.</li> <li>Stay engaged and maintain a positive mindset when working to solve tasks.</li> <li>Help and support each other when attempting a new method or approach.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to participate actively in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Cultivate a community of growth mindset learners.</li> <li>Foster perseverance in students by choosing tasks that are challenging.</li> <li>Develop students' ability to analyze and problem solve.</li> <li>Recognize students' effort when solving challenging problems.</li> </ul>
MA.K12.MTR.2.1:	<p>Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Build understanding through modeling and using manipulatives.</li> <li>Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.</li> <li>Progress from modeling problems with objects and drawings to using algorithms and equations.</li> <li>Express connections between concepts and representations.</li> <li>Choose a representation based on the given context or purpose.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Help students make connections between concepts and representations.</li> <li>Provide opportunities for students to use manipulatives when investigating concepts.</li> <li>Guide students from concrete to pictorial to abstract representations as understanding progresses.</li> <li>Show students that various representations can have different purposes and can be useful in different situations.</li> </ul>
MA.K12.MTR.3.1:	<p>Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Select efficient and appropriate methods for solving problems within the given context.</li> <li>Maintain flexibility and accuracy while performing procedures and mental calculations.</li> <li>Complete tasks accurately and with confidence.</li> <li>Adapt procedures to apply them to a new context.</li> <li>Use feedback to improve efficiency when performing calculations.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.</li> <li>Offer multiple opportunities for students to practice efficient and generalizable methods.</li> <li>Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.</li> </ul>
MA.K12.MTR.4.1:	<p>Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Communicate mathematical ideas, vocabulary and methods effectively.</li> <li>Analyze the mathematical thinking of others.</li> <li>Compare the efficiency of a method to those expressed by others.</li> <li>Recognize errors and suggest how to correctly solve the task.</li> <li>Justify results by explaining methods and processes.</li> <li>Construct possible arguments based on evidence.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.</li> <li>Create opportunities for students to discuss their thinking with peers.</li> <li>Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.</li> <li>Develop students' ability to justify methods and compare their responses to the responses of their peers.</li> </ul>
	<p>Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:</p> <ul style="list-style-type: none"> <li>Focus on relevant details within a problem.</li> <li>Create plans and procedures to logically order events, steps or ideas to solve problems.</li> <li>Decompose a complex problem into manageable parts.</li> </ul>

MA.K12.MTR.5.1:

- Relate previously learned concepts to new concepts.
- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

**Clarifications:**

Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

Assess the reasonableness of solutions.

Mathematicians who assess the reasonableness of solutions:

- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

MA.K12.MTR.6.1:

**Clarifications:**

Teachers who encourage students to assess the reasonableness of solutions:

- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

Apply mathematics to real-world contexts.

Mathematicians who apply mathematics to real-world contexts:

- Connect mathematical concepts to everyday experiences.
- Use models and methods to understand, represent and solve problems.
- Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.

MA.K12.MTR.7.1:

**Clarifications:**

Teachers who encourage students to apply mathematics to real-world contexts:

- Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
- Challenge students to question the accuracy of their models and methods.
- Support students as they validate conclusions by comparing them to the given situation.
- Indicate how various concepts can be applied to other disciplines.

Cite evidence to explain and justify reasoning.

**Clarifications:**

K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.

2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.

6-8 Students continue with previous skills and use a style guide to create a proper citation.

9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

ELA.K12.EE.1.1:

Read and comprehend grade-level complex texts proficiently.

**Clarifications:**

See Text Complexity for grade-level complexity bands and a text complexity rubric.

Make inferences to support comprehension.

**Clarifications:**

Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

ELA.K12.EE.3.1:

Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

**Clarifications:**

In kindergarten, students learn to listen to one another respectfully.

In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think \_\_\_\_\_ because \_\_\_\_\_." The collaborative conversations are becoming academic conversations.

In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

ELA.K12.EE.4.1:

Use the accepted rules governing a specific format to create quality work.

**Clarifications:**

Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to

ELA.K12.EE.5.1:

	do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	<b>Clarifications:</b> In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### GENERAL NOTES

#### SUBJECT AREA TRANSFER NUMBERS

Each course transferred into a Florida public school by an out-of-state or non-public school student should be matched with a course title and number when such course provides substantially the same content. However, a few transfer courses may not be close enough in content to be matched. For those courses a subject area transfer number is provided.

#### Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit [https://www.cpalms.org/Standards/BEST\\_Standards.aspx](https://www.cpalms.org/Standards/BEST_Standards.aspx) and select the appropriate B.E.S.T. Standards package.

### QUALIFICATIONS

NA

### GENERAL INFORMATION

**Course Number:** 0200220

**Course Path:** Section: Grades PreK to 12 Education  
Courses > **Grade Group:** Grades 6 to 8 Education  
Courses > **Subject:** Computer Education >  
**SubSubject:** General >

**Abbreviated Title:** M/J CPTR TRAN

**Course Length:** Year (Y)

**Course Level:** 2

**Course Status:** State Board Approved

**Grade Level(s):** 6,7,8

# Computer Science Discoveries (#0200305) 2019 - 2022 (current)

## Course Standards

Name	Description
SC.912.CS-CC.1.1:	Evaluate modes of communication and collaboration.
SC.912.CS-CC.1.2:	Select appropriate tools within a project environment to communicate with project team members.
SC.912.CS-CC.1.4:	Develop a collaborative digital product using collaboration tools (e.g., version control systems and integrated development environments).
SC.912.CS-CC.1.5:	Communicate and publish key ideas and details to a variety of audiences using digital tools and media-rich resources.
SC.912.CS-CC.1.6:	Identify how collaboration influences the design and development of software artifacts.
SC.912.CS-CC.1.7:	Evaluate program designs and implementations written by others for readability and usability.
SC.912.CS-CP.1.1:	Evaluate effective uses of Boolean logic (e.g., using "not", "or", "and") to refine searches for individual and collaborative projects.
SC.912.CS-CP.1.2:	Perform advanced searches to locate information and/or design a data-collection approach to gather original data (e.g., qualitative interviews, surveys, prototypes, and simulations).
SC.912.CS-CP.1.3:	Analyze and manipulate data collected by a variety of data collection techniques to support a hypothesis.
SC.912.CS-CP.1.4:	Collect real-time data from sources such as simulations, scientific and robotic sensors, and device emulators, using this data to formulate strategies or algorithms to solve advanced problems.
SC.912.CS-CP.2.1:	Explain the program execution process (by an interpreter and in CPU hardware).
SC.912.CS-CP.2.4:	Facilitate programming solutions using application programming interfaces (APIs) and libraries.
SC.912.CS-CP.2.5:	Explain the role of an API in the development of applications and the distinction between a programming language's syntax and the API.
SC.912.CS-CP.2.6:	Describe a variety of commonly used programming languages.
SC.912.CS-CP.2.7:	Classify programming languages by paradigm and application domain (e.g., imperative, functional, and logic languages) and evaluate their application to domains such as web programming, symbolic processing and data/numerical processing.
SC.912.CS-CP.3.1:	Create a computational artifact, individually and collaboratively, followed by reflection, analysis, and iteration (e.g., data-set analysis program for science and engineering fair, capstone project that includes a program, term research project based on program data).
SC.912.CS-CP.3.2:	Create mobile computing applications and/or dynamic web pages through the use of a variety of design and development tools, programming languages, and mobile devices/emulators.
SC.912.CS-CS.1.1:	Analyze data and identify real-world patterns through modeling and simulation.
SC.912.CS-CS.1.2:	Formulate, refine, and test scientific hypotheses using models and simulations.
SC.912.CS-CS.1.3:	Explain how data analysis is used to enhance the understanding of complex natural and human systems.
SC.912.CS-CS.1.4:	Compare techniques for analyzing massive data collections.
SC.912.CS-CS.1.5:	Represent and understand natural phenomena using modeling and simulation.
SC.912.CS-CS.2.2:	Describe the concept of parallel processing as a strategy to solve large problems.
SC.912.CS-CS.2.4:	Divide a complex problem into simpler parts by using the principle of abstraction to manage complexity (i.e., by using searching and sorting as abstractions) using predefined functions and parameters, classes, and methods.
SC.912.CS-CS.2.5:	Evaluate classical algorithms and implement an original algorithm.
SC.912.CS-CS.2.6:	Evaluate various data types and data structures.
SC.912.CS-CS.2.9:	Evaluate ways to characterize how well algorithms perform and that two algorithms can perform differently for the same task.
SC.912.CS-CS.2.10:	Design and implement a simple simulation algorithm to analyze, represent, and understand natural phenomena.
SC.912.CS-CS.2.11:	Evaluate algorithms by their efficiency, correctness, and clarity (e.g., by analyzing and comparing execution times, testing with multiple inputs or data sets, and by debugging).
SC.912.CS-CS.2.12:	Compare and contrast simple data structures and their uses.
SC.912.CS-CS.2.13:	Explain how automated software testing can reduce the cost of the testing effort.
SC.912.CS-CS.2.14:	Explain what tools are applied to provide automated testing environments.
SC.912.CS-CS.3.1:	Describe digital tools or resources to use for a real-world task based on their efficiency and effectiveness.
SC.912.CS-CS.3.2:	Evaluate different file types for different purposes (e.g., word processing, images, music, and three-dimensional drawings).
SC.912.CS-CS.4.1:	Describe a software development process that is used to solve problems at different software development stages (e.g., design, coding, testing, and verification).
SC.912.CS-CS.4.2:	Describe the organization of a computer and identify its principal components by name, function, and the flow of instructions and data between components (e.g., storage devices, memory, CPU, graphics processors, IO and network ports).
SC.912.CS-CS.4.3:	Differentiate between multiple levels of hardware and software (such as CPU hardware, operating system, translation, and interpretation) that support program execution.
SC.912.CS-CS.4.4:	Evaluate various forms of input and output (e.g., IO and storage devices and digital media).
SC.912.CS-CS.4.6:	Develop criteria for selecting appropriate hardware and software when solving a specific real-world problem (such as business, educational, personal).
SC.912.CS-CS.4.7:	Develop a software artifact (independently and collaboratively) in phases (or stages) according to a common software development methodology (e.g., Waterfall or Spiral model).
SC.912.CS-CS.4.9:	Analyze historical trends in hardware and software to assess implications on computing devices for the future (e.g., upgrades for power/energy, computation capacity, speed, size, ease of use).
SC.912.CS-CS.5.1:	Identify and select the most appropriate file format based on trade-offs (e.g., open file formats, text, proprietary and binary formats, compression and encryption formats).
SC.912.CS-CS.5.2:	Describe the issues that impact network functionality (e.g., latency, bandwidth, firewalls and server capability).
SC.912.CS-CS.5.3:	Describe common network protocols, such as IP, TCP, SMTP, HTTP, and FTP, and how these are applied by client-server and peer-to-peer networks.
SC.912.CS-PC.1.1:	Compare and contrast appropriate and inappropriate social networking behaviors.
SC.912.CS-PC.1.2:	Describe and demonstrate ethical and responsible use of modern communication media and devices.
SC.912.CS-PC.1.3:	Evaluate the impacts of irresponsible use of information (e.g., plagiarism and falsification of data) on collaborative projects.

