KHAZAR UNIVERSITY

School of Architecture, Engineering and Applied Sciences

COURSE SYLLABUS

Advanced Data Structures

Advanced Data Structures

IDENTIFICATION:

Department:	Computer Science
Subject:	Advanced Data Structures (CMS 555)
Credit Units:	3
Instructor:	Aygun Alasgarova
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Term:	Spring, 2010

PREREQUISITES: Data Structures and Algorithms (CMS 218)

COURSE DESCRIPTION

This is a computer science course that introduces the advanced data structures, advanced arrays- their implementation as well as their application, data aggregates and how they can be implemented in programming. The course will focus on advanced structured programming techniques and their algorithmic counterparts.

OBJECTIVES

- Use the techniques of advanced data structures.
- Introduce a new approach to problem solving methods and algorithm development.
- Learn advanced algorithm design, compiling, debugging, testing, and documentation.
- Learn the concepts of advanced levels of Arrays, Queues and Lists, Trees, Sorting, Searching, Graphs and their applications.

TEXTBOOKS

Core Textbook:

1. Advanced Data Structures & Algorithms in C++ by V.V. Muniswamy. 2009
2. Advanced Data Structures by Peter Brass. 2008
3. Data Structures and Algorithms Using Java by William McAllister. 2008

Supplementary Textbook: A Practical Approach to Data Structures and Algorithms by Sanjay Pahuja. 2009.

GRADING

Midterm Exam	30 points
Final Exam	40 points
Class Participation	10 points
Assignments and home works	20 points
TOTAL:	**100 points**

LEARNING AND TEACHING METHODS

This course considers active learning process where students are expected to intensively participate in discussions and brainstorming.

COURSE OUTLINE

Weeks	Topics	Lecture Hours	Lab. Hours	Notes
1	Amortized complexity	2	2	Chapter 1 (Book 1) in core text book; Chapter 1 (Book 2) in core text book
2	Introduction to external sorting	2	2	Chapter 2 (Book 1) in core text book; Chapter 2 (Book 3) in core text book
3	Selection trees & k-way merging	2	2	Chapter 3 (Book 2) in core text book; Chapter 3 (Book 3) in core text book
4	Run generation	2	2	Chapter 4 (Book 2) in core text book; Chapter 4 (Book 3) in core text book
5	Optimal merging of runs	2	2	Chapter 5 (Book 1) in core text book; Chapter 5 (Book 3) in core text book; Chapter 5 in Supplementary Textbook
6	Buffering	2	2	Chapter 6 (Book 1) in core text book; Chapter 6 (Book 2) in core text book; Chapter 6 in Supplementary text

				book
7	Double-ended priority queues. General methods; Interval heaps	2	2	Chapter 7 (Book 1) in core text book; Chapter 7 (Book 3) in core text book; Chapter 7 in Supplementary Textbook
8	**Midterm Exam**			
9	Binomial heaps	2	2	Chapter 8 (Book 1) in core text book; Chapter 7 (Book 2) in core text book; Chapter 8 in Supplementary Textbook
10	Fibonacci heaps	2	2	Chapter 9 (Book 1) in core text book; Chapter 9 (Book 2) in core text book; Chapter 9 in Supplementary Textbook
11	Pairing heaps	2	2	Chapter 10 (Book 1) in core text book; Chapter 10 (Book 3) in core text book
12	Optimal binary search trees	2	2	Chapter 11 (Book 1) in core text book; Chapter 11 (Book 2) in core text book
13	Segment Trees; Interval Trees	2	2	Chapter 12 (Book 1) in core text book; Chapter 12 (Book 2) in core text book
14	Priority Search Trees	2	2	Chapter 13 (Book 1) in core text book; Chapter 13 (Book 2) in core text book; Chapter 10 in Supplementary Textbook
15	Multidimensional Search Trees	2	2	Chapter 14 (Book 1) in core text book; Chapter 14 (Book 2) in core text book
16	Case Study	2	2	
	Final Exam			