Exploring Computer Science

Curriculum Mapping to Learning Standards

State Standards Edition

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The California standards included here are from http://www.cde.ca.gov/be/st/ss/ and the Illinois standards are from http://www.isbe.net/ils/default.htm. The same numbering scheme is used here as in the original documents.

Unit by Unit Overview of the ECS Curriculum Mapping to State Learning Standards

Unit	Unit Objectives	Computational Practices	California Standards	Illinois Standards
1	* Analyze the characteristics of hardware components to determine the applications for which they can be used. * Use appropriate tools and methods to execute Internet searches which yield requested data. * Evaluate the results of web searches and the reliability of information found on the Internet. * Explain the differences between tasks that can and cannot be accomplished with a computer. * Analyze the effects of computing on society within economic, social, and cultural contexts. * Communicate legal and ethical concerns raised by computing innovation. * Explain the implications of communication as data exchange.	* Analyze the effects of developments in Computing * Design and implement creative solutions and artifacts. * Apply abstractions and models. * Connect computation with other disciplines. * Communicate thought processes and results * Work effectively in teams	* Geometry California Standards Test - Logic and Geometric Proofs Cluster: Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement. (3.0) * Investigation and Experimentation Cluster - Earth Science, Biology, Chemistry: Formulate explanations by using logic and evidence (ESIE1.d) * California High School Exit Exam -- Math - Mathematical Reasoning: Develop generalizations of the results obtained and the strategies used and apply them to new problem situations (3.3)	* Reading - Goal 1 - 1.C.4c: Interpret, evaluate and apply information from a variety of sources to other situations (e.g., academic, vocational, technical, personal). * Reading - Goal 1 - 1.C.4d: Summarize and make generalizations from content and relate them to the purpose of the material. * Listen and Speak - Goal 4 - 4.A.4a: Apply listening skills as individuals and members of a group in a variety of settings (e.g., lectures, discussions, conversations, team projects, presentations, interviews). * Listen and Speak - Goal 4 - 4.B.4a: Deliver planned informative and persuasive oral presentations using visual aids and contemporary technology as individuals and members of a group; demonstrate organization, clarity, vocabulary, credible and accurate supporting evidence. * Listen and Speak - Goal 4 - 4.B.4b: Use group discussion skills to assume leadership and participant roles within an assigned project or to reach a group goal. * Science - Goal 11 - 11.A.4f: Using available technology, report, display

				and defend to an audience conclusions drawn from investigations. * Geometry - Goal 9 - 9.A.5: Use geometric figures and their properties to solve problems in the arts, the physical and life sciences and the building trades, with and without the use of technology.
2	* Name and explain the steps they use in solving a problem. * Solve a problem by applying appropriate problem-solving techniques. * Express a solution using standard design tools. * Determine if a given algorithm successfully solves a stated problem. * Create algorithms that meet specified objectives. * Explain the connections between binary numbers and computers. * Summarize the behavior of an algorithm. * Compare the tradeoffs between different algorithms for solving the same problem. * Explain the characteristics of problems that cannot be solved by an algorithm.	* Analyze the effects of developments in computing. * Apply abstractions and models. * Connect computation with other disciplines. * Communicate thought processes and results. * Work effectively in teams.	* Geometry California Standards Test - Logic and Geometric Proofs Cluster: Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement. (3.0) * Algebra II California Standards Test - Series, Combinatorics, and Probability and Statistics Clusters: Students apply the method of mathematical induction to prove general statements about the positive integers (21.0) * California High School Exit Exam -- Math - Mathematical Reasoning: Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns (1.1) * California High School Exit Exam -- Math - Mathematical Reasoning: Make and test conjectures by using both inductive and deductive reasoning (2.4) * California High School Exit Exam -- Math - Mathematical Reasoning: Develop generalizations of the results obtained and the strategies used and apply them to new problem situations (3.3)	* Listen and Speak - Goal 4 - 4.A.4a: Apply listening skills as individuals and members of a group in a variety of settings (e.g., lectures, discussions, conversations, team projects, presentations, interviews). * Listen and Speak - Goal 4 - 4.B.4a: Deliver planned informative and persuasive oral presentations using visual aids and contemporary technology as individuals and members of a group; demonstrate organization, clarity, vocabulary, credible and accurate supporting evidence. * Listen and Speak - Goal 4 - 4.B.4b: Use group discussion skills to assume leadership and participant roles within an assigned project or to reach a group goal. * Algebra - Goal 8 - 8.A.4b: Represent mathematical patterns and describe their properties using variables and mathematical symbols. * Geometry - Goal 9 - 9.A.5: Use geometric figures and their properties to solve problems in the arts, the