SC.912.CS-PC.1.4:	Explain the principles of cryptography by examining encryption, digital signatures, and authentication methods (e.g., explain why and how certificates are used with “https” for authentication and encryption).
SC.912.CS-PC.1.5:	Implement an encryption, digital signature, or authentication method.
SC.912.CS-PC.1.6:	Describe computer security vulnerabilities and methods of attack, and evaluate their social and economic impact on computer systems and people.
SC.912.CS-PC.2.1:	Describe how the Internet facilitates global communication.
SC.912.CS-PC.2.2:	Identify ways to use technology to support lifelong learning.
SC.912.CS-PC.2.3:	Discuss and analyze the impact of values and points of view that are presented in media messages (e.g., racial, gender, and political).
SC.912.CS-PC.2.4:	Analyze the positive and negative impacts of technology on popular culture and personal life.
SC.912.CS-PC.2.5:	Construct strategies to combat cyberbullying or online harassment.
SC.912.CS-PC.2.8:	Evaluate ways in which adaptive technologies may assist users with special needs.
SC.912.CS-PC.2.10:	Describe and evaluate the challenges (e.g., political, social, and economic) in providing equal access and distribution of technology in a global society.
SC.912.CS-PC.2.12:	Explore a variety of careers to which computing is central.
SC.912.CS-PC.2.13:	Predict future careers and the technologies that may exist based on current technology trends.
SC.912.CS-PC.4.4:	Describe security and privacy issues that relate to computer networks.
SC.912.CS-PC.4.5:	Identify computer-related laws and analyze their impact on digital privacy, security, intellectual property, network access, contracts, and harassment.
SC.912.CS-PC.4.6:	Describe security and privacy issues that relate to computer networks including the permanency of data on the Internet, online identity, and privacy.
SC.912.CS-PC.4.8:	Describe the impact of government regulation on privacy and security.
LAFS.1112.SL.1.1:	<p>Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <ol style="list-style-type: none"> <li>Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.</li> <li>Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.</li> <li>Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.</li> <li>Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.</li> </ol>
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker’s point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.SL.1.1:	<p>Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <ol style="list-style-type: none"> <li>Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.</li> <li>Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.</li> <li>Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.</li> <li>Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.</li> </ol>
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker’s point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
MAFS.K12.MP.1.1:	<p><b>Make sense of problems and persevere in solving them.</b></p> <p>Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Reason abstractly and quantitatively.</b></p> <p>Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically</p>

MAFS.K12.MP.2.1:	<p>and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.</p> <p><b>Standard Relation to Course: Supporting</b>  <b>Construct viable arguments and critique the reasoning of others.</b></p> <p>Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.</p>
MAFS.K12.MP.3.1:	<p><b>Standard Relation to Course: Supporting</b>  <b>Model with mathematics.</b></p> <p>Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.</p>
MAFS.K12.MP.4.1:	<p><b>Standard Relation to Course: Supporting</b>  <b>Use appropriate tools strategically.</b></p> <p>Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.</p>
MAFS.K12.MP.5.1:	<p><b>Standard Relation to Course: Supporting</b>  <b>Attend to precision.</b></p> <p>Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.</p>
MAFS.K12.MP.6.1:	<p><b>Standard Relation to Course: Supporting</b>  <b>Look for and make use of structure.</b></p> <p>Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see <math>7 \times 8</math> equals the well remembered <math>7 \times 5 + 7 \times 3</math>, in preparation for learning about the distributive property. In the expression <math>x^2 + 9x + 14</math>, older students can see the 14 as <math>2 \times 7</math> and the 9 as <math>2 + 7</math>. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see <math>5 - 3(x - y)^2</math> as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers <math>x</math> and <math>y</math>.</p>
MAFS.K12.MP.7.1:	<p><b>Standard Relation to Course: Supporting</b>  <b>Look for and express regularity in repeated reasoning.</b></p> <p>Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through <math>(1, 2)</math> with slope 3, middle school students might abstract the equation <math>(y - 2)/(x - 1) = 3</math>. Noticing the regularity in the way terms cancel when expanding <math>(x - 1)(x + 1)</math>, <math>(x - 1)(x^2 + x + 1)</math>, and <math>(x - 1)(x^3 + x^2 + x + 1)</math> might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.</p>
ELD.K12.ELL.SI.1:	<p>English language learners communicate for social and instructional purposes within the school setting.</p>

## VERSION DESCRIPTION

### PURPOSE

Computing is so fundamental to understanding and participating in society that it is valuable for every student to learn as part of a modern education. Computer science can be viewed as a liberal art, a subject that provides students with a critical lens for interpreting the world around them. Computer science prepares all students to be active and informed contributors to our increasingly technological society whether they pursue careers in technology or not. Computer science can be life-changing, not just skill training.

Students learn best when they are intrinsically motivated. This course prioritizes learning experiences that are active, relevant to students' lives, and provide students authentic choice. Students are encouraged to be curious, solve personally relevant problems and to express themselves through creation. Learning is an inherently social activity, so the course is designed to interweave lessons with discussions, presentations, peer feedback, and shared reflections. As students proceed through the pathway, the structures increasingly shift responsibility to students to formulate their own questions, develop their own solutions, and critique their work.

It is also critical to diversify the technology workforce. Addressing inequities within the field of computer science is critical to bringing computer science to all students. The tools and strategies in this course will help teachers understand and address well-known equity gaps within the field. All students can succeed in computer science when given the right supports and opportunities, regardless of prior knowledge.

### OVERVIEW AND GOALS

Computer Science Discoveries introduces students to computer science as a vehicle for problem solving, communication, and personal expression. The course focuses on the visible aspects of computing and computer science and encourages students to see where computer science exists around them and how they can engage with it as a tool for exploration and expression. Centering on the immediately observable and personally applicable elements of computer science, the course asks students to look outward and explore the impact of computer science on society. Students should see how a thorough student-centered design process produces a better application, how data is used to address problems that affect large numbers of people, and how physical computing with circuit boards allows computers to collect, input and return output in a variety of ways.

#### **Additional Notes - Pedagogical Approach to Learning: Teacher as Lead Learner**

What is the Lead Learner approach?

As the lead learner, the teacher role shifts from being the source of knowledge to that of a leader in seeking knowledge. The lead learner's mantra is: "I may not know the answer, but I know that together we can figure it out."

The philosophy of the lead learner strategy is that students can benefit from having a model to demonstrate the learning process. Being a lead learner doesn't discount the need for a teacher to develop computer science content expertise, but it does allow for an environment of openness with students about the teacher learning process. Modeling and teaching *how to learn* are the most important factors to consider in order to be successful with this style of teaching and learning.

The lead learner technique represents good teaching practice in general. One important role of the teacher in the Computer Science Discoveries classroom is to model excitement about investigating how things work by asking motivating questions about why things work the way they do or are the way they are. With teacher guidance, students will learn how to hypothesize; ask questions of peers; test, evaluate, and refine solutions collaboratively; seek out resources; analyze data; and write clear and cogent code.

#### **English Language Arts (ELA) Standards Special Notes Section:**

Teachers are required to provide speaking and listening instruction that allows students to communicate information, ideas and concepts for academic success in the content area. Within this course you will find standards specific to the 9-10 and 11-12 grade ranges, the appropriate standards for the grade should be utilized.

#### **English Language Development (ELD) Standards Special Notes Section:**

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

<https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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#### **Additional Resources**

Additional resources and a free curriculum that may be utilized for this course can be found at <https://curriculum.code.org/csd-18/> and <https://codehs.com/info/states/florida>.

## QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

In order for this course to be taught with fidelity teachers without a computer science certification or related postsecondary coursework should, at a minimum, have completed a course in computer science such as those offered through a MOOC from a reputable institution or by attending training such as those offered by code.org.

