Exploring Computer Science

Curriculum Mapping to Learning Standards

National Standards Edition

Draft Version 0.1 | SRI International

Acknowledgements

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The Common Core standards included here are from http://www.corestandards.org/the-standards. The same numbering scheme is used here as in the original documents.

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

Unit	Unit Objectives	Computational Practices	Common Core 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.	Anchor Standards: • CCSS.ELA-Literacy.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. • CCSS.ELA-Literacy.CCRA.R.2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. • CCSS.ELA-Literacy.CCRA.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. • CCSS.ELA-Literacy.CCRA.W.6 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. • CCSS.ELA-Literacy.CCRA.W.8 Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. • CCSS.ELA-Literacy.CCRA.W.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. • CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations

			and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. • CCSS.ELA-Literacy.CCRA.SL.2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. • CCSS.ELA-Literacy.CCRA.SL.4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. • CCSS.ELA-Literacy.CCRA.L.6 Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression. Mathematical Practice: • CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them. • CCSS.Math.Practice.MP4 Model with mathematics. • CCSS.Math.Practice.MP5 Use appropriate tools strategically.
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.	* Analyze the effects of developments in computing. * Apply abstractions and models. * Connect computation with other disciplines.	Anchor Standards: • CCSS.ELA-Literacy.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. • CCSS.ELA-Literacy.CCRA.R.2 Determine central

	* 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.	* Communicate thought processes and results. * Work effectively in teams.	ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. • CCSS.ELA-Literacy.CCRA.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. • CCSS.ELA-Literacy.CCRA.W.6 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. • CCSS.ELA-Literacy.CCRA.W.7 Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. • CCSS.ELA-Literacy.CCRA.W.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. • CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. • CCSS.ELA-Literacy.CCRA.SL.2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. • CCSS.ELA-Literacy.CCRA.SL.4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

			English Language Arts: • Reading Standards for Literacy in Science and Technical Subjects 6-12 - Grades 9-10 students: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exception defined in the text. Mathematical Practice: • CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them. • CCSS.Math.Practice.MP2 Reason abstractly and quantitatively. • CCSS.Math.Practice.MP3 Construct viable arguments and critique the reasoning of others. • CCSS.Math.Practice.MP4 Model with Mathematics. Mathematical Content: • CCSS.Math.Content.HSF-BF.A.1a Building Functions - Write a function that describes a relationship between two quantities: Determine an explicit expression, a recursive process, or steps for calculation from a context.
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 and development.	* Analyze the effects of developments in computing. * Design and implement creative solutions and artifacts. * Apply abstractions and models. * Analyze their computational work and the work of others. * Communicate thought processes and	Anchor Standards: • CCSS.ELA-Literacy.CCRA.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. • CCSS.ELA-Literacy.CCRA.W.6 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. • CCSS.ELA-Literacy.CCRA.W.8 Gather relevant information from multiple print and digital

	* Describe the use of a website with appropriate documentation.	results.	sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism. Mathematical Practice: • CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them.
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.	Anchor Standards: • CCSS.ELA-Literacy.CCRA.W.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. • CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. • CCSS.ELA-Literacy.CCRA.SL.4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. Mathematical Practice: • CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them. Mathematical Content: • CCSS.Math.Content.HSF-BF.A.1a Building Functions - Write a function that describes a relationship between two quantities: Determine an explicit expression, a recursive process, or steps for calculation from a context. • CCSS.Math.Content.HSA-CED.A.3 Creating Equations - Create Equations that describe

			numbers or relationships: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
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 thought processes and results. * Work effectively in teams.	Anchor Standards: • CCSS.ELA-Literacy.CCRA.W.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. • CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. • CCSS.ELA-Literacy.CCRA.SL.2 [Integrate and] evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. • CCSS.ELA-Literacy.CCRA.SL.3 Evaluate a [speaker's] point of view, reasoning, and use of evidence and rhetoric. • CCSS.ELA-Literacy.CCRA.SL.4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. • CCSS.ELA-Literacy.CCRA.SL.5 Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. • CCSS.ELA-Literacy.CCRA.L.6 Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for

reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

Mathematical Practice:

- CCSS.Math.Practice.MP4 Model with mathematics.
- CCSS.Math.Practice.MP5 Use appropriate tools strategically.

Mathematical Content:

- CCSS.Math.Content.HSS-ID.A.1 Interpreting Categorical and Quantitative Data - Summarize, represent, and interpret data on a single count or measurement variable: Represent data with plots on the real number line (dot plots, histograms, and box plots).
- CCSS.Math.Content.HSS-ID.A.3 Interpreting Categorical and Quantitative Data - Summarize, represent, and interpret data on a single count or measurement variable: Interpret differences in shape, center, and spread in the context of data sets, accounting for possible effects of extreme data points (outliers).
- CCSS.Math.Content.HSS-ID.A.13 Interpreting Categorical and Quantitative Data - Summarize, represent, and interpret data on a single count or measurement variable: Represent data with plots on the real number line (dot plots, histograms, and box plots).
- CCSS.Math.Content.HSS-CP.A.1 Conditional Probability and the Rules of Probability - Understand independence and conditional probability and use them to interpret data: Describe events as subsets of a sample space (the set of outcomes) using characteristics (or

			categories) of the outcomes, or as unions, intersections, or complements of other events ("or" and "not"). • CCSS.Math.Content.HSS-IC.B.4 Making inferences and Justifying Conclusions - Make inferences and justify conclusions from sample surveys, experiments, and observational studies: Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
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.	Anchor Standards • CCSS.ELA-Literacy.CCRA.R.2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. • CCSS.ELA-Literacy.CCRA.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. • CCSS.ELA-Literacy.CCRA.W.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences. • CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. • CCSS.ELA-Literacy.CCRA.L.6 Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary

		knowledge when encountering an unknown term important to comprehension or expression. Mathematical Practice: • CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them. • CCSS.Math.Practice.MP5 Use appropriate tools strategically. Mathematical Content • CCSS.Math.Content.HSA-CED.A.3 Creating Equations - Create Equations that describe numbers or relationships: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.