



Sample Syllabus 4 Contents

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Curricular Requirements

- CR1a Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P1: Connecting Computing.
- See pages 2, 7, 8, 9, 11
- CR1b Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P2: Creating Computational Artifacts.
- See pages 2, 3, 4, 5, 7, 9, 11
- CR1c Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P3: Abstracting.
- See pages 4, 6, 10, 12
- CR1d Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.
- See pages 2, 4, 5, 6, 7, 8, 9, 10, 12
- CR1e Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).
- See pages 2, 3, 4, 5, 7, 8, 9, 10
- CR1f Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P6: Collaborating.
- See pages 5, 8, 11
- CR2a Students are provided with opportunities to meet learning objectives within Big Idea 1: Creativity. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.
- See pages 2, 5, 7, 8, 9, 11
- CR2b Students are provided with opportunities to meet learning objectives within Big Idea 2: Abstraction. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.
- See page 10
- CR2c Students are provided with opportunities to meet learning objectives within Big Idea 3: Data and Information. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.
- See pages 10, 11
- CR2d Students are provided with opportunities to meet learning objectives within Big Idea 4: Algorithms. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.
- See pages 3, 4, 5



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- CR2e Students are provided with opportunities to meet learning objectives within Big Idea 5: Programming. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.
- See pages 4, 5, 12
- CR2f Students are provided with opportunities to meet learning objectives within Big Idea 6: The Internet. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.
- See pages 6, 7
- CR2g Students are provided with opportunities to meet learning objectives within Big Idea 7: Global Impact. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.
- See pages 2, 6, 7, 8, 9, 11
- CR3 Students are provided the required amount of class time to complete the AP Through-Course Assessment *Explore - Impact of Computing Innovations* Performance Task.
- See page 13
- CR4 Students are provided the required amount of class time to complete the AP Through-Course Assessment *Create - Applications from Ideas* Performance Task.
- See page 13

AP[®] Computer Science Principles Course Syllabus

Course Description

CS Principles is a course that exposes students to the beauty and awe of computer science. The course teaches students programming while emphasizing problem solving and logic development. Other topics explored in this course are the impact of computer science and the use of computational tools in data analysis. Students are taught to use computer tools to solve problems pertaining to computer science. Most projects are open-ended and students will be working on them either in pairs or by themselves. As students create projects, they will be asked to narrate the project as well as reflect on their work by writing reports or responding to prompts. Most groups will not exceed three students.

Course Outline

The course is based on the College Board's AP Computer Science Principles Curriculum Framework (CF) 2016-2017.

The course is focused around seven big ideas:

- Big Idea 1: Creativity—Computing is a creative activity.
- Big Idea 2: Abstraction—Abstraction reduces information and detail to facilitate focus on relevant concepts.
- Big Idea 3: Data and Information—Data and information facilitate creation of knowledge.
- Big Idea 4: Algorithms—Algorithms are used to develop and express solutions to computational problems.
- Big Idea 5: Programming—Programming enables problem solving, human expression, and creation of knowledge.
- Big Idea 6: The Internet—The Internet pervades modern computing.
- Big Idea 7: Global Impact—Computing has global impact.

Each of the ideas is paired with one or more of the following Computational Thinking Practices (these are referred to below with the notation P1, P2, etc.):

- P1. Connecting Computing
- P2. Creating Computational Artifacts
- P3. Abstracting
- P4. Analyzing Problems and Artifacts
- P5. Communicating (both orally and written)
- P6. Collaborating

Total course time: 33 to 34 weeks

Four weeks for implementation of the performance tasks.

Summary below accounts for 30 weeks (55-minute class periods; class meets every day).

Unit 1: Impact

Allocated Time: 3 days

Content/Activity:

Students will understand the impact of computing by researching one of the commonly used technology tools such as smart phones, GPS, etc. (students will be given a list of four items to pick from). Students are expected to write a one-to-two page research paper not to exceed 1000 words and are expected to cite their resources. Students will present a quick one-minute summary of their findings to their class using a presentation software tool. [CR1a] [CR1d] [CR1e] [CR2g]

LOs from the CF:

LO 7.1.1 [P4] Explain how computing innovations affect communication, interaction, and cognition.