## GENERAL INFORMATION

**Course Number:** 0200305

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** COMP SCI DISCOVERIES

**Course Length:** Year (Y)

**Course Attributes:**

- Class Size Core Required

**Course Type:** Core Academic Course

**Course Level:** 2

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

**Graduation Requirement:** Mathematics

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Computer Science Discoveries (#0200305) 2022 - And Beyond

## Course Standards

Name	Description
SC.912.CS-CC.1.1:	Evaluate modes of communication and collaboration.
SC.912.CS-CC.1.2:	Select appropriate tools within a project environment to communicate with project team members.
SC.912.CS-CC.1.4:	Develop a collaborative digital product using collaboration tools (e.g., version control systems and integrated development environments).
SC.912.CS-CC.1.5:	Communicate and publish key ideas and details to a variety of audiences using digital tools and media-rich resources.
SC.912.CS-CC.1.6:	Identify how collaboration influences the design and development of software artifacts.
SC.912.CS-CC.1.7:	Evaluate program designs and implementations written by others for readability and usability.
SC.912.CS-CP.1.1:	Evaluate effective uses of Boolean logic (e.g., using "not", "or", "and") to refine searches for individual and collaborative projects.
SC.912.CS-CP.1.2:	Perform advanced searches to locate information and/or design a data-collection approach to gather original data (e.g., qualitative interviews, surveys, prototypes, and simulations).
SC.912.CS-CP.1.3:	Analyze and manipulate data collected by a variety of data collection techniques to support a hypothesis.
SC.912.CS-CP.1.4:	Collect real-time data from sources such as simulations, scientific and robotic sensors, and device emulators, using this data to formulate strategies or algorithms to solve advanced problems.
SC.912.CS-CP.2.1:	Explain the program execution process (by an interpreter and in CPU hardware).
SC.912.CS-CP.2.4:	Facilitate programming solutions using application programming interfaces (APIs) and libraries.
SC.912.CS-CP.2.5:	Explain the role of an API in the development of applications and the distinction between a programming language's syntax and the API.
SC.912.CS-CP.2.6:	Describe a variety of commonly used programming languages.
SC.912.CS-CP.2.7:	Classify programming languages by paradigm and application domain (e.g., imperative, functional, and logic languages) and evaluate their application to domains such as web programming, symbolic processing and data/numerical processing.
SC.912.CS-CP.3.1:	Create a computational artifact, individually and collaboratively, followed by reflection, analysis, and iteration (e.g., data-set analysis program for science and engineering fair, capstone project that includes a program, term research project based on program data).
SC.912.CS-CP.3.2:	Create mobile computing applications and/or dynamic web pages through the use of a variety of design and development tools, programming languages, and mobile devices/emulators.
SC.912.CS-CS.1.1:	Analyze data and identify real-world patterns through modeling and simulation.
SC.912.CS-CS.1.2:	Formulate, refine, and test scientific hypotheses using models and simulations.
SC.912.CS-CS.1.3:	Explain how data analysis is used to enhance the understanding of complex natural and human systems.
SC.912.CS-CS.1.4:	Compare techniques for analyzing massive data collections.
SC.912.CS-CS.1.5:	Represent and understand natural phenomena using modeling and simulation.
SC.912.CS-CS.2.2:	Describe the concept of parallel processing as a strategy to solve large problems.
SC.912.CS-CS.2.4:	Divide a complex problem into simpler parts by using the principle of abstraction to manage complexity (i.e., by using searching and sorting as abstractions) using predefined functions and parameters, classes, and methods.
SC.912.CS-CS.2.5:	Evaluate classical algorithms and implement an original algorithm.
SC.912.CS-CS.2.6:	Evaluate various data types and data structures.
SC.912.CS-CS.2.9:	Evaluate ways to characterize how well algorithms perform and that two algorithms can perform differently for the same task.
SC.912.CS-CS.2.10:	Design and implement a simple simulation algorithm to analyze, represent, and understand natural phenomena.
SC.912.CS-CS.2.11:	Evaluate algorithms by their efficiency, correctness, and clarity (e.g., by analyzing and comparing execution times, testing with multiple inputs or data sets, and by debugging).
SC.912.CS-CS.2.12:	Compare and contrast simple data structures and their uses.
SC.912.CS-CS.2.13:	Explain how automated software testing can reduce the cost of the testing effort.
SC.912.CS-CS.2.14:	Explain what tools are applied to provide automated testing environments.
SC.912.CS-CS.3.1:	Describe digital tools or resources to use for a real-world task based on their efficiency and effectiveness.
SC.912.CS-CS.3.2:	Evaluate different file types for different purposes (e.g., word processing, images, music, and three-dimensional drawings).
SC.912.CS-CS.4.1:	Describe a software development process that is used to solve problems at different software development stages (e.g., design, coding, testing, and verification).
SC.912.CS-CS.4.2:	Describe the organization of a computer and identify its principal components by name, function, and the flow of instructions and data between components (e.g., storage devices, memory, CPU, graphics processors, IO and network ports).
SC.912.CS-CS.4.3:	Differentiate between multiple levels of hardware and software (such as CPU hardware, operating system, translation, and interpretation) that support program execution.
SC.912.CS-CS.4.4:	Evaluate various forms of input and output (e.g., IO and storage devices and digital media).
SC.912.CS-CS.4.6:	Develop criteria for selecting appropriate hardware and software when solving a specific real-world problem (such as business, educational, personal).
SC.912.CS-CS.4.7:	Develop a software artifact (independently and collaboratively) in phases (or stages) according to a common software development methodology (e.g., Waterfall or Spiral model).
SC.912.CS-CS.4.9:	Analyze historical trends in hardware and software to assess implications on computing devices for the future (e.g., upgrades for power/energy, computation capacity, speed, size, ease of use).
SC.912.CS-CS.5.1:	Identify and select the most appropriate file format based on trade-offs (e.g., open file formats, text, proprietary and binary formats, compression and encryption formats).
SC.912.CS-CS.5.2:	Describe the issues that impact network functionality (e.g., latency, bandwidth, firewalls and server capability).
SC.912.CS-CS.5.3:	Describe common network protocols, such as IP, TCP, SMTP, HTTP, and FTP, and how these are applied by client-server and peer-to-peer networks.
SC.912.CS-PC.1.1:	Compare and contrast appropriate and inappropriate social networking behaviors.
SC.912.CS-PC.1.2:	Describe and demonstrate ethical and responsible use of modern communication media and devices.
SC.912.CS-PC.1.3:	Evaluate the impacts of irresponsible use of information (e.g., plagiarism and falsification of data) on collaborative projects.

SC.912.CS-PC.1.4:	Explain the principles of cryptography by examining encryption, digital signatures, and authentication methods (e.g., explain why and how certificates are used with “https” for authentication and encryption).
SC.912.CS-PC.1.5:	Implement an encryption, digital signature, or authentication method.
SC.912.CS-PC.1.6:	Describe computer security vulnerabilities and methods of attack, and evaluate their social and economic impact on computer systems and people.
SC.912.CS-PC.2.1:	Describe how the Internet facilitates global communication.
SC.912.CS-PC.2.2:	Identify ways to use technology to support lifelong learning.
SC.912.CS-PC.2.3:	Discuss and analyze the impact of values and points of view that are presented in media messages (e.g., racial, gender, and political).
SC.912.CS-PC.2.4:	Analyze the positive and negative impacts of technology on popular culture and personal life.
SC.912.CS-PC.2.5:	Construct strategies to combat cyberbullying or online harassment.
SC.912.CS-PC.2.8:	Evaluate ways in which adaptive technologies may assist users with special needs.
SC.912.CS-PC.2.10:	Describe and evaluate the challenges (e.g., political, social, and economic) in providing equal access and distribution of technology in a global society.
SC.912.CS-PC.2.12:	Explore a variety of careers to which computing is central.
SC.912.CS-PC.2.13:	Predict future careers and the technologies that may exist based on current technology trends.
SC.912.CS-PC.4.4:	Describe security and privacy issues that relate to computer networks.
SC.912.CS-PC.4.5:	Identify computer-related laws and analyze their impact on digital privacy, security, intellectual property, network access, contracts, and harassment.
SC.912.CS-PC.4.6:	Describe security and privacy issues that relate to computer networks including the permanency of data on the Internet, online identity, and privacy.
SC.912.CS-PC.4.8:	Describe the impact of government regulation on privacy and security.
MA.K12.MTR.1.1:	<p>Mathematicians who participate in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Analyze the problem in a way that makes sense given the task.</li> <li>Ask questions that will help with solving the task.</li> <li>Build perseverance by modifying methods as needed while solving a challenging task.</li> <li>Stay engaged and maintain a positive mindset when working to solve tasks.</li> <li>Help and support each other when attempting a new method or approach.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to participate actively in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Cultivate a community of growth mindset learners.</li> <li>Foster perseverance in students by choosing tasks that are challenging.</li> <li>Develop students’ ability to analyze and problem solve.</li> <li>Recognize students’ effort when solving challenging problems.</li> </ul>
MA.K12.MTR.2.1:	<p>Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Build understanding through modeling and using manipulatives.</li> <li>Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.</li> <li>Progress from modeling problems with objects and drawings to using algorithms and equations.</li> <li>Express connections between concepts and representations.</li> <li>Choose a representation based on the given context or purpose.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Help students make connections between concepts and representations.</li> <li>Provide opportunities for students to use manipulatives when investigating concepts.</li> <li>Guide students from concrete to pictorial to abstract representations as understanding progresses.</li> <li>Show students that various representations can have different purposes and can be useful in different situations.</li> </ul>
MA.K12.MTR.3.1:	<p>Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Select efficient and appropriate methods for solving problems within the given context.</li> <li>Maintain flexibility and accuracy while performing procedures and mental calculations.</li> <li>Complete tasks accurately and with confidence.</li> <li>Adapt procedures to apply them to a new context.</li> <li>Use feedback to improve efficiency when performing calculations.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.</li> <li>Offer multiple opportunities for students to practice efficient and generalizable methods.</li> <li>Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.</li> </ul>
MA.K12.MTR.4.1:	<p>Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Communicate mathematical ideas, vocabulary and methods effectively.</li> <li>Analyze the mathematical thinking of others.</li> <li>Compare the efficiency of a method to those expressed by others.</li> <li>Recognize errors and suggest how to correctly solve the task.</li> <li>Justify results by explaining methods and processes.</li> <li>Construct possible arguments based on evidence.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.</li> <li>Create opportunities for students to discuss their thinking with peers.</li> <li>Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.</li> </ul>

- Develop students' ability to justify methods and compare their responses to the responses of their peers.

