

IB/AP Computer Science A

Summary Course Description

Computer science embraces problem solving, hardware, algorithms, and perspectives that help people utilize computers to address real-world problems in contemporary life. Throughout the course, students will design, implement, and analyze solutions to problems. Students in AP Computer Science will use standard data structures, develop and select appropriate algorithms and data structures to solve new problems, write solutions fluently in an object-oriented paradigm, write, run, test, and debug solutions in the Java programming language, utilizing standard Java library classes and interfaces from the AP Java subset.

The AP Computer Science A course introduces students to computer science with fundamental topics that include problem solving, design strategies and methodologies, organization of data (data structures), approaches to processing data (algorithms), analysis of potential solutions, and the ethical and social implications of computing. The course emphasizes both object-oriented and imperative problem solving and design. These techniques represent proven approaches for developing solutions that can scale up from small, simple problems to large, complex ones.

This course is the first part of the IB Computer Science SL course. At the end of this course students have the option to continue into the second half to earn IB credit in addition to the AP course credit.

Learning Objectives

The following goals apply to the AP Computer Science A course. Students should be able to:

- Design, implement and analyze solutions to problems.
- Use and implement commonly used algorithms.
- Use standard data structures.
- Develop and select appropriate algorithms and data structures to solve new problems.
- Write solutions fluently in an object-oriented paradigm.
- Write, run, test, and debug solutions in the Java programming language, utilizing standard Java library classes and interfaces from the AP Java subset.

College Credit Option

Students are expected to take the Advanced Placement (AP) Examination in May. Many colleges grant credit and/or placement to students with AP exam scores of 3 (out of 5) and higher.

Course Curriculum

The course adheres to College Board's AP Computer Science A's curriculum. The course emphasizes object-oriented programming using an objects-late approach. The major units of study are:

- Unit 1: History of computing and Java background
- Unit 2: Data Types
- Unit 3: Using Objects with Java
- Unit 4: Booleans, conditionals, logic, and decisions
- Unit 5: Iteration: for, do while and while do loops
- Unit 6: Student-developed methods
- Unit 7: Creating classes and objects
- Unit 8: Arrays, 1-D and 2-D, and the control structures to manipulate them
- Unit 9: Using ArrayLists
- Unit 10: Testing methodologies
- Unit 11: Inheritance and polymorphism
- Unit 12: Extending polymorphism: Interfaces
- Unit 13: Exception handling
- Unit 14: Recursion
- Unit 15: Sorting and searching
- Unit 16: Review for the AP exam
- Unit 17: Reading and writing binary and text files
- Unit 18: Analysis phase of major projects