COURSE DESCRIPTION

Dept., Number	**CS 2302 Required**	Course Title	Data Structures
Semester hours	45 hours	Course Coordinator	Olac Fuentes

Current Catalog Description

Abstract data types, representation of data using sets, lists trees and graphs. Storage allocation and collection techniques.

Textbook:

Data Structures and Algorithm Analysis in Java, by Mark Allen Weiss. Addison Wesley, Third Edition, 2011.

Course Outcomes:

Level 3 Outcomes: Synthesis and Evaluation

1. Given a problem, judge which data structures that are required to solve it efficiently and justify the selection.
2. Given a non-recursive algorithm, examine its loop structure, assess its asymptotic running time, and express it using big-O notation.
3. Given a recursive algorithm, examine its structure, formulate and solve a recurrence equation defining its running time, and express it using big-O notation.
4. Design and implement solutions to computational problems based on iteration and recursion.

Level 2 Outcomes: Application and Analysis

1. Describe, implement, and use the following data structures:
    a. Heaps
    b. Hash tables
    c. Balanced trees
    d. Graphs
    e. Disjoint set forests
2. Describe, implement, and apply the following graph algorithms:
    a. Connected components
    b. Breadth-first search
    c. Depth-first search
    d. Topological sorting
    e. Minimum spanning trees (Kruskal's and Prim's)
    f. Single-source shortest paths
3. Trace the behavior of recursive programs using activation records.

Level 1 Outcomes: Knowledge and Comprehension

1. Identify and explain the following algorithm design techniques:
    a. Greedy algorithms

b. Divide and conquer
c. Dynamic programming
d. Backtracking

2. Explain the concept of NP completeness.
3. Explain the utility of randomized algorithms.

Student Outcomes

Student Outcomes: 1, 2, 3, 9, 10

Prerequisites by Topic:

CS 2401 and MATH 2300 each with a grade of C or better