



Course Information

Course Code	5670441
Course Section	1
Course Title	DATA STRUCTURES
Course Credit	3
Course ECTS	5.0
Course Catalog Description	Arrays, stacks, queues, linked lists, trees, hash tables, graphs: Algorithms and efficiency of access. Searching and sorting algorithms.
Prerequisites	Students must complete one of the following sets to take this course.

Set	Prerequisites
1	5710230
2	5710229

Schedule	Monday , 09:40 - 10:30, EA208 Wednesday, 13:40 - 15:30, EA208
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Instructor Information

Name/Title	Prof.Dr. ŞENAN ECE SCHMİDT
Office Address	A-402
Email	eguran@metu.edu.tr
Personal Website	http://users.metu.edu.tr/eguran/
Office Phone	210 4405
Office Hours	None

Course Objectives

This course primarily aims to acquaint the student with basic data structures frequently used in software engineering and programming practices. Concepts of object-oriented programming, abstract data types, dynamic memory management and algorithm complexity are given. Searching and sorting algorithms are also discussed.

Course Learning Outcomes

i. Create awareness of and experience in object-oriented programming discipline.

- Understand the meaning of and the usage of object oriented programming
- Learn basics of object oriented programming and class definition.
- Learn recursive algorithms and argument passing

ii. Create awareness of and experience in dynamic memory management.

- Understand the meaning of and the usage of memory and dynamic memory.
- Learn to create and delete dynamic memory.
- Use dynamic memory in various data structures.

iii. Learn fundamental data structures with their searching, insertion and deletion capabilities.

- Learn array data structure.
- Learn stack and queue data structure.
- Learn linked list and tree data structure.
- Learn graph data structure.
- Learn hash coding.



- Learn searching, insertion and deletion in the covered data
- iv. Learn fundamental sorting algorithms with their complexity analysis.
 - Understand the meaning of sorting.
 - Learn sorting algorithms (selection sort, bubble sort, quick sort, radix sort).
 - Compare the algorithms in terms of their complexity.
- v. Create awareness of and experience in algorithm complexity.
 - Understand the meaning of algorithm complexity.
 - Learn Big-O, Ω , Θ complexity analysis details.
 - Perform complexity analysis for various algorithms.
- vi. Create awareness of and experience in computational complexity.
 - Understand the meaning of computational complexity
 - Learn decision problems, P, NP, NP complete, NP hard problem classes, relation between these classes and problem reduction

Instructional Methods

Lectures, programming assignments, exams

Tentative Weekly Outline

Week	Topic	Relevant Reading	Assignments
1	Object-Oriented Programming, Classes		
2	Argument passing, references		
3	Pointers, arrays		
4	Algorithmic Complexity		
5	Stacks and Queues		
6	Dynamic memory		
7	Linked lists		
8	Trees		
9	Graphs		
10	Sorting		
11	Hashing		
12	Computational Complexity		



Course Textbook(s)

Reference books:

- (1) Preiss, B.R., Data Structures and Algorithms with Object-Oriented Design Patterns in C++, Wiley, 1999;
- (2) Ford & Topp, Data Structures with C++, Prentice-Hall, 1999;
- (3) Shaffer, C., Data Structures & Algorithm Analysis in C++, Dover Publications, 2012 (<http://www.e-booksdirectory.com/details.php?ebook=7307>).

Course Material(s) and Reading(s)

Material(s)

Lecture notes on odutclass.

Reading(s)

Lecture notes on odutclass.

Supplementary Readings / Resources / E-Resources

Resources

Introduction to Algorithms, 3rd Edition (The MIT Press) 3rd Edition
by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein

Assessment of Student Learning

Assessment	Dates or deadlines
Midterm Exam	
Quizzes	
Final Exam	
Programming Assignment I	
Programming assignment II	
Programming assignment III	

Course Grading

Deliverable	Grade Points
Midterm Exam	30
Final Exam	40
Programming Assignments, Quizzes	30
Attendance (Bonus)	5
Total	105



Course Policies

Class Attendance

Class attendance is graded

Late Submission of Assignments

Late submissions of assignments will be penalized according to the following policy:

- 1 day late submission: HW will be evaluated out of 70.
- 2 days late submission: HW will be evaluated out of 50.
- 3 days late submission: HW will be evaluated out of 30.
- 4 or more days late submission: HW will not be evaluated.

It is **NOT** allowed to prepare homeworks as groups. METU honor code is essential.

To **COPY** or **BEING COPIED** will result in grade **ZERO**.

Make up for Exams and Assignments

Make-ups are to be given to those having medical report approved by METU medical center.

Final Exam Entrance Conditions

Students who miss all the exams, or who do not submit any HW will be graded as NA.

Other

It is not allowed:

- to use calculators, cell phones or other electronic devices
 - going outside
- during exams.

Academic Honesty

The METU Honour Code is as follows: "Every member of METU community adopts the following honour code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted. The members of the METU community are reliable, responsible and honourable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."