

AP Computer Science Principles



TEACHER INFORMATION

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GENERAL INFORMATION

Course Description

The AP Computer Science Principles course is designed to be equivalent to a first-semester introductory college computing course. In this course, students will develop computational thinking skills vital for success across all disciplines, such as using computational tools to analyze and study data and working with large data sets to analyze, visualize, and draw conclusions from trends. The course is unique in its focus on fostering student creativity. Students are encouraged to apply creative processes when developing computational artifacts and to think creatively while using computer software and other technology to explore questions that interest them. They will also develop effective communication and collaboration skills, working individually and collaboratively to solve problems, and discussing and writing about the importance of these problems and the impacts to their community, society, and the world.

Standards

The AP Computer Science Principles Course Standards will be provided to each student in PDF format through itsLearning, including a detailed list of objectives and topics within each objective. The standards may also be accessed at: <https://secure-media.collegeboard.org/digitalServices/pdf/ap/ap-computer-science-principles-course-and-exam-description.pdf>

Learning Resources/Textbook(s):

- *Computer Science Illuminated*, Dale & Lewis, 6th Edition, 2016, Pearson Education, Inc. (classroom set)
- *Introduction to Programming with Greenfoot*, Michael Kolling, 2nd Edition, 2016 (.pdf provided to each student)
- *Blown to Bits: Your Life, Liberty, and Happiness after the Digital Explosion*, Abelson, Ledeen, & Lewis, 1st Edition, 2008 (.pdf provided to each student)

Java Development Environment

We will use BlueJ as our Integrated Development Environment. Students will need to download and install BlueJ Combined Installer appropriate for the operation system and type of computer. BlueJ is free and available from: <http://www.bluej.org/>

Greenfoot Interface

We will also be using the Greenfoot Interface to assist with Java programming. Greenfoot teaches object orientation with Java. Create 'actors' which live in 'worlds' to build games, simulations, and other graphical programs. Greenfoot is visual and interactive. Visualization and interaction tools are built into the environment. The actors are programmed in standard textual Java code, providing a combination of programming experience in a traditional text-based language with visual execution. Students will need to download a copy of Greenfoot to USB drive. Greenfoot is free and available from:

<http://www.greenfoot.org/download>

AP Test Information

You can receive college credit for AP Computer Science Principles by taking the AP CSP test. The score you need to achieve and whether you receive credit depends upon the individual college. The test is broken into two parts: two in class projects (Create & Explore) = 40% and 74 multiple choice questions = 60%. Details and deadlines for registration and payment will be shared throughout the year. It is the expectation that all students take the AP test and students with financial concerns should speak with their teacher.

- The AP test fee is ~\$123.00. More details will be provided in December.

Supplies

- Something to write with and paper (not all of the work is done on a computer)
- USB jump drive (so files can be carried between home and school)
- Access to a computer and the Internet away from school (there WILL NOT be enough time to get programming assignments completed with only class time) Students with laptop computers are welcome to use them in class for programming assignments and note taking, as long as they do not become a distraction. Convenient access to power is not guaranteed.

Course Fee

- \$30.00 for FBLA Membership

Future Business Leaders of America

The FBLA Mission is to bring business and education together in a positive working relationship through innovative leadership and career development programs. We bring our mission to life through the application of our Motto: Service, Education, and Progress. Competencies FBLA are integral components of both the core employability skills standards and the technical skills standards, and FBLA activities are incorporated throughout instructional strategies developed for the course.

