### COURSE DESCRIPTION

<table>
<thead>
<tr>
<th>Dept., Number</th>
<th>CS 2302</th>
<th>Course Title</th>
<th>Data Structures</th>
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<tr>
<td>Semester hours</td>
<td>45 hours</td>
<td>Course Coordinator</td>
<td>Olac Fuentes</td>
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Current Catalog Description

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

Textbook:


Course Outcomes:

**Level 3 Outcomes: Synthesis and Evaluation**

1. Given a problem, judge which data structures 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
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<tr>
<td>b.</td>
<td>Divide and conquer</td>
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<td>c.</td>
<td>Dynamic programming</td>
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<tr>
<td>d.</td>
<td>Backtracking</td>
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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