Syllabus Development Guide: AP® Computer Science Principles

The guide contains the following sections and information:

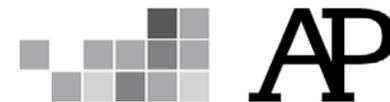|	
Curricular Requirements	The curricular requirements are the core elements of the course. Your syllabus must provide clear evidence that each requirement is fully addressed in your course.
Scoring Components	Some curricular requirements consist of complex, multipart statements. These particular requirements are broken down into their component parts and restated as "scoring components." Reviewers will look for evidence that each scoring component is included in your course.
Evaluation Guideline(s)	These are the evaluation criteria that describe the level and type of evidence required to satisfy each scoring component.
Key Term(s)	These ensure that certain terms or expressions, within the curricular requirement or scoring component that may have multiple meanings, are clearly defined.
Samples of Evidence	For each scoring component, three separate samples of evidence are provided. These statements provide clear descriptions of what acceptable evidence should look like.

Syllabus Development Guide Contents

Curricular Requirement 1	**Students are provided with opportunities to meet learning objectives connected to the six computational thinking practices as described in the *AP Computer Science Principles Course and Exam Description*.**
Scoring Component 1a	Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P1: Connecting Computing.
Evaluation Guideline(s)	The syllabus must briefly describe at least one assignment or activity that addresses Computational Thinking Practice P1: Connecting Computing. The Performance Tasks alone do not sufficiently meet this requirement. Each assignment or activity must be labeled with a learning objective and the associated computational thinking practice [P1].
Key Term(s)	None at this time.
Samples of Evidence	1. Students write a short paper explaining ways that a person's privacy may be compromised when using the Internet. LO 6.3.1 **[P1]**, LO 7.3.1 [P4] 2. Students debate the question, "Is computing technology closing or widening economic inequality?" LO 7.3.1 [P4], LO 7.4.1 **[P1]** 3. Students will work in pairs to explore the concepts of data analysis and visualization by using spreadsheet software to analyze a large data set provided to them from the Bureau of Labor Statistics. LO 3.1.2 [P6], LO 3.1.3 [P5], LO 3.2.1 **[P1]**

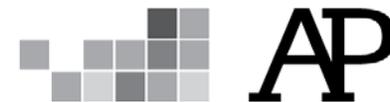|	
Curricular Requirement 1	**Students are provided with opportunities to meet learning objectives connected to the six computational thinking practices as described in the *AP Computer Science Principles Course and Exam Description.***
Scoring Component 1b	Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P2: Creating Computational Artifacts.
Evaluation Guideline(s)	The syllabus must briefly describe at least one assignment or activity that addresses Computational Thinking Practice P2: Creating Computational Artifacts. The Performance Tasks alone do not sufficiently meet this requirement. Each assignment or activity must be labeled with a learning objective and the associated computational thinking practice [P2].
Key Term(s)	None at this time.
Samples of Evidence	1. Students work collaboratively to create an innovative maze game and explain an algorithm and abstraction used in their program. LO 1.2.1 **[P2]**, LO 2.2.1 **[P2]**, LO 2.2.2 [P3], LO 4.1.1 **[P2]**, LO 4.1.2 [P5], LO 5.1.1 **[P2]**, LO 5.3.1 [P3]
	2. Student Internet Survey: As a class, students create a survey about Internet usage. Each student administers the survey and collects the data. All of the data is compiled and analyzed as a whole data set. LO 1.2.1 **[P2]**, LO 3.1.2 [P6]
	3. Each student creates a web page that serves as a portfolio for their work. LO 1.1.1 **[P2]**, LO1.2.3 **[P2]**, LO 1.2.2 **[P2]**, LO 1.3.1 **[P2]**, LO 7.1.1 [P4]

Curricular Requirement 1	**Students are provided with opportunities to meet learning objectives connected to the six computational thinking practices as described in the *AP Computer Science Principles Course and Exam Description.***
Scoring Component 1c	Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P3: Abstracting.
Evaluation Guideline(s)	The syllabus must briefly describe at least one assignment or activity that addresses Computational Thinking Practice P3: Abstracting. The Performance Tasks alone do not sufficiently meet this requirement.