LO 7.5.1 [P1] Access, manage, and attribute information using effective strategies.

LO 7.5.2 [P5] Evaluate online and print sources for appropriateness and credibility.

[CR1a] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P1: Connecting Computing.

[CR1d] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.

[CR1e] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).

[CR2g] — Students are provided with opportunities to meet learning objectives within Big Idea 7: Global Impact. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- Current articles from “ACM Tech News,” *Association for Computing Machinery* at technews.acm.org.
- Current articles from *ScienceDaily* at sciencedaily.com.
- Current articles from the Technology section of the *New York Times* at nytimes.com.
- “AP Computer Science Principles Creativity and Global Impact Curriculum Module,” *College Board*, October 2014.

Unit 2: Algorithms

Allocated Time: 3 weeks

Content/Activity:

Students will access the Lightbot program and solve puzzles as they reach higher levels. Once completed, students will design their own puzzle and have a partner solve the puzzle. [CR1b] [CR2a]

LOs from the CF:

LO 1.2.2 [P2] Create a computational artifact using computing tools and techniques to solve a problem.

LO 1.3.1 [P2] Use computing tools and techniques for creative expression.

[CR1b] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P2: Creating Computational Artifacts.

[CR2a] — Students are provided with opportunities to meet learning objectives within Big Idea 1: Creativity. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resource:

- “Programming Puzzles,” *Lightbot* at lightbot.com.

Content/Activity:

Students will learn how to solve a problem through a step-by-step sequencing process. They will write the solution to simple everyday problems such as waking up in the morning, going to school, etc. using sequencing, iteration, and decision-making. Their solutions will also incorporate input and output commands. The tools that they will use to achieve this will be flowcharts and pseudocode. [CR1b] [CR1e] [CR2d]

LOs from the CF:

LO 4.1.1 [P2] Develop an algorithm for implementation in a program.

LO 4.1.2 [P5] Express an algorithm in a language.

[CR1b] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P2: Creating Computational Artifacts.

[CR1e] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).

[CR2d] — Students are provided with opportunities to meet learning objectives within Big Idea 4: Algorithms. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- Flowcharting tools from *Gliffy* at gliffy.com and MS Word.
- Pseudocode reference sheet provided by the College Board.

Content/Activity:

Students will learn that to give instructions to the computer, they must be very detailed. This can be frustrating. Start the section with the video to motivate and encourage problem solving, analysis, and creativity. Students then do the following activity: Write step-by-step instructions on how to create an origami. Students will use the pseudocode reference sheet to write pseudocode solutions to making an origami. [CR1b] [CR1e] [CR2d]

LOs from the CF:

LO 4.1.1 [P2] Develop an algorithm for implementation in a program.

LO 4.1.2 [P5] Express an algorithm in a language.

[CR1b] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P2: Creating Computational Artifacts.

[CR1e] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).

[CR2d] — Students are provided with opportunities to meet learning objectives within Big Idea 4: Algorithms. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- Resources from Code.org.

- “Unplugged - Building a Foundation,” *Code.org*, YouTube video, 2:07. Published on September 11, 2014.
- Shared resources from CS4Alabama.

Unit 3: Programming

Allocated Time: 6 weeks

Content/Activity:

Students will learn fundamental programming constructs and data structures: Conditionals, loops, and lists. Using the handout provided, students write programs in Scratch. All programs should have a flowchart or pseudocode representing the algorithm(s) used in the program. The final program should match the rubric provided. [CR1b] [CR1c] [CR1d] [CR1e] [CR2d] [CR2e]

LOs from the CF:

LO 4.1.1 [P2] Develop an algorithm for implementation in a program.

LO 4.1.2 [P5] Express an algorithm in a language.

LO 5.1.2 [P2] Develop a correct program to solve problems.

LO 5.2.1 [P3] Explain how programs implement algorithms.

LO 5.4.1 [P4] Evaluate the correctness of a program.

[CR1b] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P2: Creating Computational Artifacts.

[CR1c] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P3: Abstracting.

