CMSC 123 - DATA STRUCTURE
2ND SEMESTER, A.Y. 2013-14

Description:	Abstract data types and implementations of data structures; arrays, stacks, queues, linked lists, mappings, trees, sets and graphs; internal and external searching and sorting; dynamic storage management.
Prerequisite(s):	(CMSC 21 and CMSC 57) or COI
Credit:	3 units
Hours per week:	5 (2 hrs lecture, 3 hrs laboratory)

OBJECTIVES

At the end of the course, the student should be able to:

- identify data structures and algorithms appropriate for a given problem;
- design alternative implementations of a data structure;
- construct correct and efficient algorithms; and,
- analyze the running time of programs.

COURSE OUTLINE

1 List ADT
- 1.1 Array Implementation
- 1.2 Linked List Implementation
- 1.3 Linked Lists
- 1.3.1 Singly Linked Lists
- 1.3.2 Circular Linked Lists
- 1.3.3 Doubly Linked Lists

2 Stack ADT
- 2.1 Array Implementation
- 2.2 Linked List Implementation

3 Queue ADT
- 3.1 Array Implementation
- 3.2 Linked List Implementation

4 Trees
- 4.1 Basic Concepts and Terminology
- 4.2 Binary Trees and their Implementations
- 4.3 Binary Search Trees
- 4.4 AVL Trees

5 Introduction to analysis of algorithms
- 5.1 Space Complexity
- 5.2 Time Complexity

6 Heaps
- 6.1 Binary Heaps
- 6.2 Priority Queue

7 Graphs
- 7.1 Graph Terminologies and Representations
- 7.2 Graph Traversals
- 7.3 Shortest Path Problem
- 7.4 Other Graph Problems

8 Sorting, Searching and Hashing
- 8.1 Sorting Algorithms
- 8.2 Linear vs. Binary Search
- 8.3 Open vs. Closed Hashing

Laboratory
1. List
2. Stack
3. Queue
4. BST
5. AVL
6. Heap
7. Graphs
8. Analysis of Algorithms
9. Sorting
10. Hashing

COURSE REQUIREMENTS

Your final grade will be based on the following requirements:

50% Lecture

- 5% Attendance/Quizzes
- 25% Long Examinations
- 20% Final Examination

50% Laboratory

Quizzes will be given at the start of the lecture. The quiz will also serve as your attendance in the class.

You will be required to take two (2) **long examinations**. Each examination will be taken during class hours.

The **final examination** will be given during the final exam week. The schedule of this exam will be set by the Office of the University Registrar. **All students are required to take the final exam**.

Grading Scheme:

Grade	Standing	Grade	Standing
1.0	95-100	2.25	70-74
1.25	90-94	2.5	65-69
1.5	85-89	2.75	60-64
1.75	80-84	3.0	55-59
2.0	75-79	5.0	0-54

POLICIES

Pass Both

To pass the course, your standing should be passing in BOTH lecture and laboratory.

Absences

The maximum number of allowable absences (excused + unexcused) for the lecture classes is seven (7), while three (3) for the laboratory classes. If you incurred more absences than these, you may be given a grade of five (5.0) (University Rule).

Missed Requirements Due to Absence

If an official excuse letter is provided (whereas appropriate):

- the missed laboratory exercise should still be taken by the student;
- the missed lecture quiz will be dropped from the final grade computation; or
- the missed lecture examination will be replaced by taking the final examination.

Otherwise, a score of zero will be given on the missed laboratory exercise, lecture quiz or lecture examination.

Exemption from the Final Examination

All students are required to take the final exam.

Laboratory Policies

The policies in the lab will be discussed by the laboratory instructor.

Cheating

The use of any type of reference (websites, books, persons, etc.) must always be cited. Non-acknowledgement of any help is considered plagiarism and is punishable as an academic offense. Also, a student caught cheating in any form in any activity will automatically have a final grade of 5.0.

Class Standing

Students are required to see his/her instructor within three (3) working days after the release of standings. If the student does not approach his/her instructor, it implies that he/she agrees with his/her standing, thus no changes shall be made.

TEACHING STAFF

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USEFUL REFERENCES

EA Albacea. 2007. Introduction to Data Structures 3rd ed. ICS, UPLB.
MA Weiss. 1993. Data Structures and Algorithm Analysis in C. Benjamin/Cummings.
AV Aho, JE Hopcroft, JD Ullman. 1983. Data Structures and Algorithms. Addison-Wesley.
TH Cormen, CE Leiserson, RL Rivest. 1990. Introduction to Algorithms. MIT Press.