

CNG 213 Data Structures

2012-2013 Spring Semester

Syllabus

Course Info

Catalog Description

Classification of data structures, space and time considerations. Linked lists, stacks and queues. Tree structures, binary search trees. Array and pointer based implementations. Recursive applications. Sorting and searching.

Credits 3(0)-3 (ECTS credits: 6.0)

Category Content Departmental

Prerequisites CNG 140

Lecture Time and Place

- Monday 14:40-16:30 (Two Hours) [TZ-15]
- Wednesday 14:40-15:30 (One Hour) [TZ-15]

Textbook

- **Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Addison-Wesley, 1997 (ISBN-13: 9780201498400).**

Course Objectives

The main objective of this course is to provide an introduction to basic data structures, and algorithms for manipulating them, by using C programming language. This course specifically has the following objectives: The fundamental design, analysis, and implementation of basic data structures and algorithms; The analysis and evaluation of the data structure needs of particular problems; The design, analysis, and implementation of C programs by using basic data structures and algorithms.

Course Learning Outcomes

Having successfully completed this course, the student will be able to:

- (1) Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;
- (2) Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;
- (3) Analyse, evaluate and choose appropriate abstract data types and algorithms to solve particular problems;
- (4) Design and implement C programs that apply abstract data types.

Instructor

- Tolga Can, TZ-30, tcan@ceng.metu.edu.tr

Teaching Assistant

- None

Course Conduct

The course is structured on the following materials:

1. Text book
2. Lectures
3. Homeworks

There will be 4 programming assignments throughout the semester. There will be NO labs in this course. The students will practice the learned subjects with programming assignments.

Course Outline

Weekly Coverage

- **Week-1**
 - Introduction: Pointers, Dynamic memory allocation, pointers and arrays, structures
- **Week-2**
 - Pointers, dynamic memory allocation, pointers and arrays, structures
- **Week-3**
 - Abstract Data Types (ADT) & Fundamentals of Linked Lists
- **Week-4**
 - Linked List Operations

Distribution of Homework #1

- **Week-5**
 - The Stack Abstract Data Type
- **Week-6**
 - The Stack Abstract Data Type: Linked List Implementation

Distribution of Homework #2

- **Week-7**
 - The Queue Abstract Data Type
- **Week-8**
 - The Queue Abstract Data Type: Linked List Implementation

Midterm Exam (April 15 Monday, in class) (Week 9)

- **Week-10**
 - Algorithm Analysis & Linked List Types: Doubly Linked Lists

Distribution of Homework #3

- **Week-11**
 - Tree ADT and Binary Search Tree
- **Week-12**
 - AVL Tree

Distribution of Homework #4

- **Week-13**
 - Heaps
- **Week-14**
 - Final review

Grading Policy

Homeworks **20%**

Midterm Exam **40%**

Final Exam **40%**

Each programming assignment is going to be coded individually. You may discuss your solution with your friends; however, sharing of any piece of code is strictly forbidden. If you are caught cheating in an exam or homework, you will get a grade of 0 (zero) for that exam or homework. Even if a small portion of code is shared in a programming assignment, you will get a zero from that assignment.

Course Requirements and Policies:

- **Assignments: No Late Submission for assignments is accepted unless there is a valid reason. If the reason is illness, then a valid medical certificate from the METU NCC Health Center has to be provided.**
- **Examinations: There will be no make-up exams, unless the student has a valid medical leave with a medical certificate from the METU NCC Health Center.**
- **Professionalism and Ethics: Students are expected to complete the assignments on their own. Any code sharing will be considered as cheating. When a breach of the code of ethics occurs (cheating, plagiarism, deception, etc.), you will get a zero (0) from that assignment.**