Programming Logic & Technique – Course Contents

1.) Introduction to Computers and Programming
   - Introduction
   - Hardware
   - How Computers Store Data
   - How a Program Works
   - Types of Software

2.) Input, Processing, and Output
   - Designing a Program
   - Output, Input, and Variables
   - Variable Assignment and Calculations
   - IN THE SPOTLIGHT: Calculating a Percentage
   - IN THE SPOTLIGHT: Calculating an Average
   - IN THE SPOTLIGHT: Converting a Math Formula to a Programming Statement
   - Variable Declarations and Data Types
   - Named Constants
   - Hand Tracing a Program
   - Documenting a Program
   - IN THE SPOTLIGHT: Using Named Constants, Style Conventions, Programming Exercises

3.) Modules
   - Introduction to Modules
   - Defining and Calling a Module
   - IN THE SPOTLIGHT: Defining and Calling Modules
   - Local Variables
   - Passing Arguments to Modules
   - IN THE SPOTLIGHT: Passing an Argument to a Module
   - IN THE SPOTLIGHT: Passing an Argument by Reference
   - Global Variables and Global Constants
   - IN THE SPOTLIGHT: Using Global Constants
   - Programming Exercises

4.) Decision Structures and Boolean Logic
   - Introduction to Decision Structures
   - IN THE SPOTLIGHT: Using the If-Then Statement
   - Dual Alternative Decision Structures
   - IN THE SPOTLIGHT: Using the If-Then-Else Statement
   - Comparing Strings
   - Nested Decision Structures
   - IN THE SPOTLIGHT: Multiple Nested Decision Structures
   - The Case Structure
   - IN THE SPOTLIGHT: Using a Case Structure
   - Logical Operators
   - Boolean Variables
   - Programming Exercises

5.) Repetition Structures
   - Introduction to Repetition Structures
   - Condition-Controlled Loops: While, Do-While, and Do-Until
   - IN THE SPOTLIGHT: Designing a While Loop
   - IN THE SPOTLIGHT: Designing a Do-While Loop
Count-Controlled Loops and the For Statement

IN THE SPOTLIGHT: Designing a Count-Controlled Loop with the For Statement
Calculating a Running Total
Sentinels

IN THE SPOTLIGHT: Using a Sentinel

Nested Loops

Programming Exercises

6.) Functions

Introduction to Functions: Generating Random Numbers

IN THE SPOTLIGHT: Using Random Numbers

IN THE SPOTLIGHT: Using Random Numbers to Represent Other Values

Writing Your Own Functions

IN THE SPOTLIGHT: Modularizing with Functions

More Library Functions

Programming Exercises

7.) Input Validation

Garbage In, Garbage Out

The Input Validation Loop

IN THE SPOTLIGHT: Designing an Input Validation Loop

Defensive Programming

Programming Exercises

8.) Arrays

Array Basics

IN THE SPOTLIGHT: Using Array Elements in a Math Expression

Sequentially Searching an Array

Processing the Contents of an Array

IN THE SPOTLIGHT: Processing an Array

Parallel Arrays

IN THE SPOTLIGHT: Using Parallel Arrays

Two-Dimensional Arrays

IN THE SPOTLIGHT: Using a Two-Dimensional Array

Arrays of Three or More Dimensions

Programming Exercises

9.) Sorting and Searching Arrays

The Bubble Sort Algorithm

IN THE SPOTLIGHT: Using the Bubble Sort Algorithm

The Selection Sort Algorithm

The Insertion Sort Algorithm

The Binary Search Algorithm

IN THE SPOTLIGHT: Using the Binary Search Algorithm

Programming Exercises

10.) Files

Introduction to File Input and Output

Using Loops to Process Files

IN THE SPOTLIGHT: Working with Files

Using Files and Arrays

Processing Records

IN THE SPOTLIGHT: Adding and Displaying Records

IN THE SPOTLIGHT: Searching for a Record
IN THE SPOTLIGHT: Modifying Records
IN THE SPOTLIGHT: Deleting Records
Control Break Logic
IN THE SPOTLIGHT: Using Control Break Logic
Programming Exercises

11.) Menu-Driven Programs
   - Introduction to Menu-Driven Programs
   - Modularizing a Menu-Driven Program
   - Using a Loop to Repeat the Menu
IN THE SPOTLIGHT: Designing a Menu-Driven Program
   - Multiple-Level Menus
Programming Exercises

12.) Text Processing
   - Introduction
     - Character-By-Character Text Processing
IN THE SPOTLIGHT: Validating a Password
IN THE SPOTLIGHT: Formatting and Unformatting Telephone Numbers
Programming Exercises

13.) Recursion
   - Introduction to Recursion
   - Problem Solving with Recursion
   - Examples of Recursive Algorithms
Programming Exercises

14.) Object-Oriented Programming
   - Procedural and Object-Oriented Programming
   - Classes
     - Using the Unified Modelling Language to Design Classes
     - Finding the Classes and Their Responsibilities in a Problem
IN THE SPOTLIGHT: Finding the Classes in a Problem
IN THE SPOTLIGHT: Determining Class Responsibilities
   - Inheritance
   - Polymorphism
Programming Exercises

15.) GUI Applications and Event-Driven Programming
   - Graphical User Interfaces
     - Designing the User Interface for a GUI Program
IN THE SPOTLIGHT: Designing a Window
   - Writing Event Handlers
IN THE SPOTLIGHT: Designing an Event Handler
Programming Exercises