Use patterns and structure to help understand and connect mathematical concepts.  
Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

- Focus on relevant details within a problem.
- Create plans and procedures to logically order events, steps or ideas to solve problems.
- Decompose a complex problem into manageable parts.
- Relate previously learned concepts to new concepts.
- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

MA.K12.MTR.5.1:

**Clarifications:**

Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

Assess the reasonableness of solutions.  
Mathematicians who assess the reasonableness of solutions:

- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

MA.K12.MTR.6.1:

**Clarifications:**

Teachers who encourage students to assess the reasonableness of solutions:

- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

Apply mathematics to real-world contexts.  
Mathematicians who apply mathematics to real-world contexts:

- Connect mathematical concepts to everyday experiences.
- Use models and methods to understand, represent and solve problems.
- Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.

MA.K12.MTR.7.1:

**Clarifications:**

Teachers who encourage students to apply mathematics to real-world contexts:

- Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
- Challenge students to question the accuracy of their models and methods.
- Support students as they validate conclusions by comparing them to the given situation.
- Indicate how various concepts can be applied to other disciplines.

Cite evidence to explain and justify reasoning.

**Clarifications:**

K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.  
2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.  
4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.  
6-8 Students continue with previous skills and use a style guide to create a proper citation.  
9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

ELA.K12.EE.1.1:

Read and comprehend grade-level complex texts proficiently.

**Clarifications:**

See Text Complexity for grade-level complexity bands and a text complexity rubric.

ELA.K12.EE.2.1:

Make inferences to support comprehension.

**Clarifications:**

Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

ELA.K12.EE.3.1:

Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

**Clarifications:**

In kindergarten, students learn to listen to one another respectfully.  
In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think \_\_\_\_\_ because \_\_\_\_\_." The collaborative conversations are becoming academic conversations.

ELA.K12.EE.4.1:

	In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. <b>Clarifications:</b> Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. <b>Clarifications:</b> In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### VERSION DESCRIPTION

#### PURPOSE

Computing is so fundamental to understanding and participating in society that it is valuable for every student to learn as part of a modern education. Computer science can be viewed as a liberal art, a subject that provides students with a critical lens for interpreting the world around them. Computer science prepares all students to be active and informed contributors to our increasingly technological society whether they pursue careers in technology or not. Computer science can be life-changing, not just skill training.

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#### OVERVIEW AND GOALS

Computer Science Discoveries introduces students to computer science as a vehicle for problem solving, communication, and personal expression. The course focuses on the visible aspects of computing and computer science and encourages students to see where computer science exists around them and how they can engage with it as a tool for exploration and expression. Centering on the immediately observable and personally applicable elements of computer science, the course asks students to look outward and explore the impact of computer science on society. Students should see how a thorough student-centered design process produces a better application, how data is used to address problems that affect large numbers of people, and how physical computing with circuit boards allows computers to collect, input and return output in a variety of ways.

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What is the Lead Learner approach?

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#### Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards:

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit [https://www.cpalms.org/Standards/BEST\\_Standards.aspx](https://www.cpalms.org/Standards/BEST_Standards.aspx) and select the appropriate B.E.S.T. Standards package.

#### English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

<https://cpalmsmediaproduct.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

#### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and

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### Additional Resources

Additional resources and a free curriculum that may be utilized for this course can be found at <https://curriculum.code.org/csd-18/> and <https://codehs.com/info/states/florida>.

## QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

In order for this course to be taught with fidelity teachers without a computer science certification or related postsecondary coursework should, at a minimum, have completed a course in computer science such as those offered through a MOOC from a reputable institution or by attending training such as those offered by code.org.

## GENERAL INFORMATION

**Course Number:** 0200305

**Number of Credits:** One (1) credit

**Course Type:** Core Academic Course

**Course Status:** State Board Approved

**Grade Level(s):** 9,10,11,12

**Graduation Requirement:** Mathematics

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Abbreviated Title:** COMP SCI DISCOVERIES

**Course Length:** Year (Y)

**Course Attributes:**

- Class Size Core Required

**Course Level:** 2

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Computer Science Principles (#0200315) 2019 - 2022 (current)

## Course Standards

Name	Description
SC.912.CS-CC.1.1:	Evaluate modes of communication and collaboration.
SC.912.CS-CC.1.2:	Select appropriate tools within a project environment to communicate with project team members.
SC.912.CS-CC.1.3:	Collect, analyze, and present information using a variety of computing devices (e.g., probes, sensors, and handheld devices).
SC.912.CS-CC.1.4:	Develop a collaborative digital product using collaboration tools (e.g., version control systems and integrated development environments).
SC.912.CS-CC.1.5:	Communicate and publish key ideas and details to a variety of audiences using digital tools and media-rich resources.
SC.912.CS-CC.1.6:	Identify how collaboration influences the design and development of software artifacts.
SC.912.CS-CC.1.7:	Evaluate program designs and implementations written by others for readability and usability.
SC.912.CS-CP.1.1:	Evaluate effective uses of Boolean logic (e.g., using "not", "or", "and") to refine searches for individual and collaborative projects.
SC.912.CS-CP.1.2:	Perform advanced searches to locate information and/or design a data-collection approach to gather original data (e.g., qualitative interviews, surveys, prototypes, and simulations).
SC.912.CS-CP.1.3:	Analyze and manipulate data collected by a variety of data collection techniques to support a hypothesis.
SC.912.CS-CP.1.4:	Collect real-time data from sources such as simulations, scientific and robotic sensors, and device emulators, using this data to formulate strategies or algorithms to solve advanced problems.
SC.912.CS-CP.2.1:	Explain the program execution process (by an interpreter and in CPU hardware).
SC.912.CS-CP.2.2:	Design and implement a program using global and local scope.
SC.912.CS-CP.2.3:	Implement a program using an industrial-strength integrated development environment.
SC.912.CS-CP.2.4:	Facilitate programming solutions using application programming interfaces (APIs) and libraries.
SC.912.CS-CP.2.5:	Explain the role of an API in the development of applications and the distinction between a programming language's syntax and the API.
SC.912.CS-CP.2.6:	Describe a variety of commonly used programming languages.
SC.912.CS-CP.2.7:	Classify programming languages by paradigm and application domain (e.g., imperative, functional, and logic languages) and evaluate their application to domains such as web programming, symbolic processing and data/numerical processing.
SC.912.CS-CP.3.1:	Create a computational artifact, individually and collaboratively, followed by reflection, analysis, and iteration (e.g., data-set analysis program for science and engineering fair, capstone project that includes a program, term research project based on program data).
SC.912.CS-CP.3.2:	Create mobile computing applications and/or dynamic web pages through the use of a variety of design and development tools, programming languages, and mobile devices/emulators.
SC.912.CS-CS.1.1:	Analyze data and identify real-world patterns through modeling and simulation.
SC.912.CS-CS.1.2:	Formulate, refine, and test scientific hypotheses using models and simulations.
SC.912.CS-CS.1.3:	Explain how data analysis is used to enhance the understanding of complex natural and human systems.
SC.912.CS-CS.1.4:	Compare techniques for analyzing massive data collections.
SC.912.CS-CS.1.5:	Represent and understand natural phenomena using modeling and simulation.
SC.912.CS-CS.2.1:	Explain intractable problems and understand that problems exist that are computationally unsolvable (e.g., classic intractable problems include the Towers of Hanoi and the Traveling Salesman Problem -TSP).
SC.912.CS-CS.2.2:	Describe the concept of parallel processing as a strategy to solve large problems.
SC.912.CS-CS.2.3:	Demonstrate concurrency by separating processes into threads of execution and dividing data into parallel streams.
SC.912.CS-CS.2.4:	Divide a complex problem into simpler parts by using the principle of abstraction to manage complexity (i.e., by using searching and sorting as abstractions) using predefined functions and parameters, classes, and methods.
SC.912.CS-CS.2.5:	Evaluate classical algorithms and implement an original algorithm.
SC.912.CS-CS.2.6:	Evaluate various data types and data structures.
SC.912.CS-CS.2.7:	Explain how sequence, selection, iteration, and recursion are building blocks of algorithms.
SC.912.CS-CS.2.8:	Decompose a problem by defining new functions and classes.
SC.912.CS-CS.2.9:	Evaluate ways to characterize how well algorithms perform and that two algorithms can perform differently for the same task.
SC.912.CS-CS.2.10:	Design and implement a simple simulation algorithm to analyze, represent, and understand natural phenomena.
SC.912.CS-CS.2.11:	Evaluate algorithms by their efficiency, correctness, and clarity (e.g., by analyzing and comparing execution times, testing with multiple inputs or data sets, and by debugging).
SC.912.CS-CS.2.12:	Compare and contrast simple data structures and their uses.
SC.912.CS-CS.2.13:	Explain how automated software testing can reduce the cost of the testing effort.
SC.912.CS-CS.2.14:	Explain what tools are applied to provide automated testing environments.
SC.912.CS-CS.4.1:	Describe a software development process that is used to solve problems at different software development stages (e.g., design, coding, testing, and verification).
SC.912.CS-CS.4.2:	Describe the organization of a computer and identify its principal components by name, function, and the flow of instructions and data between components (e.g., storage devices, memory, CPU, graphics processors, IO and network ports).
SC.912.CS-CS.4.3:	Differentiate between multiple levels of hardware and software (such as CPU hardware, operating system, translation, and interpretation) that support program execution.
SC.912.CS-CS.4.4:	Evaluate various forms of input and output (e.g., IO and storage devices and digital media).
SC.912.CS-CS.4.5:	Develop and evaluate criteria for purchasing or upgrading computer system hardware (e.g., Wi-Fi, mobile devices, home and office machines).
SC.912.CS-CS.4.6:	Develop criteria for selecting appropriate hardware and software when solving a specific real-world problem (such as business, educational, personal).
SC.912.CS-CS.4.7:	Develop a software artifact (independently and collaboratively) in phases (or stages) according to a common software development methodology (e.g., Waterfall or Spiral model).
SC.912.CS-CS.4.8:	Evaluate the basic components of computer networks.