Each assignment or activity must be labeled with a learning objective and the associated computational thinking practice [P3]. |
| **Key Term(s)** | None at this time. |
| **Samples of Evidence** | 1. Students write a draw-square procedure that accepts the size of the square as input. Students use this procedure to draw more complex designs. LO 1.2.1 [P2], LO 2.2.2 **[P3]**, LO 5.1.1 [P2], LO 5.3.1 **[P3]**

2. Students research a recent computing innovation and write about the algorithms and abstractions used in that innovation. LO 2.1.1 **[P3]**, LO 2.2.3 **[P3]**, LO 4.1.2 [P5], LO 7.1.1 [P4], LO 7.2.1 [P1], LO 7.5.1[P1]

3. Students use logic gates to demonstrate how computers add two bits. LO 2.2.3 **[P3]** |

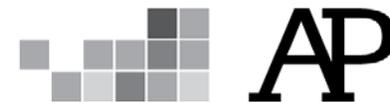|	
Curricular Requirement 1	**Students are provided with opportunities to meet learning objectives connected to the six computational thinking practices as described in the *AP Computer Science Principles Course and Exam Description*.**
Scoring Component 1d	Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P4: Analyzing Problems and Artifacts.
Evaluation Guideline(s)	The syllabus must briefly describe at least one assignment or activity that addresses Computational Thinking Practice P4: Analyzing Problems and Artifacts. The Performance Tasks alone do not sufficiently meet this requirement. Each assignment or activity must be labeled with a learning objective and the associated computational thinking practice [P4].
Key Term(s)	None at this time.
Samples of Evidence	1. In a group exercise, students investigate a large data set, analyze it, and create a visualization of the data set. Students present their results to the class. LO 3.1.1 **[P4]**, LO 3.1.2 [P6], LO 3.1.3 [P5], LO 3.2.2 [P3] 2. Students write a short paper explaining ways that a person's privacy may be compromised when using the Internet. LO 3.3.1 **[P4]**, LO 6.3.1 [P1], LO 7.3.1 **[P4]** 3. Students debate the statement, "Computing technology makes us smarter." LO 7.1.1 **[P4]**, LO 7.3.1 **[P4]**

Curricular Requirement 1	**Students are provided with opportunities to meet learning objectives connected to the six computational thinking practices as described in the *AP Computer Science Principles Course and Exam Description.***
Scoring Component 1e	Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P5: Communicating (both orally and written).
Evaluation Guideline(s)	The syllabus must briefly describe at least one written assignment or activity that addresses Computational Thinking Practice P5: Communicating. The Performance Tasks alone do not sufficiently meet this requirement. Each assignment or activity must be labeled with a learning objective and the associated computational thinking practice [P5].
Key Term(s)	None at this time.
Samples of Evidence	1. Students work independently to write a program to solve a given problem. Each student's solution is then randomly given to another student. A peer review is done by each student: the student examines the work of another student and develops a written summary of the abstractions and algorithms used in the program, any errors encountered when testing the program, and any suggestions for improvement that the student reviewing may have for the student who wrote the program. LO 1.2.2 [P2], LO 1.2.5 [P4], LO 4.1.1 [P2], LO 4.1.2 **[P5]**, LO 4.2.4 [P4], LO 5.1.2 [P2], LO 5.2.1 [P3], LO 5.3.1 [P3], LO 5.4.1 [P4], LO 5.5.1 [P1] 2. Students are given a map of their neighborhood. They must select two locations on the map and write directions that a pedestrian could follow to get from one point to the other. Working in pairs, one partner reads her written directions while the other attempts to follow them on the map. LO 4.1.2 **[P5]**

Samples of Evidence

(continued)

3. Working from binary sequences provided by the teacher, students explain in writing how their assigned sequence could represent a character, a number, a color, and a sound. Students then discuss different representations of their binary sequence. LO 2.1.2 **[P5]**

