Advanced Placement Computer Science A2
TECH 072 057
Credits: 0.5 units / 5 hours / NCAA

Course Description

AP Computer Science A 2 is the second semester of a 2 semester sequence that is equivalent to a one semester, college-level course in computer science. Topics covered in this second semester include defining classes and using objects; Arraylist structure, constructors and methods; list structure; abstract classes and interfaces; superclass constructors; polymorphism; recursion; searching and sorting; analysis of algorithms; streams and random access files; computer graphics concepts; GUI components and classes. This course will conclude with a review and practice for the AP exam. All instructions in this course are written for a PC with Windows 7 operating system. You may need to make adjustments if you are using a different platform or operating system. Students will need to download both Java SDK and an IDE such as JCreator, along with various programming components and student guides from the online course or from the textbook publisher's website for use in course activities and projects.

Graded Assessments: 3 Unit Evaluations; 3 Projects; 3 Proctored Progress Tests

Course Objectives

When you have completed the materials in this course, you should be able to:

1. Effectively apply the main principles of object-oriented software design and programming: classes and objects, constructors, methods, instance and static variables, inheritance, class hierarchies, and polymorphism.
2. Demonstrate an ability to code fluently in Java in a well-structured fashion and in good style; learn to pay attention to code clarity and documentation.
3. Use Java library packages and classes within the scope of the AP Java subset.
4. Implement algorithms in Java using conditional and iterative control structures and recursion.
5. Select appropriate algorithms and data structures to solve a given problem.
6. Compare efficiency of alternative solutions to a given problem.
7. Use common searching and sorting algorithms: Sequential Search and Binary Search; Selection Sort, Insertion Sort, and Mergesort.
8. Understand and use one- and two-dimensional arrays, the List interface, and the ArrayList class appropriately in programming projects.
9. Demonstrate skills in designing object-oriented software solutions to problems from various application areas.
10. Prepare for the AP Computer Science A exam effectively; meeting all of the curricular requirements defined by the College Board for this course.

Course Outline

Unit 5: Classes and Class Hierarchies
Lesson 11: Defining Classes and Using Objects
Lesson 12: java.util.ArrayList
Lesson 13: Class Hierarchies, Abstract Classes and Interfaces
Project 1
Progress Test 1

Unit 6: Recursion, Searching, and Sorting
Lesson 14: Algorithms and Recursion
Lesson 15: Searching and Sorting
Project 2
Progress Test 2

Unit 7: Graphics, GUI, Streams and Files
Lesson 16: Streams and Files
Lesson 17: Graphics and GUI
Project 3
Progress Test 3

AP Exam Review

Required Textbook and Materials
(available through Follett virtual bookstore at http://highschool.nebraska.bkstr.com)

Textbooks:
Java Methods: Object-Oriented Programming and Data Structures, 3rd AP Edition, 2015. (ISBN 9780982477564)

Optional
This textbook is an important part of student's preparation for taking the College Board's AP Computer Science A exam. It is optional for the successful completion of this course, and is used mainly in the second semester of this course.
Be Prepared for the AP Computer Science Exam in Java, 6th Edition. 2014. (ISBN: 9780982477533)