SC.912.CS-CS.5.1:	Identify and select the most appropriate file format based on trade-offs (e.g., open file formats, text, proprietary and binary formats, compression and encryption formats).
SC.912.CS-CS.5.2:	Describe the issues that impact network functionality (e.g., latency, bandwidth, firewalls and server capability).
SC.912.CS-CS.5.3:	Describe common network protocols, such as IP, TCP, SMTP, HTTP, and FTP, and how these are applied by client-server and peer-to-peer networks.
SC.912.CS-PC.1.1:	Compare and contrast appropriate and inappropriate social networking behaviors.
SC.912.CS-PC.1.2:	Describe and demonstrate ethical and responsible use of modern communication media and devices.
SC.912.CS-PC.1.3:	Evaluate the impacts of irresponsible use of information (e.g., plagiarism and falsification of data) on collaborative projects.
SC.912.CS-PC.1.4:	Explain the principles of cryptography by examining encryption, digital signatures, and authentication methods (e.g., explain why and how certificates are used with "https" for authentication and encryption).
SC.912.CS-PC.1.5:	Implement an encryption, digital signature, or authentication method.
SC.912.CS-PC.1.6:	Describe computer security vulnerabilities and methods of attack, and evaluate their social and economic impact on computer systems and people.
SC.912.CS-PC.2.1:	Describe how the Internet facilitates global communication.
SC.912.CS-PC.2.2:	Identify ways to use technology to support lifelong learning.
SC.912.CS-PC.2.3:	Discuss and analyze the impact of values and points of view that are presented in media messages (e.g., racial, gender, and political).
SC.912.CS-PC.2.4:	Analyze the positive and negative impacts of technology on popular culture and personal life.
SC.912.CS-PC.2.5:	Construct strategies to combat cyberbullying or online harassment.
SC.912.CS-PC.2.6:	Describe the impact of computing on business and commerce (e.g., automated inventory processing, financial transactions, e-commerce, virtualization, and cloud computing).
SC.912.CS-PC.2.7:	Describe how technology has changed the way people build and manage organizations and how technology impacts personal life.
SC.912.CS-PC.2.8:	Evaluate ways in which adaptive technologies may assist users with special needs.
SC.912.CS-PC.2.9:	Explain how societal and economic factors are affected by access to critical information.
SC.912.CS-PC.2.10:	Describe and evaluate the challenges (e.g., political, social, and economic) in providing equal access and distribution of technology in a global society.
SC.912.CS-PC.2.11:	Construct writings and/or communications using developmentally appropriate terminology.
SC.912.CS-PC.2.12:	Explore a variety of careers to which computing is central.
SC.912.CS-PC.2.13:	Predict future careers and the technologies that may exist based on current technology trends.
SC.912.CS-PC.3.1:	Evaluate the quality of digital resources for reliability (i.e., currency, relevancy, authority, accuracy, and purpose of digital information).
SC.912.CS-PC.3.2:	Evaluate the accuracy, relevance, comprehensiveness, appropriateness, and bias of electronic information resources.
SC.912.CS-PC.3.3:	Conduct research using peer reviewed articles, newspapers, magazine articles, and online books.
SC.912.CS-PC.3.4:	Analyze and evaluate public/government resources and describe how using these resources for communication can affect change.
SC.912.CS-PC.4.1:	Describe how different types of software licenses (e.g., open source and proprietary licenses) can be used to share and protect intellectual property.
SC.912.CS-PC.4.2:	Explain how access to information may not include the right to distribute the information.
SC.912.CS-PC.4.3:	Describe differences between open source, freeware, and proprietary software licenses, and how they apply to different types of software.
SC.912.CS-PC.4.4:	Describe security and privacy issues that relate to computer networks.
SC.912.CS-PC.4.5:	Identify computer-related laws and analyze their impact on digital privacy, security, intellectual property, network access, contracts, and harassment.
SC.912.CS-PC.4.6:	Describe security and privacy issues that relate to computer networks including the permanency of data on the Internet, online identity, and privacy.
SC.912.CS-PC.4.7:	Evaluate and use digital citation tools to cite sources.
SC.912.CS-PC.4.8:	Describe the impact of government regulation on privacy and security.
LAFS.1112.SL.1.1:	<p>Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.</p> <ol style="list-style-type: none"> <li>Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.</li> <li>Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.</li> <li>Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.</li> <li>Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.</li> </ol>
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
LAFS.910.SL.1.1:	<p>Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.</p> <ol style="list-style-type: none"> <li>Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.</li> <li>Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.</li> <li>Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.</li> <li>Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.</li> </ol>
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.SL.2.5:	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
MAFS.K12.MP.1.1:	<p><b>Make sense of problems and persevere in solving them.</b></p> <p>Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Reason abstractly and quantitatively.</b></p>
MAFS.K12.MP.2.1:	<p>Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Construct viable arguments and critique the reasoning of others.</b></p>
MAFS.K12.MP.3.1:	<p>Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Model with mathematics.</b></p>
MAFS.K12.MP.4.1:	<p>Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Use appropriate tools strategically.</b></p>
MAFS.K12.MP.5.1:	<p>Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Attend to precision.</b></p>
MAFS.K12.MP.6.1:	<p>Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Look for and make use of structure.</b></p>
	<p>Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see <math>7 \times 8</math> equals the well remembered <math>7 \times 5 + 7 \times 3</math>, in preparation for learning about the distributive property. In the expression <math>x^2 +</math></p>

MAFS.K12.MP.7.1:	<p>9x + 14, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see 5 – 3(x – y)<sup>2</sup> as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.</p> <p><b>Standard Relation to Course: Supporting</b></p> <p><b>Look for and express regularity in repeated reasoning.</b></p> <p>Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation (y – 2)/(x – 1) = 3. Noticing the regularity in the way terms cancel when expanding (x – 1)(x + 1), (x – 1)(x<sup>2</sup> + x + 1), and (x – 1)(x<sup>3</sup> + x<sup>2</sup> + x + 1) might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.</p> <p><b>Standard Relation to Course: Supporting</b></p>
MAFS.K12.MP.8.1:	
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### VERSION DESCRIPTION

This course introduces students to the foundational concepts of computer science and challenges them to explore how computing and technology can impact the world. Computing is so fundamental to understanding and participating in society that it is valuable for every student to learn as part of a modern education. Computer science can be viewed as a liberal art, a subject that provides students with a critical lens for interpreting the world around them. Computer science prepares all students to be active and informed contributors to our increasingly technological society whether they pursue careers in technology or not. Computer science can be life-changing, not just skill training.

Students learn best when they are intrinsically motivated. This course prioritizes learning experiences that are active, relevant to students' lives, and provide students authentic choice. Students are encouraged to be curious, solve personally relevant problems and to express themselves through creation. Learning is an inherently social activity, so the course is designed to interweave lessons with discussions, presentations, peer feedback, and shared reflections. As students proceed through the pathway, the structures increasingly shift responsibility to students to formulate their own questions, develop their own solutions, and critique their own work.

It is also critical to diversity the technology workforce. Addressing inequities within the field of computer science is critical to bringing computer science to all students. The tools and strategies in this course will help teachers understand and address well-known equity gaps within the field. All students can succeed in computer science when given the right supports and opportunities, regardless of prior knowledge.

#### Additional Information

##### Computer Science Principles

Computer Science Principles introduces students to the foundational concepts of computer science and challenges them to explore how computing and technology can impact the world. More than a traditional introduction to programming, it is a rigorous, engaging, and approachable course that explores many of the foundational ideas of computing, so all students understand how these concepts are transforming the world we live in.

##### English Language Arts (ELA) Standards Special Notes Section:

Teachers are required to provide speaking and listening instruction that allows students to communicate information, ideas and concepts for academic success in the content area. Within this course you will find standards specific to the 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grade ranges, the appropriate standards for the grade should be utilized.

##### English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

<https://cpalmsmediaproduct.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

##### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE) will need modifications to meet their needs. Modifications change the outcomes and or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course.

##### Additional Resources

Additional resources and a free curriculum that may be utilized for this course can be found at <https://curriculum.code.org/csd-18/>.

## QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

In order for this course to be taught with fidelity teachers without a computer science certification or related postsecondary coursework should, at a minimum, have completed a course in computer science such as those offered through a MOOC from a reputable institution or by attending a training such as those offered by code.org.