Curricular Requirement 1	**Students are provided with opportunities to meet learning objectives connected to the six computational thinking practices as described in the *AP Computer Science Principles Course and Exam Description*.**
Scoring Component 1f	Students are provided with opportunities to meet learning objectives connected to Computational Thinking Practice P6: Collaborating.
Evaluation Guideline(s)	The syllabus must briefly describe at least one assignment or activity that addresses Computational Thinking Practice P6: Collaborating. The Performance Tasks alone do not sufficiently meet this requirement. Each assignment or activity must be labeled with a learning objective and the associated computational thinking practice [P6].
Key Term(s)	None at this time.
Samples of Evidence	1. Students write an application in the programming language being used in the course, using pair programming. Two students alternate the roles of driver and navigator, and consistently give each other feedback. LO 1.2.4 **[P6]**, LO 5.1.2 [P2], LO 5.1.3 **[P6]** 2. In pairs, students design a method to encrypt a two-digit number. One student communicates the encrypted number to the class. After the students try to guess the number, the partner tells the class what the original number was. LO 3.1.2 **[P6]**, LO 4.1.2 [P5], LO 6.3.1 [P1] 3. Using a collaborative workspace, students work together as a class to develop a website in which they showcase technological solutions to problems in society. LO 1.2.4 **[P6]**, LO 1.2.5 [P4], LO 7.2.1 [P1], LO 7.3.1 [P4], LO 7.4.1 [P1]

Curricular Requirement 2	**Students are provided with opportunities to meet learning objectives within each of the seven big ideas as described in the *AP Computer Science Principles Course and Exam Description*.**
Scoring Component 2a	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.
Evaluation Guideline(s)	The syllabus must briefly describe at least one assignment or activity designed to meet at least one learning objective within Big Idea 1: Creativity. The Performance Tasks alone do not sufficiently meet this requirement. Each assignment or activity must be labeled with the associated learning objective(s).
Key Term(s)	None at this time.
Samples of Evidence	1. Students work collaboratively to create an innovative maze game and explain an algorithm and abstraction used in their program. **LO 1.2.1** [P2], LO 2.2.1 [P2], LO 2.2.2 [P2], LO 4.1.1 [P2], LO 4.1.2 [P5], LO 5.1.1 [P2], LO 5.3.1 [P3] 2. Students use available computational tools by uploading a photograph to a website and modifying it in a creative way. **LO 1.3.1** [P2] 3. Students work collaboratively to create an online survey of personal interest, report the results, and discuss how their survey may scale to gain additional insight. **LO 1.2.1** [P2], LO 3.1.2 [P6], LO 7.1.2 [P4]

Curricular Requirement 2

Students are provided with opportunities to meet learning objectives within each of the seven big ideas as described in the *AP Computer Science Principles Course and Exam Description*.

Scoring Component 2b

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.

Evaluation Guideline(s)

The syllabus must briefly describe at least one assignment or activity designed to meet at least one learning objective within Big Idea 2: Abstraction. The Performance Tasks alone do not sufficiently meet this requirement.

Each assignment or activity must be labeled with the associated learning objective(s).

Key Term(s)

None at this time.

Samples of Evidence

1. Students work collaboratively to create an innovative maze game and explain an algorithm and abstraction used in their program. LO 1.2.1 [P2], **LO 2.2.1** [P2], **LO 2.2.2** [P3], LO 4.1.1 [P2], LO 4.1.2 [P5], LO 5.1.1[P2], LO 5.3.1 [P3]

2. Students discuss the hardware and software abstractions used in taking a digital picture. **LO 2.1.1** [P3]

3. Students write a simulation program that models real-world phenomena (e.g., sports statistics, disease spread, or stock market), run the program many times, and analyze the results. LO 1.2.5 [P4], **LO 2.3.1** [P3], **LO 2.3.2** [P3], LO 3.1.1 [P4], LO 4.1.2 [P5], LO 5.1.2 [P2], LO 5.5.1 [P1]

