

**Exploring  
Computer  
Science**

**Curriculum Mapping to Learning Standards**  
CA CTE Edition

## Acknowledgements

*Exploring Computer Science: Curriculum Mapping to Learning Standards* was developed by the Center for Technology in Learning at SRI International with support from the National Science Foundation under contract numbers, CNS-1132232 and CNS-1240625.

The California CTE standards included here are from the Information and Communication Technologies sector standards found at <http://www.cde.ca.gov/ci/ct/sf/ctemcstandards.asp>. The same numbering scheme is used here as in the CTE documents.



## Unit by Unit Overview of the ECS Curriculum Mapping to the new California CTE Standards

UNIT	UNIT OBJECTIVES	COMPUTATIONAL PRACTICES	NEW CA CTE STANDARDS - ICT SECTOR	NEW CA CTE STANDARDS - ICT SECTOR
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1	<ul style="list-style-type: none"> <li>* Analyze the characteristics of hardware components to determine the applications for which they can be used.</li> <li>* Use appropriate tools and methods to execute Internet searches which yield requested data.</li> <li>* Evaluate the results of web searches and the reliability of information found on the Internet.</li> <li>* Explain the differences between tasks that can and cannot be accomplished with a computer.</li> <li>* Analyze the effects of computing on society within economic, social, and cultural contexts.</li> <li>* Communicate legal and ethical concerns</li> </ul>	<ul style="list-style-type: none"> <li>* Analyze the effects of developments in Computing</li> <li>* Design and implement creative solutions and artifacts.</li> <li>* Apply abstractions and models.</li> <li>* Connect computation with other disciplines.</li> <li>* Communicate thought processes and results.</li> <li>* Work effectively in teams.</li> </ul>	<ul style="list-style-type: none"> <li>* 2.3 Interpret verbal [and nonverbal] communications and respond appropriately.</li> <li>* 2.5 Communicate information and ideas effectively [to multiple audiences] using a variety of media and formats.</li> <li>* 2.7 Use [technical writing and] communication skills to work effectively [with diverse groups of people.]</li> <li>* 4.4 Discern the quality and value of information collected using digital technologies, and recognize bias and intent of the associated sources.</li> <li>* 5.4 Interpret information and draw conclusions, based on the best analysis, to make informed decisions.</li> <li>* 8.8 Identify legal and ethical issues that have proliferated with increased technology adoption, including [hacking, scamming, and] breach of privacy.</li> <li>* 10.1 Interpret and explain terminology [and practices] specific to the Information and Communication Technologies sector.</li> <li>* 10.5 Understand the major [software and] hardware components of a computer [and a network and how they relate to each other].</li> <li>* 10.6 Understand data sizes of various types of information (text, pictures, sound, video, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>* 2.1 Recognize the elements of communication using a sender–receiver model.</li> <li>* 2.2 Identify barriers to accurate and appropriate communication.</li> <li>* 2.4 Demonstrate elements of written [and electronic] communication such as accurate spelling, grammar, and format.</li> <li>* 2.6 [Advocate and] practice safe, [legal,] and responsible use of digital media information and communications technologies.</li> <li>* 2.8 Understand the principles of a customer-oriented service approach to users.</li> <li>* 5.1 Identify and ask significant questions that clarify various points of view to solve problems.</li> <li>* 7.4 Practice time management and efficiency to fulfill responsibilities.</li> <li>* 7.5 Apply high-quality techniques to product or presentation design and development.</li> <li>* 9.2 Identify the characteristics of successful teams, including leadership, cooperation, collaboration, and effective decision-making skills as applied in groups, teams, and career technical student organization activities.</li> <li>* 9.3 Understand the characteristics and benefits of teamwork, [leadership, and citizenship] in the school, community, and workplace setting.</li> </ul>

