Computer Science Fundamentals

Course Overview

This course introduces students to core computer science principles that underpin programming languages like Python and Java. It focuses on concepts like data representation, variables, data types, control structures, and basic object-oriented programming. This course is intended to be taken ***before*** or ***alongside*** a programming course in Java or Python.

Course Objectives

- Understand how computers represent and manipulate data using binary.
- Utilize variables, data types, and operators in programming.
- Learn fundamental control structures like conditional statements and loops.
- Learn the basics of object-oriented programming, including classes and objects.
- Familiarize with error handling, compilation, and execution processes.
- Develop problem-solving skills applicable to software development.

Unit 1: Data Representation and Variables

Learn how computers represent data and how variables are used to store and manipulate this data. The unit covers number systems, data types, and the fundamentals of variables in programming.

- ☐ Video - How I would learn to code (If I could start over)
- ☐ Converting Binary to (and from) Decimal
- ☐ Two's Complement
- ☐ Variables and Data Types
- ☐ Memory Allocation
- ☐ Operators
    - ☐ Arithmetic
    - ☐ Assignment
    - ☐ Increment
    - ☐ Comparison
- ☐ Syntax Errors vs Semantics Errors
- ☐ Unit 1 Test

Unit 2: Control Structures and Operations

Learn about control structures that govern the flow of a program. Explore conditional statements, loops, relational operators, and basic error handling.

- ☐ Operators
    - ☐ Relational
- ☐ Conditional Statements
- ☐ Loops
- ☐ Arrays
- ☐ Input/Output Streams
- ☐ Error Handling
- ☐ Unit 2 Test

Unit 3: Object-Oriented Programming and Software Development Basics

The final unit introduces the principles of object-oriented programming (OOP) and other essential concepts in software development. Students will learn about classes, objects, methods, and the compilation process.

- ☐ Classes and Objects
- ☐ Unit 3