[CR1d] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.

[CR1e] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).

[CR2d] — Students are provided with opportunities to meet learning objectives within Big Idea 4: Algorithms. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

[CR2e] — Students are provided with opportunities to meet learning objectives within Big Idea 5: Programming. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- Resources from Code.org.
- Videos:
 - ◇ “Learn to Code with Mark Zuckerberg,” *Code.org*, YouTube video, 1:34. Published May 19, 2015.
 - ◇ “Learn to Code with Mark Zuckerberg,” *Code.org*, YouTube video, 0:59. Published May 19, 2015.
- Handout using the following resources:
 - ◇ “Scratch,” programming language from *MIT Media Lab* at scratch.mit.edu.
 - ◇ Brennan, Karen, Christian Balch, and Michelle Chung. “Scratch Curriculum Guide,” *ScratchED*, November 3, 2011.
 - ◇ “Curriculum,” *Exploring Computer Science* at exploringcs.org.

Content/Activity:

Students will design and develop a program for rock-paper-scissors. Students will be required to comment their code. The final program should match the rubric provided. [CR1b] [CR1d] [CR1e] [CR2d] [CR2e]

LOs from the CF:

LO 4.1.2 [P5] Express an algorithm in a language.

LO 5.1.2 [P2] Develop a correct program to solve problems.

LO 5.4.1 [P4] Evaluate the correctness of a program.

[CR1b] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P2: Creating Computational Artifacts.

[CR1d] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.

[CR1e] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).

[CR2d] — Students are provided with opportunities to meet learning objectives within Big Idea 4: Algorithms. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

[CR2e] — Students are provided with opportunities to meet learning objectives within Big Idea 5: Programming. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resource:

- “CS Principles for High Schools,” *University of Alabama*, Department of Computer Science.

Content/Activity:

Students will design programs collaboratively using Scratch as a programming tool. They will work with a partner assigned by the teacher. Reflective Writing: Students will keep a shared reflective journal that documents their thoughts as they develop the program. They will use this to communicate (and discuss) their ideas with each other. [CR1f] [CR2a] [CR2e]

LOs from the CF:

LO 1.2.4 [P6] Collaborate in the creation of computational artifacts.

LO 5.1.3 [P6] Collaborate to develop a program.

[CR1f] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P6: Collaborating.

[CR2a] — Students are provided with opportunities to meet learning objectives within Big Idea 1: Creativity. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

[CR2e] — Students are provided with opportunities to meet learning objectives within Big Idea 5: Programming. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- Resources from Code.org.
- “Pair Programming,” *Code.org*, YouTube video, 2:50. Published September 11, 2014.

- “CS Principles for High Schools,” *University of Alabama*, Department of Computer Science. Google Sponsored MOOC Software Development Process. Note: This resource has a good write-up on the incremental software development process.

Unit 4: Internet

Allocated Time: 2 weeks

Content/Activity:

Students will work on a hands-on activity on packet switching. This activity comes with a handout of instructions provided to the students. In addition, the students watch the video link provided to understand how the Internet functions. Students will work in groups to summarize their activities. [CR1c] [CR1d] [CR2f]

LOs from the CF:

LO 6.1.1 [P3] Explain the abstractions in the Internet and how the Internet functions.

LO 6.2.2 [P4] Explain how the characteristics of the Internet influence the systems built on it.

[CR1c] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P3: Abstracting.

[CR1d] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.

[CR2f] — Students are provided with opportunities to meet learning objectives within Big Idea 6: The Internet. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- Resources from Code.org.
- “Karlie Kloss: Coding is a superpower,” *Code.org*, YouTube video, 2:05. Published March 17, 2015.

Content/Activity:

Students will understand the issues involved with privacy using the activity of reading a handout and making note of key points. There will be a guided notes section provided for students to complete after reading the article.

[CR1d] [CR2g]

LO from the CF:

LO 7.3.1 [P4] Analyze the beneficial and harmful effects of computing.

[CR1d] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.