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	<p>raised by computing innovation.</p> <p>* Explain the implications of communication as data exchange.</p>		<p>and data capacity of various forms of media.</p> <p>* 10.9 Use common industry-standard software and their applications including [word processing, spreadsheets, databases, and] multimedia software.</p> <p>* 10.12 Know appropriate search procedures for different types of information, sources, and queries.</p> <p>* 10.13 Evaluate the accuracy, relevance, and comprehensiveness of retrieved information.</p> <p>* A3.5 Use multiple online search techniques and resources to acquire information.</p> <p>* C6.3 Use media design and editing software: [keyframe animation,] drawing software, image editors, [and three-dimensional design.]</p> <p>* C6.7 Create and/or capture professional-quality media, images, [documents, audio, and video clips].</p> <p>* C10.1 Describe models of intelligent behavior and what distinguishes humans from machines.</p>	<p>* 9.5 Understand that the modern world is an international community and requires an expanded global view.</p> <p>* 9.7 Participate in interactive teamwork to solve real Information and Communication Technologies sector issues and problems.</p> <p>* A2.1 Identify and list the criteria [and processes] for evaluating the functions of information systems.</p> <p>* A2.2 Investigate, evaluate, select, and [use] major types of [software, services, and] vendors.</p>
2	<p>* Name and explain the steps they use in solving a problem.</p> <p>* Solve a problem by applying appropriate problem-solving techniques.</p> <p>* Express a solution using standard design</p>	<p>* Analyze the effects of developments in computing.</p> <p>* Apply abstractions and models.</p> <p>* Connect computation</p>	<p>* 2.3 Interpret verbal and nonverbal communications and respond appropriately.</p> <p>* 2.4 Demonstrate elements of written [and electronic] communication such as accurate spelling, grammar, and format.</p> <p>* 2.5 Communicate information and ideas effectively [to multiple audiences] using a variety of media and formats.</p>	<p>* 4.4 Discern the quality and value of information collected using digital technologies, and recognize bias and intent of the associated sources.</p> <p>* 5.2 Solve predictable and unpredictable work-related problems using various types of reasoning (inductive, deductive) as appropriate.</p> <p>* 7.4 Practice time management and efficiency to fulfill responsibilities.</p>

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	<p>tools.</p> <p>* Determine if a given algorithm successfully solves a stated problem.</p> <p>* Create algorithms that meet specified objectives.</p> <p>* Explain the connections between binary numbers and computers.</p> <p>* Summarize the behavior of an algorithm.</p> <p>* Compare the tradeoffs between different algorithms for solving the same problem.</p> <p>* Explain the characteristics of problems that cannot be solved by an algorithm.</p>	<p>with other disciplines.</p> <p>* Communicate thought processes and results.</p> <p>* Work effectively in teams.</p>	<p>* 5.1 Identify and ask significant questions that clarify various points of view to solve problems.</p> <p>* 5.4 Interpret information and draw conclusions, based on the best analysis, to make informed decisions.</p> <p>* 5.5 Use a logical and structured approach to [isolate and identify the source of problems and to] resolve problems.</p> <p>* 5.7 Work out problems iteratively and recursively.</p> <p>* 5.8 Create and use algorithms and solve problems.</p> <p>* 5.5 Use a logical and structured approach to [isolate and identify the source of problems and to] resolve problems.</p> <p>* 5.10 Use [multiple layers of] abstraction.</p> <p>* 5.11 Understand the concept of base systems, including binary [and hexadecimal].</p> <p>* 8.8 Identify legal and ethical issues that have proliferated with increased technology adoption, including [hacking, scamming, and] breach of privacy.</p> <p>* C4.10 Create and know the comparative advantages of various [queue, sorting, and] searching algorithms.</p> <p>* C6.3 Use media design and editing software: keyframe animation, drawing software, image editors, and three-dimensional design.</p>	<p>* 7.5 Apply high-quality techniques to product or presentation design and development.</p> <p>* 9.3 Understand the characteristics and benefits of teamwork, [leadership, and citizenship] in the school, [community, and workplace setting.]</p> <p>* 9.6 Respect individual [and cultural] differences and recognize the importance of diversity [in the workplace].(gallery walk)</p>

