COP 3014 Foundations of Computer Science

Credits: 3

Text book, title, author, and year: *Walter Savitch, Problem Solving with C++, 8th Edition, Pearson, 2012*
Supplemental materials: none.

Specific course information

a. **Catalog description:** Builds programming skills with an emphasis on disciplined program design and coding. Introduction to object-based programming concepts including class design and implementation. Programming in C++.
b. **Prerequisites:** COP 2220
c. **Required, elective, or selected elective:** Required

Specific goals for the course

a. **Specific outcomes of instruction:** By the end of the course students will be able to: (i) Demonstrate the ability to produce correct code; (ii) Demonstrate the ability to produce clear and well-structured code; (iii) Demonstrate the ability to produce code that is space and time efficient; (iv) Demonstrate the ability to choose and implement data structures; (v) Demonstrate understanding of the entire software life cycle including design, implementation, testing, maintenance, and documentation;(vi) Demonstrate understanding of the overall structure of an operating system, and the data structures and programming constructs used in operating systems.

Brief list of topics to be covered:

a. Review of C basics, basic program formatting/documentation standards.
b. Basic machine architecture and terminology: compilation, linking, RAM, OS, etc.
c. C++ I/O, simple classes (private & public) and types
d. if/else, operators, value-returning functions, more on classes & members
e. Program design: top-down design, bottom-up design
f. Iteration: scope
g. Documentation standards.
h. Class design and implementation
i. Abstract Data Type, ADT
j. Standard Template Library, STL
k. Streams, reference parameters
l. Arrays, VECTOR class
m. Recursion, sorting
n. Pointers, linked lists, dynamic memory allocation
o. Function and operator overloading.
p. Function and class templates