[CR2g] — Students are provided with opportunities to meet learning objectives within Big Idea 7: Global Impact. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- “Days 8-9 Privacy Activity,” *CS10k Community* at cs10kcommunity.org.
- “Jot Thoughts,” activity from *Cooperative Learning Resources* at cooperativelearningresources.weebly.com.

Content/Activity:

Students will understand the key characteristics of the Internet by working on this activity. The link has content for two activities that will be done in the classroom. The first is Lesson 1, Activity 1, which talks about how the Internet works. The other is Lesson 2, Activity 2, which simulates how the routers work. [CR1d] [CR1e] [CR2f]

LOs from the CF:

LO 6.2.1 [P5] Explain characteristics of the Internet and the systems built on it.

LO 6.2.2 [P4] Explain how the characteristics of the Internet influence the systems built on it.

[CR1d] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.

[CR1e] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).

[CR2f] — Students are provided with opportunities to meet learning objectives within Big Idea 6: The Internet. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resource:

- “AP Computer Science Principles Internet Curriculum Module,” *College Board*, October 2014.

Unit 5: Impact**(Revisit Unit 1)**

Allocated Time: 2 weeks

Content/Activity:

Video making: Students will develop videos that demonstrate features on a computing innovation. [CR1a] [CR1b] [CR2a] [CR2g]

LOs from the CF:

LO 1.2.2 [P2] Create a computational artifact using computing tools and techniques to solve a problem.

LO 7.2.1 [P1] Explain how computing has impacted innovations in other fields.

[CR1a] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P1: Connecting Computing.

[CR1b] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P2: Creating Computational Artifacts.

[CR2a] — Students are provided with opportunities to meet learning objectives within Big Idea 1: Creativity. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

[CR2g] — Students are provided with opportunities to meet learning objectives within Big Idea 7: Global Impact. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- For PC: Screencast-o-Matic.
- For Mac: iMovie, *Apple*.

Content/Activity:

Read several articles and write a research paper on a computing innovation. [CR1a] [CR1e] [CR2g]

LOs from the CF:

LO 7.2.1 [P1] Explain how computing has impacted innovations in other fields.

LO 7.5.1 [P1] Access, manage, and attribute information using effective strategies.

LO 7.5.2 [P5] Evaluate online and print sources for appropriateness and credibility.

[CR1a] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P1: Connecting Computing.

[CR1e] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).

[CR2g] — Students are provided with opportunities to meet learning objectives within Big Idea 7: Global Impact. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resource:

- “Jot Thoughts,” activity from *Cooperative Learning Resources* at cooperativelearningresources.weebly.com.

Unit 6: Creating Websites

Allocated Time: 3 weeks

Content/Activity:

Students will work with a partner to build a website using web development tools such as Google.com, Wix.com, and Weebly.com. A rubric will be provided to guide the student on what the finished project should look like.

[CR1d] [CR1f] [CR2a]

LOs from the CF:

LO 1.2.4 [P6] Collaborate in the creation of computational artifacts.

LO 1.2.5 [P4] Analyze the correctness, usability, functionality, and suitability of computational artifacts.

[CR1d] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.

[CR1f] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P6: Collaborating.

[CR2a] — Students are provided with opportunities to meet learning objectives within Big Idea 1: Creativity. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- “Google Apps for Work,” *Google* at Google.com.
- Website builder at Wix.com.
- Website builder at Weebly.com.

Content/Activity:

Students will build websites using HTML/CSS. Students will use tutorial-based textbooks to guide them step-by-step in building complete websites. [CR1b] [CR2a]

LO from the CF:

LO 1.3.1 [P2] Use computing tools and techniques for creative expression.

[CR1b] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P2: Creating Computational Artifacts.

[CR2a] — Students are provided with opportunities to meet learning objectives within Big Idea 1: Creativity. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resource:

Textbook: Barksdale, Karl and E. Shane Turner. *HTML and JavaScript Basics*. 4th ed. Boston: Cengage Learning, 2011.

Unit 7: Impact**(Revisit Unit 1)**

Allocated Time: 1 week

Content/Activity:

Students will write a research paper and develop a video on a computing innovation, illustrating the benefits and harm of the innovation. [CR1a] [CR1d] [CR1e] [CR2g]

LOs from the CF:

LO 7.3.1 [P4] Analyze the beneficial and harmful effects of computing.