			* California Standards Tests in Science Investigation and Experimentation Cluster - Life Science (Grade 10): Evaluate the accuracy and reproducibility of data (8SIE9.b) * California Standards Tests in Science Investigation and Experimentation Cluster - Life Science (Grade 10): Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions (BIIE1.c.) * Investigation and Experimentation Cluster - Earth Science, Biology, Chemistry: Formulate explanations by using logic and evidence (ESIE1.d)	physical and life sciences and the building trades, with and without the use of technology. * Science - Goal 11 - 11.A.4c: Collect, organize and analyze data accurately and precisely. * Science - Goal 11 - 11.A.4f: Using available technology, report, display and defend to an audience conclusions drawn from investigations. * Science - Goal 11 - 11.B.4c: Develop working visualizations of the proposed solution designs. * Science - Goal 11 - 11.B.4e: Develop and test a prototype or simulation of the solution design using available materials, instruments and technology. * Data Analysis - Goal 10 - 10.B.4: Design and execute surveys or experiments, gather data to answer relevant questions, and communicate results and conclusions to an audience using traditional methods and contemporary technology.
3	* Create web pages to address specified objectives. * Create web pages with a practical, personal, and/or societal purpose. * Select appropriate techniques when creating web pages. * Use abstraction to separate style from content in web page design	* Analyze the effects of developments in computing. * Design and implement creative solutions and artifacts.	* California High School Exit Exam -- Math - Mathematical Reasoning: Develop generalizations of the results obtained and the strategies used and apply them to new problem situations (3.3) * Geometry California Standards Test: Logic and Geometric Proofs Cluster - Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement (3.0)	* Listen and Speak - Goal 4 - 4.A.4a: Apply listening skills as individuals and members of a group in a variety of settings (e.g., lectures, discussions, conversations, team projects, presentations, interviews). * Listen and Speak - Goal 4 - 4.B.4b: Use group discussion skills to assume leadership and participant roles within an assigned project or to reach a group

	and development. * Describe the use of a website with appropriate documentation.	* Apply abstractions and models. * Analyze their computational work and the work of others. * Communicate thought processes and results.		goal. * Science - Goal 11 - 11.B.4c: Develop working visualizations of the proposed solution designs (e.g., blueprints, schematics, flowcharts, cad-cam, animations). * Science - Goal 11 - 11.B.4e: Develop and test a prototype or simulation of the solution design using available materials, instruments and technology. * Science - Goal 11 - 11.B.4e: Develop and test a prototype or simulation of the solution design using available materials, instruments and technology.
4	* Use appropriate algorithms to solve a problem. * Design, code, test, and execute a program that corresponds to a set of specifications. * Select appropriate programming structures. * Locate and correct errors in a program. * Explain how a particular program functions. * Justify the correctness of a program. * Create programs with practical, personal, and/or societal intent.	* Design and implement creative solutions and artifacts. * Analyze their computational work and the work of others. * Connect computation with other disciplines. * Communicate thought processes and results.	* California High School Exit Exam -- Math - Mathematical Reasoning: Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns (1.1) * California High School Exit Exam -- Math - Mathematical Reasoning: Develop generalizations of the results obtained and the strategies used and apply them to new problem situations (3.3) * Algebra II California Standards Test - Series, Combinatorics, and Probability and Statistic Clusters: Students use properties from number systems to justify steps in combining and simplifying functions (25.0)	* Science - Goal 11 - 11.B.4e: Develop and test a prototype or simulation of the solution design using available materials, instruments and technology. * Science - Goal 11 - 11.B.4e: Develop and test a prototype or simulation of the solution design using available materials, instruments and technology. * Science - Goal 11 - 11.B.4e: Develop and test a prototype or simulation of the solution design using available materials, instruments and technology. * Science - Goal 11 - 11.B.4e: Develop and test a prototype or simulation of the solution design using available materials, instruments and technology. * Listen and Speak - Goal 4 - 4.A.4a: Apply listening skills as individuals and members of a group in a variety of