- Promote competent, assertive business leadership
- Strengthen confidence of students in themselves and their work
- Create interest in and understanding of American business enterprise
- Encourage development of individual projects to improve home, business, and community
- Facilitate the transition from school to work
- Assist students in the establishment of career goals
- Encourage scholarship and promote school loyalty
- Encourage and practice sound financial management
- Develop character, prepare for useful citizenship, and foster patriotism

Nature of the Work in AP Computer Science

AP Computer Science is a college-level course. Students who pass the AP exam in May often earn college credit in Computer Science (requirements for credit vary by college). As such, students should not expect to have prepared reviews handed to them prior to quizzes and tests, and they should also not expect their tests to be essentially identical to their practice problems. Computer Science requires different types of critical thinking and problem solving skills than other high school courses. There is also much reading in the course and a great demand for a high level of reading comprehension. Regular daily reading and programming practice is necessary to excel in this course. In order to prepare students for the AP exam, it is important that parents and students understand that we cannot lower our expectations for the course. Consistent practice and willingness to seek help early when they don't understand is by far the most effective way for students to adjust and thrive at this new level of rigor.

- Students who are not prepared to make the commitment required for the elements mentioned above and whose primary motivation in taking the course is for AP recognition/college admissions are generally not successful in this course.
- Students with poor attendance and/or poor study habits are generally not successful in this course.

Required Assignments

Formative Assignments:

This class will have frequent homework and reading. Homework will sometimes be submitted for a grade. Students will frequently complete AP level free response questions and these will also sometimes be collected for a grade. The major component for this portion of the grade is question for thoughts and routine programming assignments. Programming assignments will be turned in through itsLearning, or by inspection in class. ALL assignments must be turned in by assigned due dates. Selected programming assignments will be graded in detail.

Summative Assignments:

The summative grade will come primarily from test scores and projects. There will be 4-5 tests in fall semester, plus a mid-term exam. There will be 4-5 tests in the spring semester. There will be two through course AP projects that will be counted as a summative grade. The "Final Exam" will cover all units in this course.

Independent Work Requirement (Extremely Important!):

While students will have the opportunity to work together and share ideas, both in and away from the classroom, every student is expected to turn in independent and original work. Students will not receive credit for submitted assignments that are substantially identical to work from other sources.

On-Task Work Behavior

Since you will have time in the computer lab during this course, it is tempting to use the computers for off-task behavior (playing games, working on assignments for other classes, etc). Off-task activity, in the computer lab or in the classroom, is strongly discouraged. On-task activity will be monitored and will be reflected in your grade. Playing games on the computer is prohibited AT ALL TIMES, unless you are testing a game program that is part of an assignment. Any other game playing will result in loss of computer access. Further violations will result in parent conferences and discipline referrals.

Availability for Extra Help

The lab is open before school or after school by appointment. Additional study sessions will be posted in itsLearning. Students may also seek help during IF.

Makeup Work

Make up work is defined as work assigned during a student's absence, not work assigned prior to an absence. The student has five (5) school days upon returning to school to complete make-up work. The teacher has the discretion to grant a longer period to complete the work, if there are extenuating circumstances.

Industry Credentialing/End of Pathway Assessments: Students are encouraged to select a career pathway beginning in the ninth grade that is connected to college and career goals. This course is one of three courses in the career pathway chosen by a student. At the conclusion of the third pathway course, students will be required to take an industry credentialing End of Pathway Assessment. This assessment provides students an opportunity to demonstrate what they have learned by completing an online, nationally recognized exam. Students who complete a pathway and earn an industry credential by passing the assessment will receive a graduation cord to signify their achievement.

AP Computer Science Principles is the second class in the Computer Science pathway and Web Development Pathway.

- Students in the Computer Science pathway will take the following EOPA: **Microsoft: Software Development Fundamentals.**
- Students in the Web Development pathway will take the following EOPA: **CIW Site Development Associate**

College Majors: Computer Science, Information Technology, Software Engineering, Computer Game Design and Development, etc.

Professions: Software Engineer, Computer Programmer, Computer Network Engineer, Database Administrator, Game Designer, Information Security, etc.