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			* C8.8 Analyze and display data to assist with decision making using methods like [cross tabulations,] graphs, and charts.	
3	<ul style="list-style-type: none"> <li>* Create web pages to address specified objectives.</li> <li>* Create web pages with a practical, personal, and/or societal purpose.</li> <li>* Select appropriate techniques when creating web pages.</li> <li>* Use abstraction to separate style from content in web page design and development.</li> <li>* Describe the use of a website with appropriate documentation.</li> </ul>	<ul style="list-style-type: none"> <li>* Analyze the effects of developments in computing.</li> <li>* Design and implement creative solutions and artifacts.</li> <li>* Apply abstractions and models.</li> <li>* Analyze their computational work and the work of others.</li> <li>* Communicate thought processes and results.</li> </ul>	<ul style="list-style-type: none"> <li>* C4.6 Use proper programming language syntax.</li> <li>* C6.1 Identify the basic design elements necessary to produce effective [print, video, audio, and] interactive media.</li> <li>* C6.3 Use media design and editing software: keyframe animation, drawing software, image editors, and three-dimensional design.</li> <li>* C6.6 Integrate media into a full project using appropriate tools.</li> <li>* C7.5 Create an online project, [Web-based business, and e-portfolio.]</li> </ul>	<ul style="list-style-type: none"> <li>* 2.4 Demonstrate elements of written and electronic communication such as accurate spelling, grammar, and format.</li> <li>* 2.5 Communicate information and ideas effectively [to multiple audiences] using a variety of media and formats.</li> <li>* 2.6 Advocate and practice safe, [legal, and responsible] use of digital media information and communications technologies.</li> <li>* 5.9 Deconstruct large problems into components to solve.</li> <li>* 5.10 Use multiple layers of abstraction.</li> <li>* 7.4 Practice time management and efficiency to fulfill responsibilities.</li> <li>* 7.5 Apply high-quality techniques to product or presentation design and development.</li> <li>* 8.6 Adhere to copyright and intellectual property laws and regulations, and use and appropriately cite proprietary information.</li> <li>* 9.6 Respect individual [and cultural] and recognize the importance of diversity in the workplace] (peer reviews, gallery walks)C5.4 Test software and projects.</li> <li>* C4.2 Describe the interaction and integration of programming languages and protocols [such as how</li> </ul>

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				<p>client-side programming can work with server-side programming to use a query language to access a database.]</p> <p>* C5.5 Evaluate results against initial requirements.</p> <p>* C6.4 Develop a presentation or other multimedia project: [video, game, or interactive] Web sites, from storyboard to production.10.8 Understand security concepts including authorization, [rights, and encryption.]</p> <p>* C6.5 Analyze the use of media to determine the appropriate file format and [level of compression.]</p>
4	<ul style="list-style-type: none"> <li>* Use appropriate algorithms to solve a problem.</li> <li>* Design, code, test, and execute a program that corresponds to a set of specifications.</li> <li>* Select appropriate programming structures.</li> <li>* Locate and correct errors in a program.</li> <li>* Explain how a particular program functions.</li> <li>* Justify the correctness of a</li> </ul>	<ul style="list-style-type: none"> <li>* Design and implement creative solutions and artifacts.</li> <li>* Analyze their computational work and the work of others.</li> <li>* Connect computation with other disciplines.</li> <li>* Communicate thought processes and results.</li> </ul>	<ul style="list-style-type: none"> <li>* 2.3 Interpret verbal and nonverbal communications and respond appropriately.</li> <li>* 2.5 Communicate information and ideas effectively [to multiple audiences using a variety of media and formats.]</li> <li>* 5.8 Create and use algorithms and solve problems.</li> <li>* 10.1 Interpret and explain terminology and practices specific to the Information and Communication Technologies sector.</li> <li>* C4.5 Demonstrate awareness of various programming paradigms, including [procedural, object oriented,] event-driven, [and multithreaded] programming.</li> <li>* C4.6 Use proper programming language syntax.</li> <li>* C4.9 Create programs using control structures, procedures, [functions, parameters, variables,</li> </ul>	<ul style="list-style-type: none"> <li>* 2.4 Demonstrate elements of written [and electronic] communication such as accurate spelling, grammar, and format.</li> <li>* 5.9 Deconstruct large problems into components to solve.</li> <li>* 9.6 Respect individual [and cultural] differences and recognize the importance of diversity [in the workplace.]</li> <li>* C3.1 Describe and apply the basic process of input, processing, and output.</li> <li>* C4.3 [Identify and] use [different] authoring tools [and integrated development environments (IDEs).]</li> <li>* C5.4 Test software and projects.</li> <li>* C5.5 Evaluate results against initial requirements.</li> <li>* A6.2 Use a logical and structured approach to isolate and identify the source of problems and to resolve</li> </ul>