LO 7.5.1 [P1] Access, manage, and attribute information using effective strategies.

LO 7.5.2 [P5] Evaluate online and print sources for appropriateness and credibility.

[CR1a] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P1: Connecting Computing.

[CR1d] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.

[CR1e] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).

[CR2g] — Students are provided with opportunities to meet learning objectives within Big Idea 7: Global Impact. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- Current articles from “Computing Now,” *IEEE Computer Society* at computer.org.
- “Topic: Computer science and technology,” *MIT News* at news.mit.edu.

Unit 8: Data & Abstraction

Allocated Time: 4 weeks

Content/Activity:

1. Students will understand that all images are made up of bits. They will work with the pixilation tool with an elbow partner and go through the various stages. Students then share a feature they like the most and demonstrate how they used it to understand a concept.
2. Students will work with a hands-on activity using beads and a string (binary beads) to form a binary pattern.
[CR1e] [CR2b]

LO from the CF:

LO 2.1.2 [P5] Explain how binary sequences are used to represent digital data.

[CR1e] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).

[CR2b] — Students are provided with opportunities to meet learning objectives within Big Idea 2: Abstraction. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- Resource from Code.org.
- “Pixelation. Create images with bits and bytes,” *Code.org* at studio.code.org.
- “Images, Pixels and RGB,” *Code.org*, YouTube video, 5:49. Published on March 11, 2015.
- “Lesson Plan for Introducing Binary Numbers,” *CS10k Community* at cs10kcommunity.org.

Content/Activity:

Students will understand that bits are fundamental to everything. They will read and summarize the first chapter of *Blown to Bits* (course textbook). [CR1c] [CR2b]

LO from the CF:

LO 2.1.1 [P3] Describe the variety of abstractions used to represent data.

[CR1c] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P3: Abstracting.

[CR2b] — Students are provided with opportunities to meet learning objectives within Big Idea 2: Abstraction. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resource:

- Abelson, Hal, Ken Ledeen, and Harry Lewis. “Digital Explosion: Why Is It Happening and What Is at Stake?” In *Blown to Bits: Your Life, Liberty, and Happiness After the Digital Explosion*, 1-18. Boston: Addison-Wesley Professional, 2008.

Content/Activity:

Computers Bug Me: Students will work on computers and understand and describe the components that reside on the motherboard. They will understand and summarize the layers of software that reside on the computer that are responsible for the proper functioning of a computer. [CR1c] [CR1d] [CR2b] [CR2c]

LOs from the CF:

LO 3.3.1 [P4] Analyze how data representation, storage, security, and transmission of data involve computational manipulation of information.

LO 2.1.1 [P3] Describe the variety of abstractions used to represent data.

[CR1c] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P3: Abstracting.

[CR1d] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.

[CR2b] — Students are provided with opportunities to meet learning objectives within Big Idea 2: Abstraction. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

[CR2c] — Students are provided with opportunities to meet learning objectives within Big Idea 3: Data and Information. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resource:

- “Computers Bug Me! Creativity Lesson Plan,” *CS10k Community* at cs10kcommunity.org.

Content/Activity:

Manipulation of Large Data Sets: Students will collaborate to analyze large data sets and find patterns. They will design meaningful questions that help extract useful information from the data sets. They will then present (communicate) their results using presentation software like PowerPoint or Prezi. [CR1a] [CR1f] [CR2c]

LOs from the CF:

LO 3.1.2 [P6] Collaborate when processing information to gain insight and knowledge.

LO 3.2.1 [P1] Extract information from data to discover and explain connections or trends.

[CR1a] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P1: Connecting Computing.

[CR1f] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P6: Collaborating.

[CR2c] — Students are provided with opportunities to meet learning objectives within Big Idea 3: Data and Information. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- “AP Computer Science Principles Data Abstraction and Procedural Abstraction Curriculum Module,” *College Board*, October 2014.
- Datasets from Data.gov.

