CSC 249 Data Structure & Algorithms

COURSE DESCRIPTION:

Prerequisites: CSC 151
Corequisites: None

This course introduces the data structures and algorithms frequently used in programming applications. Topics include lists, stacks, queues, dequeues, heaps, sorting, searching, mathematical operations, recursion, encryption, random numbers, algorithm testing, and standards. Upon completion, students should be able to design data structures and implement algorithms to solve various problems.
Course Hours per Week: Class, 2. Lab, 3. Semester Hours Credit, 3.

LEARNING OUTCOMES:

Upon completing requirements for this course, the student will be able to:

1. Implement data structures.
    a. Students will design, implement, and evaluate fundamental data structures—including arrays, lists, stacks, queues, hash tables, and trees—using Java to solve programming problems.
2. Analyze algorithm efficiency.
    a. Students will analyze and compare algorithms for searching, sorting, and data manipulation using appropriate performance metrics (e.g., time and space complexity), and select optimal solutions for given scenarios.
3. Apply algorithm implementations.
    a. Students will develop, test, and document recursive and iterative algorithms, and demonstrate competency through programming projects evaluated against established style and testing standards.

OUTLINE OF INSTRUCTION:

I. Introduction to Data Structures and Algorithms
II. Searching and Algorithm Analysis
III. Sorting Algorithms
IV. Lists and Arrays
V. Stacks and Queues
VI. Hash Tables
VII. Trees & Heaps

REQUIRED TEXTBOOK AND MATERIAL:

The textbook and other instructional material will be determined by the instructor.