## GENERAL INFORMATION

**Course Number:** 0200315

**Number of Credits:** One (1) credit

**Course Type:** Core Academic Course

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

**Graduation Requirement:** Mathematics

**Course Path: Section:** Grades PreK to 12 Education

Courses > **Grade Group:** Grades 9 to 12 and Adult  
Education Courses > **Subject:** Computer Education >

**SubSubject:** General >

**Abbreviated Title:** COMP SCI PRINCIPLES

**Course Length:** Year (Y)

**Course Attributes:**

- Class Size Core Required

**Course Level:** 2

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

Business Education (Grades 6-12)

# Computer Science Principles (#0200315) 2022 - And Beyond

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SC.912.CS-CS.1.4:	Compare techniques for analyzing massive data collections.
SC.912.CS-CS.1.5:	Represent and understand natural phenomena using modeling and simulation.
SC.912.CS-CS.2.1:	Explain intractable problems and understand that problems exist that are computationally unsolvable (e.g., classic intractable problems include the Towers of Hanoi and the Traveling Salesman Problem -TSP).
SC.912.CS-CS.2.2:	Describe the concept of parallel processing as a strategy to solve large problems.
SC.912.CS-CS.2.3:	Demonstrate concurrency by separating processes into threads of execution and dividing data into parallel streams.
SC.912.CS-CS.2.4:	Divide a complex problem into simpler parts by using the principle of abstraction to manage complexity (i.e., by using searching and sorting as abstractions) using predefined functions and parameters, classes, and methods.
SC.912.CS-CS.2.5:	Evaluate classical algorithms and implement an original algorithm.
SC.912.CS-CS.2.6:	Evaluate various data types and data structures.
SC.912.CS-CS.2.7:	Explain how sequence, selection, iteration, and recursion are building blocks of algorithms.
SC.912.CS-CS.2.8:	Decompose a problem by defining new functions and classes.
SC.912.CS-CS.2.9:	Evaluate ways to characterize how well algorithms perform and that two algorithms can perform differently for the same task.
SC.912.CS-CS.2.10:	Design and implement a simple simulation algorithm to analyze, represent, and understand natural phenomena.
SC.912.CS-CS.2.11:	Evaluate algorithms by their efficiency, correctness, and clarity (e.g., by analyzing and comparing execution times, testing with multiple inputs or data sets, and by debugging).
SC.912.CS-CS.2.12:	Compare and contrast simple data structures and their uses.
SC.912.CS-CS.2.13:	Explain how automated software testing can reduce the cost of the testing effort.
SC.912.CS-CS.2.14:	Explain what tools are applied to provide automated testing environments.
SC.912.CS-CS.4.1:	Describe a software development process that is used to solve problems at different software development stages (e.g., design, coding, testing, and verification).
SC.912.CS-CS.4.2:	Describe the organization of a computer and identify its principal components by name, function, and the flow of instructions and data between components (e.g., storage devices, memory, CPU, graphics processors, IO and network ports).
SC.912.CS-CS.4.3:	Differentiate between multiple levels of hardware and software (such as CPU hardware, operating system, translation, and interpretation) that support program execution.
SC.912.CS-CS.4.4:	Evaluate various forms of input and output (e.g., IO and storage devices and digital media).
SC.912.CS-CS.4.5:	Develop and evaluate criteria for purchasing or upgrading computer system hardware (e.g., Wi-Fi, mobile devices, home and office machines).
SC.912.CS-CS.4.6:	Develop criteria for selecting appropriate hardware and software when solving a specific real-world problem (such as business, educational, personal).
SC.912.CS-CS.4.7:	Develop a software artifact (independently and collaboratively) in phases (or stages) according to a common software development methodology (e.g., Waterfall or Spiral model).
SC.912.CS-CS.4.8:	Evaluate the basic components of computer networks.

SC.912.CS-CS.5.1:	Identify and select the most appropriate file format based on trade-offs (e.g., open file formats, text, proprietary and binary formats, compression and encryption formats).
SC.912.CS-CS.5.2:	Describe the issues that impact network functionality (e.g., latency, bandwidth, firewalls and server capability).
SC.912.CS-CS.5.3:	Describe common network protocols, such as IP, TCP, SMTP, HTTP, and FTP, and how these are applied by client-server and peer-to-peer networks.
SC.912.CS-PC.1.1:	Compare and contrast appropriate and inappropriate social networking behaviors.
SC.912.CS-PC.1.2:	Describe and demonstrate ethical and responsible use of modern communication media and devices.
SC.912.CS-PC.1.3:	Evaluate the impacts of irresponsible use of information (e.g., plagiarism and falsification of data) on collaborative projects.
SC.912.CS-PC.1.4:	Explain the principles of cryptography by examining encryption, digital signatures, and authentication methods (e.g., explain why and how certificates are used with "https" for authentication and encryption).
SC.912.CS-PC.1.5:	Implement an encryption, digital signature, or authentication method.
SC.912.CS-PC.1.6:	Describe computer security vulnerabilities and methods of attack, and evaluate their social and economic impact on computer systems and people.
SC.912.CS-PC.2.1:	Describe how the Internet facilitates global communication.
SC.912.CS-PC.2.2:	Identify ways to use technology to support lifelong learning.
SC.912.CS-PC.2.3:	Discuss and analyze the impact of values and points of view that are presented in media messages (e.g., racial, gender, and political).
SC.912.CS-PC.2.4:	Analyze the positive and negative impacts of technology on popular culture and personal life.
SC.912.CS-PC.2.5:	Construct strategies to combat cyberbullying or online harassment.
SC.912.CS-PC.2.6:	Describe the impact of computing on business and commerce (e.g., automated inventory processing, financial transactions, e-commerce, virtualization, and cloud computing).
SC.912.CS-PC.2.7:	Describe how technology has changed the way people build and manage organizations and how technology impacts personal life.
SC.912.CS-PC.2.8:	Evaluate ways in which adaptive technologies may assist users with special needs.
SC.912.CS-PC.2.9:	Explain how societal and economic factors are affected by access to critical information.
SC.912.CS-PC.2.10:	Describe and evaluate the challenges (e.g., political, social, and economic) in providing equal access and distribution of technology in a global society.
SC.912.CS-PC.2.11:	Construct writings and/or communications using developmentally appropriate terminology.
SC.912.CS-PC.2.12:	Explore a variety of careers to which computing is central.
SC.912.CS-PC.2.13:	Predict future careers and the technologies that may exist based on current technology trends.
SC.912.CS-PC.3.1:	Evaluate the quality of digital resources for reliability (i.e., currency, relevancy, authority, accuracy, and purpose of digital information).
SC.912.CS-PC.3.2:	Evaluate the accuracy, relevance, comprehensiveness, appropriateness, and bias of electronic information resources.
SC.912.CS-PC.3.3:	Conduct research using peer reviewed articles, newspapers, magazine articles, and online books.
SC.912.CS-PC.3.4:	Analyze and evaluate public/government resources and describe how using these resources for communication can affect change.
SC.912.CS-PC.4.1:	Describe how different types of software licenses (e.g., open source and proprietary licenses) can be used to share and protect intellectual property.
SC.912.CS-PC.4.2:	Explain how access to information may not include the right to distribute the information.
SC.912.CS-PC.4.3:	Describe differences between open source, freeware, and proprietary software licenses, and how they apply to different types of software.
SC.912.CS-PC.4.4:	Describe security and privacy issues that relate to computer networks.
SC.912.CS-PC.4.5:	Identify computer-related laws and analyze their impact on digital privacy, security, intellectual property, network access, contracts, and harassment.
SC.912.CS-PC.4.6:	Describe security and privacy issues that relate to computer networks including the permanency of data on the Internet, online identity, and privacy.
SC.912.CS-PC.4.7:	Evaluate and use digital citation tools to cite sources.
SC.912.CS-PC.4.8:	Describe the impact of government regulation on privacy and security.
MA.K12.MTR.1.1:	<p>Mathematicians who participate in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Analyze the problem in a way that makes sense given the task.</li> <li>Ask questions that will help with solving the task.</li> <li>Build perseverance by modifying methods as needed while solving a challenging task.</li> <li>Stay engaged and maintain a positive mindset when working to solve tasks.</li> <li>Help and support each other when attempting a new method or approach.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to participate actively in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Cultivate a community of growth mindset learners.</li> <li>Foster perseverance in students by choosing tasks that are challenging.</li> <li>Develop students' ability to analyze and problem solve.</li> <li>Recognize students' effort when solving challenging problems.</li> </ul>
MA.K12.MTR.2.1:	<p>Demonstrate understanding by representing problems in multiple ways.</p> <p>Mathematicians who demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Build understanding through modeling and using manipulatives.</li> <li>Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.</li> <li>Progress from modeling problems with objects and drawings to using algorithms and equations.</li> <li>Express connections between concepts and representations.</li> <li>Choose a representation based on the given context or purpose.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Help students make connections between concepts and representations.</li> <li>Provide opportunities for students to use manipulatives when investigating concepts.</li> <li>Guide students from concrete to pictorial to abstract representations as understanding progresses.</li> <li>Show students that various representations can have different purposes and can be useful in different situations.</li> </ul>
	<p>Complete tasks with mathematical fluency.</p> <p>Mathematicians who complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Select efficient and appropriate methods for solving problems within the given context.</li> <li>Maintain flexibility and accuracy while performing procedures and mental calculations.</li> <li>Complete tasks accurately and with confidence.</li> </ul>

MA.K12.MTR.3.1:

- Adapt procedures to apply them to a new context.
- Use feedback to improve efficiency when performing calculations.

**Clarifications:**

Teachers who encourage students to complete tasks with mathematical fluency:

- Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
- Offer multiple opportunities for students to practice efficient and generalizable methods.
- Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

Engage in discussions that reflect on the mathematical thinking of self and others.  
Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:

- Communicate mathematical ideas, vocabulary and methods effectively.
- Analyze the mathematical thinking of others.
- Compare the efficiency of a method to those expressed by others.
- Recognize errors and suggest how to correctly solve the task.
- Justify results by explaining methods and processes.
- Construct possible arguments based on evidence.

MA.K12.MTR.4.1:

**Clarifications:**

Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:

- Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
- Create opportunities for students to discuss their thinking with peers.
- Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
- Develop students' ability to justify methods and compare their responses to the responses of their peers.