Unit 9: Impact

(Revisit Unit 1)

Allocated Time: 3 weeks

Content/Activity:

Student will learn to manipulate and create images using appropriate tools. They will create digital images to illustrate impact of computing innovations. [CR1a] [CR1b] [CR2a] [CR2g]

LOs from the CF:

LO 7.2.1 [P1] Explain how computing has impacted innovations in other fields.

LO 1.2.3 [P2] Create a new computational artifact by combining or modifying existing artifacts.

[CR1a] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P1: Connecting Computing.

[CR1b] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P2: Creating Computational Artifacts.

[CR2a] — Students are provided with opportunities to meet learning objectives within Big Idea 1: Creativity. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

[CR2g] — Students are provided with opportunities to meet learning objectives within Big Idea 7: Global Impact. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resource:

- Use of Photo Editors: Web 2.0 Tools.

Unit 10: Programming

(Revisit Unit 3)

Allocated Time: 5 weeks

Content/Activity:

Introducing JavaScript: Students will use tutorial-based textbooks to guide them step-by-step in building JavaScript applets. Using a programming environment called Pencil Code, students will develop block and text-based programs. [CR1c] [CR1d] [CR2e]

LOs from the CF:

LO 5.2.1 [P3] Explain how programs implement algorithms.

LO 5.3.1 [P3] Use abstraction to manage complexity in programs.

LO 5.4.1 [P4] Evaluate the correctness of a program.

[CR1c] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P3: Abstracting.

[CR1d] — Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.

[CR2e] — Students are provided with opportunities to meet learning objectives within Big Idea 5: Programming. Such opportunities must occur in addition to the AP Computer Science Principles Performance Tasks.

Resources:

- Tools:
 - ◇ Pencil Code at pencilcode.net
 - ◇ Notepad, JSFiddle, Text Wrangler
- Textbook: Barksdale, Karl and E. Shane Turner. *HTML and JavaScript Basics*. 4th ed. Boston: Cengage Learning, 2011.

Summary

Time allocated for development of performance tasks and other school and state-mandated tests: 4-5 weeks.

Assessments

As a part of the CS Principles course, students will be submitting two performance tasks: *Explore - Impact of Computing* and *Create - Applications from Ideas*. These two tasks will require students to develop projects on the computer that will let them display their knowledge in various big ideas. All performance tasks have a writing component to them and, as such, students will have plenty of technical writing practice in this course.

Students will be provided with eight (8) hours of class time to complete the *Explore - Impact of Computing Innovations* Performance Task. [CR3]

[CR3] — Students are provided the required amount of class time to complete the AP Through-Course Assessment *Explore - Impact of Computing Innovations* Performance Task.

Students will be provided with twelve (12) hours of class time to complete the *Create - Applications from Ideas* Performance Task. [CR4]

[CR4] — Students are provided the required amount of class time to complete the AP Through-Course Assessment *Create - Applications from Ideas* Performance Task.

Grading

- Classwork/Labs: 20 percent
- Small Projects/Quizzes: 25 percent
- Large Projects/Tests: 35 percent
- Finals: 20 percent

Tools

- “Scratch,” programming language from *MIT Media Lab* at scratch.mit.edu.
- “Snap!,” programming language from *University of California, Berkeley* at snap.berkeley.edu.
- Programming tools from Code.org.
- Microsoft Excel, Word, PowerPoint, Google Docs.
- A classroom management system such as *Piazza*.
- Video editing software and a video screen capture software such as *Screencast*.
- Graphic design tools such as *Photoshop*, *Gimp*, etc.
- Web 2.0 tools to help with design of creative and collaborative projects.

Textbooks

- Abelson, Hal, Ken Ledeen, and Harry Lewis. *Blown to Bits: Your Life, Liberty, and Happiness After the Digital Explosion*, Chapter 1, Chapter 5, Appendix. Boston: Addison-Wesley Professional, 2008. This book can be downloaded for free from Bitsbook.com.
- Barksdale, Karl and E. Shane Turner. *HTML and JavaScript Basics*. 4th ed. Boston: Cengage Learning, 2011.