

HOSTOS COMMUNITY COLLEGE
DEPARTMENT OF MATHEMATICS

COURSE: MAT 215 MODERN PROGRAMMING LANGUAGES

CREDIT HOURS: 3.0

EQUATED HOURS: 3.0

CLASS HOURS: 3.0

PRE/COREQUISITE: MAT 210, ESL 035

REQUIRED TEXT†: Tony Gaddis. Starting Out with C++, Brief Version—From Control Structures through Objects, 7th Ed. 2011, Addison-Wesley. ISBN 978-0-13-277289-1.

DESCRIPTION: This course provides an introduction to problem solving methods and algorithm development through the study of the program, control structures, and data structures of the C++ programming language. The main aspects of the course include: the concepts of procedural and object-oriented programming, algorithm design, control structures in C++, functions and recursions, arrays, pointers, characters and strings, structured data, file operations, classes.

LEARNING OUTCOMES:

1. Understand given C++ programs and be able to predict their output and find any errors in them
2. Be able to use selection structures and repetition structures
3. Understand functions and recursion in C++
4. Understand data storage, addresses, arrays and pointers in C++
5. Knowledgeable of object-oriented programming and the process of C++ program development, and be able to develop algorithms and write C++ programs to accomplish given tasks

EXAMINATIONS: A minimum of three quizzes, midterm/project, and comprehensive final exam

GRADES: A, A-, B+, B, B-, C+, C, D, I, F.

COURSE OUTLINE:

Week Topics

- 1 **I. Introduction to Computers and Programming**
 1. Computer systems: hardware and software
 2. Programs and programming; algorithms
 3. Hands on (lab): Introducing the Dev-C++/Microsoft Visual C++ Platform

- 2 **II. Introduction to C++**
 1. The parts of a C++ program
 2. The `cout` object, variables, constants, the assignment statement, identifiers, comments
 3. Integer data types, floating-point data types
 4. Arithmetic operators
 5. `char` data type, the string class
 6. The `bool` data type

- 3 **III. Expressions and Interactivity**
 1. The `cin` object
 2. Mathematical expressions
 3. Multiple and combined assignment
 4. Formatting output
 5. Working with characters and string objects
 6. More mathematical library functions
 7. Introduction to file input and output

- 4 **IV. Making Decisions**
 1. Relational operators
 2. `if`, `if/else`, `if/else if` statements; nested `if` statements; menus
 3. Logical operators
 4. The conditional operator; the `switch` statement

- 5 **V. Looping**
 1. Increment and decrement, the `while` loop, counters
 2. The `do-while` loop
 3. The `for` loop
 4. Nested loops
 5. Breaking out of a loop; the `continue` statement

- 6 **VI. Functions**
1. Introduction to recursions
2. Defining and calling functions; function prototypes
3. Sending data into a function; passing data by value; the return statement
4. Returning value from a function; returning a Boolean value
5. Local and global variables; static local variables; default arguments; the `exit()` function
- 7 **VII. Arrays**
1. Arrays hold multiple values; accessing array elements; no bounds checking in C++
2. Array initialization; processing array contents
3. Arrays as function arguments
4. 2-dimensional arrays; arrays of strings; arrays with 3 or more dimensions
- 8 **VIII. Pointers**
1. Getting the address of a variable; pointer variables; the relationship between arrays and pointers
2. Pointer arithmetic; initializing pointers; comparing pointers
3. Pointers as function parameters
- 9 **IX. Characters, Strings, the `string` Class**
- 10 **X. Structured Data**
1. Abstract data types; accessing structure members; initializing a structure
2. Arrays of structures; nested structures
3. Structures as function arguments; returning a structure from a function
4. Pointers to structures
- 11 **XI. Advanced File Operations**
- 12 **XII. Introduction to Classes**
1. Procedural and object-oriented programming
2. Introduction to classes
3. Defining an instance of a class; inline member functions;
- 13 4. Constructors; passing arguments to constructors; destructors;
5. Private member functions
6. Arrays of objects
- 14 Review

†Subject to change.