Use patterns and structure to help understand and connect mathematical concepts.  
Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

- Focus on relevant details within a problem.
- Create plans and procedures to logically order events, steps or ideas to solve problems.
- Decompose a complex problem into manageable parts.
- Relate previously learned concepts to new concepts.
- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

MA.K12.MTR.5.1:

**Clarifications:**

Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

Assess the reasonableness of solutions.  
Mathematicians who assess the reasonableness of solutions:

- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

MA.K12.MTR.6.1:

**Clarifications:**

Teachers who encourage students to assess the reasonableness of solutions:

- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

Apply mathematics to real-world contexts.  
Mathematicians who apply mathematics to real-world contexts:

- Connect mathematical concepts to everyday experiences.
- Use models and methods to understand, represent and solve problems.
- Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.

MA.K12.MTR.7.1:

**Clarifications:**

Teachers who encourage students to apply mathematics to real-world contexts:

- Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
- Challenge students to question the accuracy of their models and methods.
- Support students as they validate conclusions by comparing them to the given situation.
- Indicate how various concepts can be applied to other disciplines.

Cite evidence to explain and justify reasoning.

**Clarifications:**

K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.  
2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.  6-8 Students continue with previous skills and use a style guide to create a proper citation.  9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently.  <b>Clarifications:</b> See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension.  <b>Clarifications:</b> Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.  <b>Clarifications:</b> In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _____ because _____." The collaborative conversations are becoming academic conversations.  In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work.  <b>Clarifications:</b> Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing.  <b>Clarifications:</b> In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

## General Course Information and Notes

### VERSION DESCRIPTION

This course introduces students to the foundational concepts of computer science and challenges them to explore how computing and technology can impact the world. Computing is so fundamental to understanding and participating in society that it is valuable for every student to learn as part of a modern education. Computer science can be viewed as a liberal art, a subject that provides students with a critical lens for interpreting the world around them. Computer science prepares all students to be active and informed contributors to our increasingly technological society whether they pursue careers in technology or not. Computer science can be life-changing, not just skill training.

Students learn best when they are intrinsically motivated. This course prioritizes learning experiences that are active, relevant to students' lives, and provide students authentic choice. Students are encouraged to be curious, solve personally relevant problems and to express themselves through creation. Learning is an inherently social activity, so the course is designed to interweave lessons with discussions, presentations, peer feedback, and shared reflections. As students proceed through the pathway, the structures increasingly shift responsibility to students to formulate their own questions, develop their own solutions, and critique their own work.

It is also critical to diversity the technology workforce. Addressing inequities within the field of computer science is critical to bringing computer science to all students. The tools and strategies in this course will help teachers understand and address well-known equity gaps within the field. All students can succeed in computer science when given the right supports and opportunities, regardless of prior knowledge.

#### Additional Information

##### Computer Science Principles

Computer Science Principles introduces students to the foundational concepts of computer science and challenges them to explore how computing and technology can impact the world. More than a traditional introduction to programming, it is a rigorous, engaging, and approachable course that explores many of the foundational ideas of computing, so all students understand how these concepts are transforming the world we live in.

##### Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards:

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit [https://www.cpalms.org/Standards/BEST\\_Standards.aspx](https://www.cpalms.org/Standards/BEST_Standards.aspx) and select the appropriate B.E.S.T. Standards package.

##### English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting

document which delineates performance definitions and descriptors, please click on the following link:  
<https://cpalmsmediaproduct.blob.core.windows.net/uploads/docs/standards/eld/si.pdf>.

### Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE) will need modifications to meet their needs. Modifications change the outcomes and or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course.

### Additional Resources

Additional resources and a free curriculum that may be utilized for this course can be found at <https://curriculum.code.org/csd-18/>.

## QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

In order for this course to be taught with fidelity teachers without a computer science certification or related postsecondary coursework should, at a minimum, have completed a course in computer science such as those offered through a MOOC from a reputable institution or by attending a training such as those offered by code.org.

## GENERAL INFORMATION

**Course Number:** 0200315

**Number of Credits:** One (1) credit

**Course Type:** Core Academic Course

**Course Status:** State Board Approved

**Grade Level(s):** 9,10,11,12

**Graduation Requirement:** Mathematics

**Course Path: Section:** Grades PreK to 12 Education

Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education >

**SubSubject:** General >

**Abbreviated Title:** COMP SCI PRINCIPLES

**Course Length:** Year (Y)

**Course Attributes:**

- Class Size Core Required

**Course Level:** 2

## Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

Business Education (Grades 6-12)

# Advanced Placement Computer Science A (#0200320) 2019 - And Beyond (current)

## General Course Information and Notes

### VERSION DESCRIPTION

The course description for this Advanced Placement courses is located on the College Board site at [http://apcentral.collegeboard.com/apc/public/courses/teachers\\_corner/index.html](http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html).

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200320

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** AP COMPUTER SCI A

**Course Length:** Year (Y)

**Course Attributes:**

- Advanced Placement (AP)

**Course Type:** Core Academic Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

**Graduation Requirement:** Mathematics

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Advanced Placement Computer Science Principles (#0200335) 2019 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

The course description for this Advanced Placement course will be located on the College Board site at [http://apcentral.collegeboard.com/apc/public/courses/teachers\\_corner/index.html](http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html).

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200335

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** AP COMPUTER SCI PRIN

**Course Length:** Year (Y)

**Course Attributes:**

- Advanced Placement (AP)

**Course Type:** Core Academic Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

**Graduation Requirement:** Mathematics

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# AICE Computing 1 AS Level (#0200420) 2014 - And Beyond (current)

## General Course Information and Notes

### VERSION DESCRIPTION

For more information about this Cambridge course, visit <http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/>.

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200420

**Number of Credits:** One (1) credit

**Course Type:** Elective Course

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Abbreviated Title:** AICE COMPUTING 1 AS

**Course Length:** Year (Y)

**Course Attributes:**

- Advanced International Certificate of Education (AICE)

**Course Level:** 3

# AICE Computing 2 A Level (#0200430) 2014 - And Beyond (current)

## General Course Information and Notes

### VERSION DESCRIPTION

For more information about this Cambridge course, visit <http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/>.

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200430

**Number of Credits:** One (1) credit

**Course Type:** Elective Course

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Abbreviated Title:** AICE COMPUTING 2 AL

**Course Length:** Year (Y)

**Course Attributes:**

- Advanced International Certificate of Education (AICE)

**Course Level:** 3

# Cambridge AICE Design and Technology 1 AS Level (#0200460) 2014 - And Beyond (current)

## General Course Information and Notes

### VERSION DESCRIPTION

For more information about this Cambridge course, visit <http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/>.

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200460

**Number of Credits:** One (1) credit

**Course Type:** Elective Course

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Abbreviated Title:** AICE DES & TECH 1 AS

**Course Length:** Year (Y)

**Course Attributes:**

- Advanced International Certificate of Education (AICE)

**Course Level:** 3

# Cambridge Pre-AICE Computer Science IGCSE Level (#0200475) 2020 - And Beyond (current)

## General Course Information and Notes

### VERSION DESCRIPTION

For more information about this Cambridge course, visit <https://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-upper-secondary/cambridge-igcse/curriculum/>.

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

Any field when certification reflects a bachelor or higher degree.

### GENERAL INFORMATION

**Course Number:** 0200475

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** PRE-AICE COMPSCI IG

**Course Type:** Elective Course

**Course Length:** Year (Y)

**Course Status:** Course Approved

**Course Level:** 3

**Grade Level(s):** 9,10,11,12

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Cambridge AICE Computer Science 1 AS Level (#0200480) 2017 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

For more information about this Cambridge course, visit <http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/>.

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200480

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** AICE COMP SCI 1 AS

**Course Length:** Year (Y)

**Course Attributes:**

- Advanced International Certificate of Education (AICE)

**Course Type:** Elective Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Cambridge AICE Computer Science 2 A Level (#0200485) 2017 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

For more information about this Cambridge course, visit <http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/>.

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200485

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** AICE COMP SCI 2 A

**Course Length:** Year (Y)

**Course Attributes:**

- Advanced International Certificate of Education (AICE)

**Course Type:** Elective Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Cambridge AICE Information Technology 1 AS Level (#0200490) 2017 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

For more information about this Cambridge course, visit <http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/>.

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200490

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** AICE INFO TECH 1 AS

**Course Length:** Year (Y)

**Course Attributes:**

- Advanced International Certificate of Education (AICE)

**Course Type:** Elective Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Cambridge AICE Information Technology 2 A Level (#0200495) 2017 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

For more information about this Cambridge course, visit <http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/>.

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200495

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** AICE INFO TECH 2 A

**Course Length:** Year (Y)

**Course Attributes:**

- Advanced International Certificate of Education (AICE)

**Course Type:** Elective Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# Cambridge Pre-AICE Information & Communication Technology IGCSE Level (#0200500) 2021 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

For more information about this Cambridge course, visit <https://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-upper-secondary/cambridge-igcse/subjects/>.

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

Any field when certification reflects a bachelor or higher degree.