Course Curriculum Content

Course Standards	Units/Topics
APCSP LO 4.2.2 Explain the difference between solvable and unsolved problems in computer science APCSP EU 1.2 Computing enables people to use creative development processes to create computational artifacts for creative expression or to solve a problem APCSP LO 1.2.1 Create a computational artifact for creative expression	Introduction to Computer Science
APCSP LO 1.1.1 Apply a creative development process when creating computational artifacts APCSP LO 1.2.2 Create a computational artifact using computing tools and techniques to solve a problem APCSP LO 1.2.3 Create a new computational artifact by combining or modifying existing artifacts	Computer Science Careers
APCSP EU 2.1 A variety of abstractions built on binary sequences can be used to represent all digital data. APCSP EU 3.1 People use computer programs to process information to gain insight and knowledge APCSP LO 3.1.1 Find patterns and test hypotheses about digitally processed information to gain insight and knowledge APCSP LO 3.1.2 Collaborate when processing information to gain insight and knowledge APCSP LO 3.1.3 Explain the insight and knowledge gained from digitally processed data by using appropriate visualizations, notations, and precise language	Data Representation
APCSP LO 2.1.1 Describe the variety of abstractions used to represent data APCSP LO 2.1.2 Explain how binary sequences are used to present digital data APCSP LO 2.2.3 Identify multiple levels of abstractions that are used when writing programs APCSP EU 4.1 Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages APCSP LO 4.1.1 Develop an algorithm for implementation in a program APCSP LO 4.1.2 Express an algorithm in a language APCSP EU 4.2 Algorithms can solve many, but not all, computational problems APCSP LO 4.2.1 Explain the difference between algorithms that run in a reasonable time and those that do not run in a reasonable time APCSP LO 4.2.4 Evaluate algorithms analytically and empirically, for efficiency, correctness and clarity	Algorithm Analysis
APCSP EU 2.2 Multiple levels of abstraction are used to write programs or create other computational artifacts APCSP LO 2.2.1 Develop an abstraction when writing a program or creating other computational artifacts APCSP LO 2.2.2 Use multiple levels of abstraction to write programs APCSP LO 1.2.4 Collaborate in the creation of computational artifacts APCSP LO 1.2.5 Analyze the correctness, usability functionality, and suitability of computational artifacts APCSP EU 5.1 Programs can be developed for creative expression, to satisfy personal	Computer Programming

<p>curiosity, to create new knowledge, or to solve problems APCSP LO 5.1.1 Develop a program for creative expression, to satisfy personal curiosity, or to create new knowledge APCSP LO 5.1.2 Develop a correct program to solve problems APCSP LO 5.1.3 Collaborate to develop a program APCSP EU 5.2 People write programs to execute algorithms APCSP LO 5.2.1 Explain how programs implement algorithms APCSP EU 5.3 Programming is facilitated by appropriate abstractions APCSP LO 5.3.1 Use abstraction to manage complexity in programs APCSP EU 5.4 Programs are developed, maintained, and used by people for different purposes APCSP LO 5.4.1 Evaluate the correctness of a program APCSP EU 5.5 Programming uses mathematical and logical concepts APCSP LO 5.5.1 Employ appropriate mathematical and logical concepts in programming</p>	
<p>APCSP EU 2.3 Models and simulations used abstraction to generate new understanding and knowledge APCSP LO 2.3.1 Use models and simulations to represent phenomena APCSP LO 2.3.2 Use models and simulations to formulate, refine, and test hypotheses APCSP EU 6.1 The Internet is a network of autonomous systems APCSP LO 6.1.1 Explain the abstractions in the Internet and how the Internet functions APCSP EU 6.2 Characteristics of the Internet influence the systems built on it APCSP LO 6.2.1 Explain characteristics of the Internet and the systems built on it APCSP LO 6.2.2 Explain how the characteristics of the Internet influence the systems built on it APCSP EU 6.3 Cybersecurity is an important concern for the Internet and the systems built on it APCSP LO 6.3.1 Identify existing cybersecurity concerns and potential options to address these issues with the internet and the systems built on it</p>	<p>Operation of the Internet</p>
<p>APCSP LO 4.2.3 Explain the existence of undecidable problems in computer science APCSP EU 7.1 Computing enhances communication, interaction, and cognition APCSP LO 7.1.1 Explain how computing innovations affect communication, interaction, and cognition APCSP LO 7.1.2 Explain how people participate in a problem-solving process that scales APCSP EU 7.2 Computing enables innovation in nearly every field APCSP LO 7.2.1 Explain how computing has impacted innovations in other fields APCSP EU 7.3 Computing has global effects – both beneficial and harmful on people and society APCSP LO 7.3.1 Analyze the beneficial and harmful effects computing APCSP EU 7.4 Computing innovations influence and are influenced by economic, social, and cultural contexts in which they are designed and used APCSP LO 7.4.1 Explain the connections between computing and real-world contexts, including economic, social, and cultural contexts APCSP EU 7.5 An investigation process is aided by effective organization and selection of resources. Appropriate technologies and tools facilitate the accessing of information and enable the ability to evaluate the credibility of sources. APCSP LO 7.5.1 Access, manage, and attribute information using effective strategies APCSP LO 7.5.2 Evaluate online and print sources for appropriateness and credibility</p>	<p>Innovation & Problem Solving</p>
<p>APCSP LO 3.2.1 Extract information from data to discover and explain connections or trends APCSP LO 3.2.2 Determine how large data sets impact the use of computational processes to discover information and knowledge APCSP EU 3.3 There are trade-offs when representing information as digital data APCSP 3.3.1 Analyze how data representation, storage, security, and transmission of data involve computational manipulation of information APCSP EU 3.2 Computing facilitates exploration and the discovery of connections in information APCSP EU 1.3 Computing can extend traditional forms of human expression and experience APCSP LO 1.3.1 Use computing tools and techniques for creative expression</p>	<p>Managing Data in a Digital World</p>