Curricular Requirement 2	**Students are provided with opportunities to meet learning objectives within each of the seven big ideas as described in the *AP Computer Science Principles Course and Exam Description*.**
Scoring Component 2c	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.
Evaluation Guideline(s)	The syllabus must briefly describe at least one assignment or activity designed to meet at least one learning objective within Big Idea 3: Data and Information. The Performance Tasks alone do not sufficiently meet this requirement. Each assignment or activity must be labeled with the associated learning objective(s).
Key Term(s)	None at this time.
Samples of Evidence	1. Students work collaboratively to conduct an investigation to gain insight and knowledge from publicly available data. Students apply computational tools and techniques to answer questions about the data. **LO 3.1.1** [P4], **LO 3.1.2** [P6], **LO 3.1.3** [P5], **LO 3.2.1** [P1], **LO 3.2.2** [P3] 2. Students work collaboratively to create an online survey of personal interest, report the results, and discuss how their survey may scale to gain additional insight. LO 1.2.1 [P2], **LO 3.1.2** [P6], LO 7.1.2 [P4] 3. Students work collaboratively to write a program to investigate statistical results for data collected from a survey that they wrote. Students will then summarize their results in a presentation to the class. LO 1.2.4 [P6], LO 2.2.1 [P3], LO 2.2.2 [P3], **LO 3.1.2** [P6], **LO 3.1.3** [P5], **LO 3.2.1** [P1], LO 4.1.1 [P4], LO 4.1.2 [P5], LO 5.1.2 [P2], LO 5.1.3 [P6], LO 5.3.1 [P3], LO 5.5.1 [P1]

Curricular Requirement 2	**Students are provided with opportunities to meet learning objectives within each of the seven big ideas as described in the *AP Computer Science Principles Course and Exam Description*.**
Scoring Component 2d	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.
Evaluation Guideline(s)	The syllabus must briefly describe at least one assignment or activity designed to meet at least one learning objective within Big Idea 4: Algorithms. The Performance Tasks alone do not sufficiently meet this requirement. Each assignment or activity must be labeled with the associated learning objective(s).
Key Term(s)	None at this time.
Samples of Evidence	1. Students work collaboratively to create an innovative maze game and explain an algorithm and abstraction used in their program. LO 1.2.1 [P2], LO 2.2.1 [P2], LO 2.2.2 [P3], **LO 4.1.1** [P2], **LO 4.1.2** [P5], LO 5.1.1 [P2], LO 5.3.1 [P3] 2. Students write a simulation program that models real-world phenomena (e.g., sports statistics, disease spread, or stock market), run the program many times, and analyze the results. LO 1.2.5 [P4], LO 2.3.1 [P3], LO 2.3.2 [P3], LO 3.1.1 [P4], **LO 4.1.2** [P5], LO 5.1.2 [P2], LO 5.5.1 [P1] 3. Students practice solving the traveling salesperson problem both by hand and through a website. Students then discuss why this problem cannot be solved in a reasonable time, and what heuristics can be employed to give reasonable solutions. **LO 4.2.1** [P1], **LO 4.2.2** [P1], **LO 4.2.3** [P1]

Curricular Requirement 2	**Students are provided with opportunities to meet learning objectives within each of the seven big ideas as described in the *AP Computer Science Principles Course and Exam Description*.**
Scoring Component 2e	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.
Evaluation Guideline(s)	The syllabus must briefly describe at least one assignment or activity designed to meet at least one learning objective within Big Idea 5: Programming. The Performance Tasks alone do not sufficiently meet this requirement. Each assignment or activity must be labeled with the associated learning objective(s).
Key Term(s)	None at this time.
Samples of Evidence	1. Students work collaboratively to create an innovative maze game and explain an algorithm and abstraction used in their program. LO 1.2.1 [P2], LO 2.2.1 [P2], LO 2.2.2 [P3], LO 4.1.1 [P2], LO 4.1.2 [P5], **LO 5.1.1** [P2], **LO 5.3.1** [P3] 2. Students write a simulation program that models real-world phenomena (e.g., sports statistics, disease spread, or stock market), run the program many times, and analyze the results. LO 1.2.5 [P4], LO 2.3.1 [P3], LO 2.3.2 [P3], LO 3.1.1 [P4], LO 4.1.2 [P5], **LO 5.1.2** [P2], **LO 5.5.1** [P1] 3. Students work collaboratively to write a program to investigate statistical results for data collected from a survey that they wrote. Students will then summarize their results in a presentation to the class. LO 1.2.4 [P6], LO 2.2.1 [P2], LO 2.2.2 [P3], LO 3.1.2 [P6], LO 3.1.3 [P5], LO 3.2.1 [P1], LO 4.1.1 [P2], LO 4.1.2 [P5], **LO 5.1.2** [P2], **LO 5.1.3** [P6], **LO 5.3.1** [P3], **LO 5.5.1** [P1]

