**New Beginnings – Practical/Programming**

**Summer 2018**

**Course Outline**: ***(7th(ish) Edition of Malik)***

**WEEK #1-2 : Getting started with C++**

**Date: Topic: Reading:**

**WK1-2 Topic #1**

• **Overview and/or Review of C++**  **Malik: 1, 2, 3**

* Structure of C++ Programs
* C++ Statements
* Data Types
* Operators

• **Continue with C++ (Loops and Arrays)**  **Malik: 4, 5**

• I/O, Conditionals, Repetition, Arrays

* Branching Statements
* Loops and Relational Expressions
* I/O and formatting output
* Arrays, Strings, String I/O

**Demonstration: Creating a complete program in C++**

* Explore C++ assignment statements, conditionals, and truth tables
* Explore C++ arrays of characters

**WEEK #3: Functions(Arrays from WK2)**

**Date: Topic: Reading:**

**WK3 Topic #2**

**Overview of C++ Functions**  **Malik: 6, 7**

* Prototypes vs. Function Definitions
* Pass by value, by reference, by const
* Passing fundamental types and array
* Demonstration: Designing using modularity
* Demonstration: Writing programs using functions with arguments
* Explore C++ functions, pass by reference, pass by value, and returning values
* Practice C++ arrays of characters, creating, reading, manipulating
* Gain experience with cstring and cctype librarie

**WEEK # 3/4: Structures, External Files**

**Date: Topic: Reading:**

**WK3 Topic #2: Structures**  **Malik: 9**

* What they are
* How to create them
* Working with arrays of structures

**Date: Topic: Reading:**

**WK4 External Files and Structs**

* Lecture: External Data Files
* Demonstration: Writing programs using structs and external files
* Explore C++ functions working with structs
* Experience external data files

**WEEK #5: Pointers and Dynamic Memory**

**Date: Topic: Reading:**

**Malik: 10**

**WK5 Topic #3 C++ Class Construct, Data Abstraction and Abstract Data Types**

* Data Abstraction and Abstract Data Types
* The C++ Class, Class versus Structs
* Class Constructors, Defining and Using Functions and Classes.
* General discussion of the C++ Class and creating .h files
* Constructors

**Pointers and Dynamic Memory Malik: 12**

* Introduce pointer variables, memory allocation and deallocation
* Examples manipulating pointers
* Pointer Arithmetic
* Pointers to structs (learn about the . versus ->)

**WEEK #6: Linear Linked Lists**

**Date: Topic: Reading:**

**WK6 Topic #4**

**Dynamic Data Structures Malik: 17**

* Review of Pointers and the new Operator
* Pointer Arithmetic
* Introduction to Linked Lists
* Demonstration: Using pointers and linked lists
* Insert Algorithms for Linear Linked Lists
* Insert and Removal Algorithms
* Demonstration: Inserting and Removal
* Explore writing functions to traverse and modify a linear linked list
* Explore Classes and dynamic structures
* Intro to Recursion using a recursive destructor

**WEEK #7: Recursion**

**Date: Topic: Reading:**

**WK7 Topic #5 Recursion Malik: 15**

* The Nature of Recursion, Tracing a Recursive Function,
* Recursive Mathematical Functions, Recursive Functions with Array Arguments
* Work through examples of recursion in class
* Problem solving with Recursion
* Demonstration: Recursion and LLL
* Explore writing recursive functions

<WILL PROBABLY START TO LOOK AT OTHER ABSTRACT DATA TYPES – Trees, Stacks and Queues>

**WEEK #8: Advanced Pointers**

**Date: Topic: Reading/Projects:**

**WK8 Topic #6 Arrays with Structured Elements Malik: 8**

Arrays of Arrays: Multidimensional Arrays,

Creating Arrays of Arrays, Arrays of Structs, and Arrays of Class Elements.

**WEEK #9: Object Oriented Programming**

**TBD**