Course Projects

Unit	Project Description	FBLA Integration
Introduction to Computer Science	What is Computer Science Computational Artifact: Do you know what Computer Science is? Write your own definition of computer science and add it to the <i>What is Computer Science discussion board</i> . Then create a custom digital artifact such as an Animoto, infographic or poster that illustrates your definition.	FBLA Benefits of Membership at the local, state, and national level
Computer Science Careers	Computer Science Education & Careers Infographic: Create an Infographic using information that gather on the Internet and your school's counseling office regarding the careers and education needed in Computer Science (CS).	FBLA Career Awareness FBLA Goal Setting & Business Achievement Awards
Data Representation	Credit Card Checksums & Luhn Algorithm: Credit cards are used about 10,000 times every second across the world. Sometimes, it is necessary to check if someone made a typo before processing the credit card. Research the Luhn Algorithm to determine how bit parity is used for error detection before a credit card is processed. Create a computational artifact to summarize what you have learned.	FBLA Leadership Development, Community Service, professional communication, and employability skills FBLA State Project Overview FBLA Business Achievement Awards
Algorithm Analysis	Flowcharting with Board Games: Select a simple children's board game such as <i>Sorry</i> , <i>Trouble</i> , <i>CandyLand</i> or <i>Chutes and Ladders</i> . Create a flow chart, using the appropriate charting symbols, illustrating the decision making process required while playing the game.	FBLA Competition Overview FBLA Career Awareness
Computer Programming	Create Project: Programming is a collaborative and create process that bring sides to life through the development of software. Students will design and development a sophisticated program to integrate mathematical and logical concepts, develop abstractions, and implement algorithms.	FBLA Competitions

Operation of the Internet	Cybersecurity and Internet Safety Project: Cyber intrusions and attacks have occurred recently that have exposed sensitive personal and business information, disrupted critical operations, and imposed high costs on the economy. Create a presentation that provides information on security vulnerabilities and one current cybersecurity breach involving the public	FBLA Internet Safety Quiz FBLA Business Achievement Awards
Innovation & Problem Solving	Explore Project: Computing innovations impact our lives in ways that require considerable study and reflection for us to fully understand them. In this performance task, students will explore a computing innovation of their choice. The close examination of a computing innovation will deepen the students' understanding of computer science principles.	FBLA State Project FBLA Business Achievement Awards
Managing Data in a Digital World	Compare/Contrast Formats: Create a presentation to compare and contrast file formats. Your presentation must compare and contrast two image formats, two audio formats, and two video formats with a focus on data compression.	FBLA Business Achievement Awards FBLA Guest Speakers from the Business Community