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	program.		error recovery, and recursion.]	problems.
	* Create programs with practical, personal, and/or societal intent.		* C5.5 Evaluate results against initial requirements.  * C6.4 Develop a presentation or other multimedia project: video, game, or interactive Web sites, from storyboard to production.  * C6.6 Integrate media into a full project using appropriate tools.  * D3.3 Using simple game development tools, create a game or simulation.  * D3.4 Present the game or simulation.	
5	* Describe the features of appropriate data sets for specific problems.  * Apply a variety of analysis techniques to large data sets.  * Use computers to find patterns in data and test hypotheses about data.  * Compare different analysis techniques and discuss the tradeoffs among them.  * Justify conclusions drawn from data	* Analyze the effects of developments in computing.  * Design and implement creative solutions and artifacts.  * Analyze their computational work and the work of others.  * Connect computation with other disciplines.	* 2.3 Interpret verbal and nonverbal communications and respond appropriately.  * 5.2 Solve predictable and unpredictable [work-related] problems using various types of reasoning (inductive, deductive) as appropriate.  * 5.4 Interpret information and draw conclusions, based on the best analysis, to make informed decisions.  * 7.8 Explore issues of global significance and document the impact on the Information and Communication Technologies sector.  * 8.8 Identify legal and ethical issues that have proliferated with increased technology adoption, including [hacking, scamming, and] breach of privacy.  * 9.7 Participate in interactive teamwork to solve [real] Information and Communication	* 2.4 Demonstrate elements of written [and electronic] communication such as accurate spelling, grammar, and format.  * 2.6 Advocate and practice safe, legal, and responsible use of digital media information and communications technologies.  * 4.4 Discern the quality and value of information collected using digital technologies, and recognize bias and intent of the associated sources.  * 5.1 Identify and ask significant questions that clarify various points of view to solve problems.  * 7.2 Explain the importance of accountability and responsibility in fulfilling personal, community, and workplace roles.  * 8.3 Demonstrate ethical and legal practices consistent with Information and Communication Technologies sector workplace standards.