Curricular Requirement 2	**Students are provided with opportunities to meet learning objectives within each of the seven big ideas as described in the *AP Computer Science Principles Course and Exam Description*.**
Scoring Component 2f	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.
Evaluation Guideline(s)	The syllabus must briefly describe at least one assignment or activity designed to meet at least one learning objective within Big Idea 6: The Internet. The Performance Tasks alone do not sufficiently meet this requirement. Each assignment or activity must be labeled with the associated learning objective(s).
Key Term(s)	None at this time.
Samples of Evidence	1. Students work in cooperative groups and physically enact the path of packets through routers on the Internet. **LO 6.2.1** [P5], **LO 6.2.2** [P4] 2. Students write a short paper explaining ways that a person's privacy may be compromised when using the Internet. **LO 6.3.1** [P1], LO 7.3.1 [P4] 3. Students discuss and answer questions about how the Internet has shaped our world. **LO 6.1.1** [P3]**, LO 6.2.2** [P4], LO 7.1.1 [P4]

Curricular Requirement 2

Students are provided with opportunities to meet learning objectives within each of the seven big ideas as described in the *AP Computer Science Principles Course and Exam Description*.

Scoring Component 2g

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.

Evaluation Guideline(s)

The syllabus must briefly describe at least one assignment or activity designed to meet at least one learning objective within Big Idea 7: Global Impact. The Performance Tasks alone do not sufficiently meet this requirement.

Each assignment or activity must be labeled with the associated learning objective(s).

Key Term(s)

None at this time.

Samples of Evidence

1. Students write a research paper about ways that public cameras, face recognition, and large data sets can infringe on privacy. **LO 7.3.1** [P4], **LO 7.5.1** [P1], **LO 7.5.2** [P5]

2. Students have a class discussion around ways that a person's privacy may be compromised when using the Internet. LO 6.3.1 [P1], **LO 7.3.1** [P4]

3. Students hold a class debate and address the prompt "As a whole, are computing innovations going to reduce or magnify inequality in society?" After the debate, students are asked to write a paragraph to summarize their stance on the issue. **LO 7.4.1** [P1]
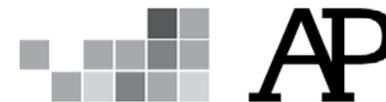
Curricular Requirement 3	**Students are provided the required amount of class time to complete the AP Through-Course Assessment _Explore - Impact of Computing Innovations_ Performance Task.**
Evaluation Guideline(s)	The syllabus must explicitly state that students are provided with eight (8) hours of class time to complete the _Explore_ Performance Task.
Key Term(s)	**Hours of Class Time:** 8 hours = 480 minutes
Samples of Evidence	None at this time.

1. Eight hours of class time will be provided for the AP Through-Course Assessment _Explore - Impact of Computing Innovations_.

2. After completing Unit 9, students complete the AP Through-Course Assessment _Explore - Impact of Computing Innovations_ (8 hours in class).

3. Ten class periods equaling 8 hours of class time will be provided for students to complete the _Explore_ Performance Task.

Curricular Requirement 4

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

Evaluation Guideline(s)

The syllabus must explicitly state that students are provided with twelve (12) hours of class time to complete the *Create* Performance Task.

Key Term(s)

Hours of Class Time: 12 hours = 720 minutes

Samples of Evidence

None at this time.

1. Twelve hours of class time will be provided for the AP Through-Course Assessment *Create - Applications from Ideas*.

2. After completing Unit 10, students complete the AP Through-Course Assessment *Create - Applications from Ideas* (12 hours in class).

3. Fifteen class periods equaling 12 hours of class time will be provided for students to complete the *Create* Performance Task.