

University of Texas at El Paso
Course Syllabus

COURSE DESCRIPTION

Dept., Number	CS2401	Course Title	Elementary Data Structures and Algorithms
Approval Date	April 2022	Course Coordinator	Monika Akbar

CATALOG DESCRIPTION

Programming and Algorithms: Second course for students majoring in Computer Science. Fundamental computing algorithms including searching and sorting; elementary abstract data types including linked lists, stacks, queues and trees; introduction to algorithm analysis. [TCCN COSC 1437]

TEXT BOOK

CS2 Software Design & Data Structures by Clifford A. Shaffer (free ebook)
<https://opendsa-server.cs.vt.edu/OpenDSA/Books/CS2/html/>

COURSE OUTCOMES

Level 1: Knowledge and Comprehension:

Level 1 outcomes are those in which the student has been exposed to the terms and concepts at a basic level and can supply basic definitions. On successful completion of this course, students will be able to:

1. Demonstrate their understanding of the features of object-oriented languages (related to the implementation of the Data Structures discussed through this course)
2. Articulate the notion of average-case time complexity

Level 2: Application and Analysis:

Level 2 outcomes are those in which the student can apply the material in familiar situations, e.g., can work a problem of familiar structure with minor changes in the details. Upon successful completion of this course, students will be able to:

1. Describe, implement, and use the following algorithms for:
 - a. Searching: linear and binary search
 - b. Sorting: merge sort, quick sort, and at least one quadratic sorting algorithm
2. Use basic notions of algorithm complexity:
 - a. Use Big-O notation to describe the running time and memory requirements of an algorithm
 - b. Determine the best- and worst-case behaviors of simple algorithms
3. Use standard problem-solving techniques such as: problem decomposition, iteration, and recursion.

Level 3: Synthesis and Evaluation:

Level 3 outcomes are those in which the student can apply the material in new situations. This is the highest level of mastery. On successful completion of this course, students will be able to:

1. Implement and use the following data structures to solve computational problems:
 - a. Linked lists
 - b. Binary trees as linked structures
 - c. Binary search trees as linked structures
 - d. Stacks
 - e. Queues
2. Trace code that uses:
 - a. Strings
 - b. Single-value data types
 - c. 1D and 2D arrays
 - d. Reference-based structures
 - e. Iterative methods
 - f. Recursive methods
 - g. Primitive vs. non-primitive data types

ABET STUDENT OUTCOMES MAPPING

Course outcomes	Student Outcome
1.2, 2.2., 2.3	1
2.3, 3.1	2 (ABET 1)
3.1, 3.2	3 (ABET 2)
	4 (ABET 5)
	5 (ABET 4)
3.1	6 (ABET 3)
	7
	8
1.1, 2.1, 2.3	9
3.1, 3.2	10 (ABET 6)

PREREQUISITES BY TOPIC

(CS 1401 w/C or better) OR (CS 1101 w/C or better AND CS 1301 w/C or better)