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	analysis.	<ul style="list-style-type: none"> <li>* Communicate thought processes and results.</li> <li>* Work effectively in teams.</li> </ul>	<ul style="list-style-type: none"> <li>Technologies sector issues and problems.</li> <li>* 10.1 Interpret and explain terminology and practices specific to the Information and Communication Technologies sector.</li> <li>* C6.4 Develop a presentation or other multimedia project: video, game, or interactive Web sites, from storyboard to production.</li> <li>* C8.5 Use queries to extract and [manipulate data] (select queries, action queries).</li> <li>* C8.8 Analyze and display data [to assist with decision making] using methods like cross tabulations, graphs, and charts</li> </ul>	<ul style="list-style-type: none"> <li>* 9.2 Identify the characteristics of successful teams, including leadership, cooperation, collaboration, and effective decision-making skills as applied in groups, teams, and career technical student organization activities.</li> <li>* 9.3 Understand the characteristics and benefits of teamwork, [leadership, and citizenship] in the school, [community, and workplace setting.]</li> <li>* 10.2 Comply with the rules, regulations, and expectations of all aspects of the Information and Communication Technologies sector.</li> </ul>
6	<ul style="list-style-type: none"> <li>* Identify the criteria that describe a robot and determine if something is a robot.</li> <li>* Match the actions of the robot to the corresponding parts of the program.</li> <li>* Build, code, and test a robot that solves a stated problem.</li> <li>* Explain ways in which different hardware designs affect the function of a machine.</li> <li>* Describe the tradeoffs among multiple ways</li> </ul>	<ul style="list-style-type: none"> <li>* Design and implement creative solutions and artifacts.</li> <li>* Communicate thought processes and results.</li> <li>* Work effectively in teams.</li> </ul>	<ul style="list-style-type: none"> <li>* 2.3 Interpret verbal and nonverbal communications and respond appropriately.</li> <li>* 2.5 Communicate information and ideas effectively [to multiple audiences using a variety of media and formats.]</li> <li>* 4.1 Use electronic reference materials to gather information and produce products and services.</li> <li>* 5.4 Interpret information and draw conclusions, based on the best analysis, to make informed decisions.</li> <li>* 5.5 Use a logical and structured approach to isolate and identify the source of problems and to resolve problems.</li> <li>* 5.8 Create and use algorithms and solve problems.</li> <li>* 5.12 Apply the concepts of Boolean logic to</li> </ul>	<ul style="list-style-type: none"> <li>* 2.4 Demonstrate elements of written [and electronic] communication such as accurate spelling, grammar, and format.</li> <li>* 2.7 Use technical [writing and] communication skills to work effectively with diverse groups of people.</li> <li>* 5.7 Work out problems iteratively and recursively.</li> <li>* 7.2 Explain the importance of accountability and responsibility in fulfilling personal, community, and workplace roles.</li> <li>* 7.4 Practice time management and efficiency to fulfill responsibilities.</li> <li>* 9.2 Identify the characteristics of successful teams, including leadership, cooperation, collaboration, and effective decision-making skills as applied in groups, teams, and career technical student organization activities.</li> </ul>

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	to program a robot to achieve a goal.		<p>decision making [and searching.]</p> <ul style="list-style-type: none"> <li>* 9.7 Participate in interactive teamwork to solve real Information and Communication Technologies sector issues and problems.</li> <li>* 10.1 Interpret and explain terminology and practices specific to the Information and Communication Technologies sector.</li> <li>* A6.2 Use a logical and structured approach to isolate and identify the source of problems and to resolve problems.</li> <li>* A6.6 Distinguish types of symptoms and which component's issue could exhibit those symptoms: [the user,] hardware, [network,] or software.</li> <li>* C1.4 Work as a member of, and within the scope and boundaries of, a development project team.</li> <li>* C3.1 Describe and apply the basic process of input, processing, and output.</li> <li>* C4.9 Create programs using control structures, [procedures, functions, parameters, variables, error recovery, and recursion.]</li> <li>* C5.4 Test software and projects.</li> <li>* C5.5 Evaluate results against initial requirements.</li> <li>* C9.1 Demonstrate awareness of the applications of device development work, including personalized computing, robotics, and smart appliances.</li> </ul>	<ul style="list-style-type: none"> <li>* 9.3 Understand the characteristics and benefits of teamwork, [leadership, and citizenship] in the school, [community, and workplace setting.]</li> <li>* C1.1 Identify the phases of the systems</li> <li>* C1.3 Identify and describe how specifications and requirements are developed for new [and existing] software applications.</li> </ul>

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			<ul style="list-style-type: none"> <li>* C9.2 Install equipment, assemble hardware, [and perform tests using appropriate tools and technology.]</li> <li>* C9.3 Use hardware to gain input, process information, and take action.</li> <li>* C9.4 Apply the concepts of embedded programming, including digital logic, machine-level representation of data, and memory-system organization.</li> <li>* C9.5 Program a micro-controller for a device or robot.</li> </ul>	