### GENERAL INFORMATION

**Course Number:** 0200500

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** PRE-AICE INF/COM TEC

**Course Length:** Year (Y)

**Course Attributes:**

- Advanced International Certificate of Education (AICE)

**Course Type:** Elective Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# International Baccalaureate Computer Science 1 (#0200800) 2019 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

The curriculum description for this IB course is provided at:  
<http://www.ibo.org/en/programmes/>

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200800

**Number of Credits:** One (1) credit

**Course Type:** Core Academic Course

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

**Graduation Requirement:** Equally Rigorous Science

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Abbreviated Title:** IB COMPTR SCIENCE 1

**Course Length:** Year (Y)

**Course Attributes:**

- International Baccalaureate (IB)

**Course Level:** 3

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# International Baccalaureate Computer Science 2 (#0200810) 2019 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

The curriculum description for this IB course is provided at:  
<http://www.ibo.org/en/programmes/>

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200810

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** IB COMPTR SCIENCE 2

**Course Length:** Year (Y)

**Course Attributes:**

- International Baccalaureate (IB)

**Course Type:** Core Academic Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

**Graduation Requirement:** Equally Rigorous Science

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# International Baccalaureate Computer Science 3 (#0200820) 2019 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

The curriculum description for this IB course is provided at:  
<http://www.ibo.org/en/programmes/>

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200820

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** IB COMPTR SCIENCE 3

**Course Length:** Year (Y)

**Course Attributes:**

- International Baccalaureate (IB)

**Course Type:** Core Academic Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

**Graduation Requirement:** Equally Rigorous Science

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# International Baccalaureate Design Technology (#0200830) 2014 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

The curriculum description for this IB course is provided at:  
<http://www.ibo.org/en/programmes/>

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200830

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** IB MYP DESIGN TECH

**Course Length:** Year (Y)

**Course Attributes:**

- International Baccalaureate (IB)

**Course Type:** Elective Course

**Course Level:** 3

**Course Status:** Course Approved

### Educator Certifications

Computer Science (Elementary and Secondary Grades K-12)

# International Baccalaureate Information Technology in Global Society 1 (#0200890) 2014 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

The curriculum description for this IB course is provided at:  
<http://www.ibo.org/en/programmes/>

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200890

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** IB INFO TECH SOC 1

**Course Length:** Year (Y)

**Course Attributes:**

- International Baccalaureate (IB)

**Course Type:** Elective Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

# International Baccalaureate Information Technology in Global Society 2 (#0200900) 2014 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

The curriculum description for this IB course is provided at:  
<http://www.ibo.org/en/programmes/>

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200900

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** IB INFO TECH SOC 2

**Course Length:** Year (Y)

**Course Attributes:**

- International Baccalaureate (IB)

**Course Type:** Elective Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

# International Baccalaureate Information Technology in Global Society 3 (#0200910) 2014 - And Beyond (current)

## General Course Information and Notes

### GENERAL NOTES

The curriculum description for this IB course is provided at:  
<http://www.ibo.org/en/programmes/>

### QUALIFICATIONS

As well as any certification requirements listed on the course description, the following qualifications may also be acceptable for the course:

**Any field when certification reflects a bachelor or higher degree.**

### GENERAL INFORMATION

**Course Number:** 0200910

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General >

**Number of Credits:** One (1) credit

**Abbreviated Title:** IB INFO TECH SOC 3

**Course Length:** Year (Y)

**Course Attributes:**

- International Baccalaureate (IB)

**Course Type:** Elective Course

**Course Level:** 3

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

# Information Technology Competency Examination (#0200985) 2016 - And Beyond (current)

## General Course Information and Notes

### VERSION DESCRIPTION

#### Online Course Requirement

The Online Course Requirement required under Section 1003.4282(4), F.S., requires that at least one course within the 24 credit required for a standard high school diploma must be completed through online learning.

This course number indicate the requirement has been met for a student who has:

- Completed a course in which a student earns a nationally-recognized industry certification in information technology (as identified on the CAPE Industry Certification Funding List); or,
- Passed an information technology certification examination without enrollment in or completion of the corresponding course.

### GENERAL INFORMATION

**Course Number:** 0200985

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General > **Abbreviated Title:** IT COMPETENCY EXAM  
**Course Length:** Not Applicable

**Course Type:** Course Waiver

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

# Computer Education Transfer (#0200990) 2015 - 2022 (current)

## General Course Information and Notes

### GENERAL NOTES

#### SUBJECT AREA TRANSFER NUMBERS

Each course transferred into a Florida public school by an out-of-state or non-public school student should be matched with a course title and number when such course provides substantially the same content. However, a few transfer courses may not be close enough in content to be matched. For those courses a subject area transfer number is provided.

### GENERAL INFORMATION

**Course Number:** 0200990

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General > **Abbreviated Title:** CPTR ED TRAN  
**Course Length:** Not Applicable

**Course Type:** Transfer Course

**Course Status:** Course Approved

**Grade Level(s):** 9,10,11,12

## Course Standards

Name	Description
MA.K12.MTR.1.1:	<p>Mathematicians who participate in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Analyze the problem in a way that makes sense given the task.</li> <li>Ask questions that will help with solving the task.</li> <li>Build perseverance by modifying methods as needed while solving a challenging task.</li> <li>Stay engaged and maintain a positive mindset when working to solve tasks.</li> <li>Help and support each other when attempting a new method or approach.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to participate actively in effortful learning both individually and with others:</p> <ul style="list-style-type: none"> <li>Cultivate a community of growth mindset learners.</li> <li>Foster perseverance in students by choosing tasks that are challenging.</li> <li>Develop students' ability to analyze and problem solve.</li> <li>Recognize students' effort when solving challenging problems.</li> </ul>
MA.K12.MTR.2.1:	<p>Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Build understanding through modeling and using manipulatives.</li> <li>Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.</li> <li>Progress from modeling problems with objects and drawings to using algorithms and equations.</li> <li>Express connections between concepts and representations.</li> <li>Choose a representation based on the given context or purpose.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:</p> <ul style="list-style-type: none"> <li>Help students make connections between concepts and representations.</li> <li>Provide opportunities for students to use manipulatives when investigating concepts.</li> <li>Guide students from concrete to pictorial to abstract representations as understanding progresses.</li> <li>Show students that various representations can have different purposes and can be useful in different situations.</li> </ul>
MA.K12.MTR.3.1:	<p>Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Select efficient and appropriate methods for solving problems within the given context.</li> <li>Maintain flexibility and accuracy while performing procedures and mental calculations.</li> <li>Complete tasks accurately and with confidence.</li> <li>Adapt procedures to apply them to a new context.</li> <li>Use feedback to improve efficiency when performing calculations.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to complete tasks with mathematical fluency:</p> <ul style="list-style-type: none"> <li>Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.</li> <li>Offer multiple opportunities for students to practice efficient and generalizable methods.</li> <li>Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.</li> </ul>
MA.K12.MTR.4.1:	<p>Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Communicate mathematical ideas, vocabulary and methods effectively.</li> <li>Analyze the mathematical thinking of others.</li> <li>Compare the efficiency of a method to those expressed by others.</li> <li>Recognize errors and suggest how to correctly solve the task.</li> <li>Justify results by explaining methods and processes.</li> <li>Construct possible arguments based on evidence.</li> </ul> <p><b>Clarifications:</b> Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:</p> <ul style="list-style-type: none"> <li>Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.</li> <li>Create opportunities for students to discuss their thinking with peers.</li> <li>Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.</li> <li>Develop students' ability to justify methods and compare their responses to the responses of their peers.</li> </ul>
	<p>Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:</p> <ul style="list-style-type: none"> <li>Focus on relevant details within a problem.</li> <li>Create plans and procedures to logically order events, steps or ideas to solve problems.</li> <li>Decompose a complex problem into manageable parts.</li> </ul>

MA.K12.MTR.5.1:

- Relate previously learned concepts to new concepts.
- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

**Clarifications:**

Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

Assess the reasonableness of solutions.

Mathematicians who assess the reasonableness of solutions:

- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

MA.K12.MTR.6.1:

**Clarifications:**

Teachers who encourage students to assess the reasonableness of solutions:

- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

Apply mathematics to real-world contexts.

Mathematicians who apply mathematics to real-world contexts:

- Connect mathematical concepts to everyday experiences.
- Use models and methods to understand, represent and solve problems.
- Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.

MA.K12.MTR.7.1:

**Clarifications:**

Teachers who encourage students to apply mathematics to real-world contexts:

- Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
- Challenge students to question the accuracy of their models and methods.
- Support students as they validate conclusions by comparing them to the given situation.
- Indicate how various concepts can be applied to other disciplines.

Cite evidence to explain and justify reasoning.

**Clarifications:**

K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.

2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.

6-8 Students continue with previous skills and use a style guide to create a proper citation.

9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

ELA.K12.EE.1.1:

Read and comprehend grade-level complex texts proficiently.

**Clarifications:**

See Text Complexity for grade-level complexity bands and a text complexity rubric.

ELA.K12.EE.2.1:

Make inferences to support comprehension.

**Clarifications:**

Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

ELA.K12.EE.3.1:

Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

**Clarifications:**

In kindergarten, students learn to listen to one another respectfully.

In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think \_\_\_\_\_ because \_\_\_\_\_." The collaborative conversations are becoming academic conversations.

In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

ELA.K12.EE.4.1:

Use the accepted rules governing a specific format to create quality work.

**Clarifications:**

Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to

ELA.K12.EE.5.1:

	do quality work.
	Use appropriate voice and tone when speaking or writing.
ELA.K12.EE.6.1:	<b>Clarifications:</b> In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.

## General Course Information and Notes

### GENERAL NOTES

#### SUBJECT AREA TRANSFER NUMBERS

Each course transferred into a Florida public school by an out-of-state or non-public school student should be matched with a course title and number when such course provides substantially the same content. However, a few transfer courses may not be close enough in content to be matched. For those courses a subject area transfer number is provided.

#### Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit [https://www.cpalms.org/Standards/BEST\\_Standards.aspx](https://www.cpalms.org/Standards/BEST_Standards.aspx) and select the appropriate B.E.S.T. Standards package.

### GENERAL INFORMATION

**Course Number:** 0200990

**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Computer Education > **SubSubject:** General > **Abbreviated Title:** CPTR ED TRAN  
**Course Length:** Not Applicable

**Course Type:** Transfer Course

**Course Status:** State Board Approved

**Grade Level(s):** 9,10,11,12