				settings (e.g., lectures, discussions, conversations, team projects, presentations, interviews). * Listen and Speak - Goal 4 - 4.B.4a: Deliver planned informative and persuasive oral presentations using visual aids and contemporary technology as individuals and members of a group; demonstrate organization, clarity, vocabulary, credible and accurate supporting evidence. * Listen and Speak - Goal 4 - 4.B.4b: Use group discussion skills to assume leadership and participant roles within an assigned project or to reach a group goal.
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 analysis.	* 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. * Communicate	* Geometry California Standards Test - Logic and Geometric Proofs Cluster: Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement. (3.0) * California High School Exit Exam -- Math - Mathematical Reasoning: Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns (1.1) * California High School Exit Exam -- Math - Mathematical Reasoning: Make and test conjectures by using both inductive and deductive reasoning (2.4) * California High School Exit Exam -- Math - Mathematical Reasoning: Develop generalizations of the results obtained and	* Science - Goal 11 - 11.A.4c: Collect, organize, and analyze data accurately and precisely. * Science - Goal 11 - 11.A.4f: Using available technology, report, display and defend to an audience conclusions drawn from investigations. * Data Analysis - Goal 10 - 10.A.4a: Represent and organize data by creating lists, charts, tables, frequency distributions, graphs, scatterplots and box-plots. * Data Analysis - Goal 10 - 10.A.4b: Analyze data using mean, median, mode, range, variance and standard deviation of a data set, with and without the use of technology. * Data Analysis - Goal 10 - 10.B.4: Design

	thought processes and results. * Work effectively in teams.	the strategies used and apply them to new problem situations (3.3) * California Standards Tests in Science Investigation and Experimentation Cluster - Life Science (Grade 10): Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from scientific evidence (7SIE7.c.) * California Standards Tests in Science Investigation and Experimentation Cluster - Life Science (Grade 10): Evaluate the accuracy and reproducibility of data (8SIE9.b) * California Standards Tests in Science Investigation and Experimentation Cluster - Life Science (Grade 10): Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions (BIIE1.c.) * Investigation and Experimentation Cluster - Earth Science, Biology, Chemistry: Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data (ESIE1.a) * Investigation and Experimentation Cluster - Earth Science, Biology, Chemistry: Formulate explanations by using logic and evidence (ESIE1.d) * Investigation and Experimentation Cluster - Earth Science, Biology, Chemistry: Investigate a science-based societal issue by researching the literature, analyzing data, and communicating the findings (ESIE1.m)	and execute surveys or experiments, gather data to answer relevant questions, and communicate results and conclusions to an audience using traditional methods and contemporary technology. * Listen and Speak - Goal 4 - 4.A.4a: Apply listening skills as individuals and members of a group in a variety of settings (e.g., lectures, discussions, conversations, team projects, presentations, interviews). * Listen and Speak - Goal 4 - 4.B.4a: Deliver planned informative and persuasive oral presentations using visual aids and contemporary technology as individuals and members of a group; demonstrate organization, clarity, vocabulary, credible and accurate supporting evidence.

6	* Identify the criteria that describe a robot and determine if something is a robot. * Match the actions of the robot to the corresponding parts of the program. * Build, code, and test a robot that solves a stated problem. * Explain ways in which different hardware designs affect the function of a machine. * Describe the tradeoffs among multiple ways to program a robot to achieve a goal.	* Design and implement creative solutions and artifacts. * Communicate thought processes and results. * Work effectively in teams.	* Geometry California Standards Test - Logic and Geometric Proofs Cluster: Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement. (3.0) * California High School Exit Exam -- Math - Mathematical Reasoning: Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns (1.1) * California High School Exit Exam -- Math - Mathematical Reasoning: Make and test conjectures by using both inductive and deductive reasoning (2.4) * California High School Exit Exam -- Math - Mathematical Reasoning: Develop generalizations of the results obtained and the strategies used and apply them to new problem situations (3.3) * California Standards Tests in Science Investigation and Experimentation Cluster - Life Science (Grade 10): Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions (BIIE1.c.) * Investigation and Experimentation Cluster - Earth Science, Biology, Chemistry: Formulate explanations by using logic and evidence (ESIE1.d)	* Science - Goal 11 - 11.B.4c: Develop working visualizations of the proposed solution designs. * Science - Goal 11 - 11.B.4e: Develop and test a prototype or simulation of the solution design using available materials, instruments and technology. * Listen and Speak - Goal 4 - 4.A.4a: Apply listening skills as individuals and members of a group in a variety of settings (e.g., lectures, discussions, conversations, team projects, presentations, interviews). * Listen and Speak - Goal 4 – 4.A.4b: Apply listening skills in practical settings (e.g., classroom note taking, interpersonal conflict situations, giving and receiving directions, evaluating persuasive messages). * Listen and Speak - Goal 4 - 4.B.4a: Deliver planned informative and persuasive oral presentations using visual aids and contemporary technology as individuals and members of a group; demonstrate organization, clarity, vocabulary, credible and accurate supporting evidence.