CS 1511: Computer Science I (5)

Catalog Description:
Introduction to the discipline of computer science. Emphasis on problem analysis, design, and development using event-driven programming in a graphical user interface environment. Programming concepts include control structures, arrays, recursion, pointers, classes and introduction to the object-oriented approach.

Textbook: Allert, J. (2009) *Programming with Visual C++: Concepts and Projects*. Boston, Course Technology/Cengage Learning.

Course Goals:
This course covers all of the elementary concepts of computer science as well the basics of program design, analysis and the C++ programming language. Students will study the fundamentals of computer systems, ethical computing, the history of computing, structured program design techniques (algorithms and traces), elementary C++ programming statements, functions and parameter passing, control structures (sequential, selection, repetition), complex expression rules and truth tables, counting and summation, the array data structure, sequential and binary searching, n^2 sorting techniques, analysis, pointers, object-oriented programming, constructors, public and private data and methods.

Prerequisites by Course & Topic:
3½ years of high school math

Major Topics Covered in the Course:
- The Fundamentals of Computer Systems
- Algorithms and testing
- Variable declaration, initialization and scope
- Arithmetic, relational and logical operators
- Operator precedence and parsing complex Boolean expressions
- Control structures for selection and repetition
- Counting and summation
- Functions, parameter passing (with value and reference parameters)
- One-dimensional Arrays
- Searching techniques (sequential and binary search)
- Sorting techniques (selection, bubble and insertion sorts)
- Into to analysis and Big-O
- Pointers and pointer arithmetic
- Dynamic memory allocation
- Object-Oriented Programming concepts
- Class definitions and instantiating objects
- Default and initializing constructors
- Public and private data and methods

Class/Laboratory Schedule: Lecture: 3 hours per week, Discussion: 1, Laboratory: 1

Course Outcomes:

1. Students demonstrate proficiency in the C++ programming language
2. Students demonstrate knowledge of data structures

Program Outcomes Assessment via this Course

UMD Computer Science Department program outcomes are assessed by identifying performance criteria for each of the program outcomes, and assessing those performance criteria in various ways. The performance criterion to be assessed in this course is:

5a. Students demonstrate proficiency in one high-level language

Program Outcomes Supported by this Course

4: Students understand the fundamentals of data structures and related algorithms
5. Students understand the application of programming languages in computer systems

Assessment Plan for Course:
This course is assessed every other year by the instructor and a course assessment document covering course outcomes and the listed performance criteria is prepared.

Coordinator/Prepared by: J. Allert