Course Pacing Guide

Course Pacing Overview		
Duration (Weeks)	Unit/Topic	Standard
1 week	Introduction to Computer Science	APCSP LO 4.2.2 APCSP EU 1.2 APCSP LO 1.2.1
1 week	Computer Science Careers	APCSP LO 1.1.1 APCSP LO 1.2.2 APCSP LO 1.2.3
3 weeks	Data Representation	APCSP EU 2.1 APCSP EU 3.1 APCSP LO 3.1.1 APCSP LO 3.1.2 APCSP LO 3.1.3
3 weeks	Algorithm Analysis	APCSP LO 2.1.1 APCSP LO 2.1.2 APCSP LO 2.2.3 APCSP EU 4.1 APCSP LO 4.1.1 APCSP LO 4.1.2 APCSP EU 4.2

		APCSP LO 4.2.1 APCSP LO 4.2.4
12 weeks	Computer Programming	APCSP EU 2.2 APCSP LO 2.2.1 APCSP LO 2.2.2 APCSP LO 1.2.4 APCSP LO 1.2.5 APCSP EU 5.1 APCSP LO 5.1.1 APCSP LO 5.1.2 APCSP LO 5.1.3 APCSP EU 5.2 APCSP LO 5.2.1 APCSP EU 5.3 APCSP LO 5.3.1 APCSP EU 5.4 APCSP LO 5.4.1 APCSP EU 5.5 APCSP LO 5.5.1
3 weeks	Operation of the Internet	APCSP EU 2.3 APCSP LO 2.3.1 APCSP LO 2.3.2 APCSP EU 6.1 APCSP LO 6.1.1 APCSP EU 6.2 APCSP LO 6.2.1 APCSP LO 6.2.2 APCSP EU 6.3 APCSP LO 6.3.1
4 weeks	Innovation & Problem Solving	APCSP LO 4.2.3 APCSP EU 7.1 APCSP LO 7.1.1 APCSP LO 7.1.2 APCSP EU 7.2 APCSP LO 7.2.1 APCSP EU 7.3 APCSP LO 7.3.1 APCSP EU 7.4 APCSP LO 7.4.1 APCSP EU 7.5 APCSP LO 7.5.1 APCSP LO 7.5.2
3 weeks	Managing Data in a Digital World	APCSP LO 3.2.1 APCP LO 3.2.2 APCSP EU 3.3 APCSP 3.3.1 APCSP EU 3.2 APCSP EU 1.3 APCSP LO 1.3.1

GRADING CALCULATIONS AND POLICY

Non-Georgia Milestones EOC Assessment Course Average

50% (1st Sem. Course Work) + 50% (2nd Sem. Course Work)

1st and 2nd Semester Course Work = 75% Summative + 25% Formative

Concept of formative and summative assessment

<http://www.forsyth.k12.ga.us/assessmentconcepts>

Grading Policy			
A = 90 – 100	B = 80 – 89	C = 70 – 79	Failing = Below 70

** Formative Assessments include, but are not limited to homework, class work, practice tests, rough drafts, and sections of projects/research papers/presentations.*

** Summative Assessments include, but are not limited to unit tests, final projects, final essays, final research papers, and final presentations.*

Career Tech Grading Policies for 2017-2018

In order to receive recovery students must complete some type of remediation (i.e. coming in before/after school or during designated recovery time).

All recovery assignments are to be completed within ten school days. Based on a 100 point score a 20-point reduction will be taken off the final grade of the assignment.

All grades become locked after the 9 week grading period ends.

In the event a student is dealing with extenuating circumstances the student must have academic waiver signed by Career Tech Administrator, to allow for an extension.

The Career Tech Department will be following the county wide policy on absences from school.

