

Phoenix Christian Unified Schools

CSC310 Advanced

AP Computer Science - JAVA

Course Scope & Sequence

COURSE DESCRIPTION

Advanced Computer Science is an Advanced Placement (AP) Course that allows the student to earn college credit and / or placement in higher-level courses. As such, the course will offer college level instruction in basic programming, concepts (branches and loops, method calls), object-oriented programming (classes, interfaces, and inheritance), data structures, and algorithms. Additional material describing this course and Advanced Placement is available from The College Board.

REQUIRED TEXTS AND *KEY SUPPLEMENTAL MATERIALS

Computing Concepts with Java Essentials, Cay Horstmann, John Wiley & Sons.
Computing Concepts with Java Essentials Advanced Placement Computer Science Study Guide, Frances Trees and Cay Horstmann, John Wiley & Sons.

COURSE SCOPE AND SEQUENCE

First Quarter

Introduction 2 Week

Key Concepts: Computers, Programming, Programming Languages, Errors, and The Compilation Process.

Assessments: Lab Activity, Review Exercises, Programming Exercises, Quiz.

Biblical Integration: Discuss how relationships work in the body of Christ.

Objects and Classes 2 Week

Key Concepts: Using and Constructing Objects, Object Variables, Defining and Testing a Class, Instance Fields, Constructors, Designing the Public Interface of a Class, Implementing a Class, Variable Types, Explicit and Implicit Method Parameters.

Assessments: Lab Activity, Review Exercises, Programming Exercises, and Unit Test.

Fundamental Data Types 2 Week

Key Concepts: Number Types, Assignment, Constants, Arithmetic and Mathematical Functions, Calling Static Methods, Type Conversion, Strings, Reading Input, Characters, Comparing Primitive Types and Objects.

Assessments: Lab Activity, Review Exercises, Programming Exercises, and Unit Test.

Decisions 1 Week

Key Concepts: "If" Statements, Comparing Values, Multiple Alternatives, Boolean Expressions.

Assessments: Lab Activity, Review Exercises, Programming Exercises, Quiz,

Iteration 4 Weeks

Key Concepts: Loops, Processing Input, Random Numbers and Simulations, Keyboard Input, The String Tokenizer.

Assessments: Lab Activity, Review Exercises, Programming Exercises, Quiz, Test

Biblical Integration: Discuss how to act in a Christian manner in worldly situations.

Designing Classes 4 Weeks

Key Concepts: Choosing Classes, Cohesion and Coupling, Accessor and Mutator Methods, Side Effects, Preconditions and Postconditions, Static Fields, Static Methods, Scoops, and Packages.

Assessments: Two Lab Activities, Review Exercises, and Programming Exercises.

Testing and Debugging 2 Week

Key Concepts: Unit Tests, Test Case Evaluation, Regression Testing and Test Coverage, Program Traces, Logging, Assertions, and the Debugger.

Assessments: Lab Activity, Review Exercises, Programming Exercises, Quiz.

Second Quarter

Marine Biology Case Study 4 Weeks

Key Concepts: Integrating Code with Real Life Applications.

Assessments: Lab Activity, Review Exercises, Programming Exercises, Case Study Test, 2 Quizzes, Test.

Biblical Integration: Discuss how a Christian should walk the talk, how to live your life in a Godly manner.

Interfaces and Polymorphism 2 Week

Key Concepts: Developing Reusable Solutions, Converting Between Two Types, Polymorphism, Using a Strategy Interface for Improving Reusability, Processing Timer Events.

Assessments: Lab Activity, Review Exercises, Programming Exercises, Quiz.

Inheritance 2 Week

Key Concepts: Inheritance, Inheritance Hierarchies, Inheriting Instance Fields and Methods, Subclass Construction, Converting from Subclasses to Superclasses, Access Control, And The Cosmic Superclass.

Assessments: Lab Activity, Review Exercises, Programming Exercises, Quiz, Test.

Array List and Arrays 2 Week

Key Concepts: Array Lists, Simple Array List Algorithms, Storing Numbers in Array Lists, Declaring and Accessing Arrays, Copying Arrays, Partially Filled Arrays, Two-Dimensional Arrays.

Assessments: Lab Activity, Review Exercises, Programming Exercises, Quiz.

Recursion

2 Week

Key Concepts: Triangle Numbers, Permutations, Thinking Recursively, Recursive Helper Methods, Mutual Recursions, and Recursion Efficiency.

Assessments: Lab Activity, Review Exercises, Programming Exercises, Quiz.

Biblical Integration: Discuss how to approach your job in a Christian manner.

Sorting and Searching

2 Week

Key Concepts: Selection Sort, Profiling the Selection Sort Algorithm, Analyzing the Performance of the Selection Sort Algorithm, Merge Sort, Analyzing the Merge Sort Algorithm, Searching, Binary Search, Searching and Sorting Real Data.

Assessments: Lab Activity, Review Exercises, Programming Exercises, Quiz, Test.

Exception Handling

2 Week

Key Concepts: Throwing Exceptions, Checked Exceptions, Designing Your Own Exception Types, Catching Exceptions, The Finally Clause, And A Complete Example.

Assessments: Lab Activity, Review Exercises, and Programming Exercises

System Design

2 Week

Key Concepts: Software Life Cycle, Discovering Classes, Relationships Between Classes, System Examples.

Assessments: Lab Activity, Review Exercises, and Programming Exercises.