

CSE 2383
Data Structures and Analysis of Algorithms

REQUIRED/ELECTIVE:

Computer Science – Required
Software Engineering – Required
Computer Engineering – Required

CATALOG DATA:

(Prerequisite: CSE 1384 with a grade of C or better) Three hours lecture. Non-linear data structures and their associated algorithms. Trees, graphs, hash tables, relational data model, file organization. Advanced software design and development.

PREREQUISITE BY TOPIC:

1. Functions, limits, derivatives of algebraic functions.
2. Software design, implementation, testing and documentation based on the object-oriented paradigm.
3. Recursion
4. Algorithm development and analysis
5. Linear abstract data types including lists, stacks, and queues.

TEXTBOOKS AND OTHER REQUIRED MATERIAL:

Nyhoff, Larry, *Data Structures with C++*, Prentice-Hall Publishing, 1999.

COORDINATOR:

Dr. David A. Dampier

COURSE OBJECTIVES:

1. To further reinforce good software development practice with attention to software quality and particular emphasis on reusability.
2. To advance students' understanding of object-oriented design.
3. To advance students' understanding of data structures, data structure application, and data structure design.
4. To advance students' understanding of representation of database representations and manipulation.

TOPICS COVERED:

Lecture	(Number of class hrs)
1. Introduction to the course	1
2. Review of linear structures (lists, stacks, queues)	3
3. Using generic container classes – Generic containers; iterators	3
4. Tree Structures – Binary Trees; Tree traversal algorithms; search trees; balanced trees; heaps	10
5. Graphs – Definitions; representations; algorithms	10
6. Hash Tables	3
7. Relational Data Model – Relational Algebra; Relational Database Management Systems; SQL	6
8. File Organization – Sequential; indexed	6
9. Exams	3

CONTRIBUTION TO PROFESSIONAL COMPONENT:

Engineering Topics of Engineering Science and Design

ASSESSMENTS:

1. Short quizzes in lecture meetings.
2. Examinations
3. Programming Assignments

RELATIONSHIP TO PROGRAM OUTCOMES:

Note: Parenthesized list indicates the ABET criteria, Computer Engineering outcomes, and Software Engineering outcomes addressed by each performance criteria.

Performance Criteria:

1. The student will be able to use the Standard Template Library.(k, se 3, se 7)
2. The student will be able to reuse and extend containers in the Standard Template Library to create new data structures. (k, cpe2, se7)
3. The student will be able to use algorithm analysis techniques to choose the data structure appropriate for a given problem. (a, k, se 7)
4. The student will be able to design, implement, and query a relational database.(b, c, k, cpe9, se 3, se 5)
5. The student will be able to apply software engineering practices of design, implementation, testing and documentation using the object-oriented paradigm to software projects.(b, c, k, se5)

PREPARED BY:

Dr. David A. Dampier, Department of Computer Science & Engineering, March 27, 2005.

ESTIMATE CSAB CATEGORY CONTENT:

	CORE	ADVANCED		CORE	ADVANCED
Data Structures	<u>2</u>	_____	Computer Organization and Architecture	_____	_____
Algorithms	<u>1</u>	_____	Concepts of Programming Languages	_____	_____
Software Design	_____	_____			

ORAL AND WRITTEN COMMUNICATIONS:

None

SOCIAL AND ETHICAL ISSUES:

None.

THEORETICAL CONTENT:

- Analysis of algorithms using Complexity Theory (3 lectures)
- Algorithm analysis for different data structures and associated algorithms (many parts of lecture throughout the course)
- Relational algebra and basic relational database theory (3 lectures)

PROBLEM ANALYSIS:

All students are expected to analyze the efficiency of data structures algorithms.

SOLUTION DESIGN:

- All students apply software engineering practices to design, implementation, testing and documentation to all programming assignments.
- All students design and implement a relational database.