# Lab: Working with Algorithms and Data Structures

**Scenario**

You need to decide which courses you will take in the upcoming quarter. Thinking through the process of viewing and choosing courses, write the pseudocode steps that you would complete for reviewing and choosing courses and then adding them to a collection.

In a situation where you are storing information in a computer program about courses that you are enrolled in, you will need to store many pieces of information. Some of this information will be of the same data type, while others will not be. In this lab, you will create some simple data structures to store similar data such as your grades for a course across the different assignments or tests associated with that course. You will also create a data structure to store information specific to the collection of courses you will take.

**Objectives**

After completing this lab, you will be able to:

• Create pseudocode to represent problem solving logic that will be used to translate into programming code.

• Create arrays to store collections of data.

• Create a stack data structure in code.

• Create a list type data structure.

**Lab Setup**

Start the 10975A-SEA-DEV virtual machine if it is not already running, and log on as **Student** with the password **Pa$$w0rd**.

## Exercise 1: Working with Pseudocode

**Scenario**

You need to decide which courses you will take in the upcoming quarter. Thinking through the process of viewing and choosing courses, write the pseudocode steps that you would complete for reviewing and choosing courses.

The main tasks for this exercise are as follows:

1. Write pseudocode.

2. Translate pseudocode into programming code.

### Task 1: Write pseudocode

• Create a Word document containing pseudocode for the lab scenario.

### Task 2: Translate pseudocode into programming code

1. Create the high-level functions from pseudocode from Task 1.

2. Create the logic inside the functions, (decision and loops), to provide the functionality from pseudocode.

Don’t worry about getting the exact code here. This is merely an exercise to help you think about converting pseudocode to working code.

**Results**: At the end of this lab, you should have a complete algorithm formulated in pseudocode that explains how you will identify the key aspects of a course and add it to a collection.

## Exercise 2: Creating Data Structures

**Scenario**

In a situation where you are storing information in a computer program about courses that you are enrolled in, you will need to store many pieces of information. Some of this information will be of the same data type, while others will not be. In this lab, you will create some simple data structures to store similar data such as your grades for a course across the different assignments or tests associated with that course. You will also create a data structure to store information specific to the collection of courses you will take.

The main tasks for this exercise are as follows:

1. Create an array.

2. Implement a stack.

3. Implement a list.

### Task 1: Create an array

1. Open the starter code for this lab from C:\Allfiles\Mod04\Labfiles\Starter\CS\AlgorithmDataStructures\_CS.

2. Create an array of floating point values to represent a series of grades.

3. Add grades to the array.

4. Read grades from the array.

### Task 2: Implement a stack

1. Use the starter code from C:\Allfiles\Mod04\Labfiles\Starter\CS\AlgorithmDataStructures\_CS

2. Implement the **System.Collections.Stack** class.

3. Push values onto the stack.

4. Pop values from the stack.

### Task 3: Implement a list

1. Use the starter code from C:\Allfiles\Mod04\Labfiles\Starter\CS\AlgorithmDataStructures\_CS

2. Create a new .Net SortedList object called myCourses.

3. Add the following values to the myCourses list.

Key Value

CS101 Introduction to Computer Science

CS102 Data Structures and Algorithm Analysis

CS201 Introduction to Databases

CS301 Introduction to Object-Oriented Programming

4. Read values from the list.

5. Remove values from the list.

**Question:** What is the difference between a stack and a queue?

**Question:** Can the same array store a mixture of text and numbers?