

School of Engineering and Natural Sciences / Industrial Engineering (English)

2022 - 2023 Academic Year

DATA STRUCTURES

Syllabus

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
DATA STRUCTURES	IND3233850	Spring Semester	3+2	4	8
Prerequisites Courses	PROGRAMLAMAYA GİRİŞ				
Recommended Elective Courses	Data Communication and Networking, Object Oriented Programming and Discrete Math				
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Elective				
Course Coordinator	Prof.Dr. Mehmet Kemal ÖZDEMİR				
Name of Lecturer(s)	Prof.Dr. Mehmet Kemal ÖZDEMİR				
Assistant(s)					
Aim	This course aims to teach how to organize data in a computer so that it can be used for designing efficient algorithms to solve various types of problems. Topics covered include arrays, lists, stacks, queues, trees, heaps, graphs and the use of these data structures for searching, sorting, selection and other related applications. C Programming language will be used for the implementation of data-structures.				
Course Content	This course contains; Introduction to data structures and algorithms; Introduction to Basics of C, Functions, Arrays, and Pointers, Strings, Structs, and Memory Allocation, Algorithm analysis and complexity notations, Fundamental data structures: Linked Lists, Abstract data types: Stack, Abstract data types: Queues, Trees and Binary Search Trees, Efficient Binary Trees and Multi-way Search Trees, Priority Queues and Heaps, Graphs, Searching and Sorting, Hashing and Collision, Files and Their Organization.				
Course Learning Outcomes		Teaching Methods		Assessment Methods	
1. Student can explain basic principles of algorithm analysis.		1, 15, 4, 9		A	
2. Student can analyze the accuracy, complexity and efficiency of an algorithmic solution.		1, 13, 16, 4, 9		A, D	
3. Student can apply basic data structures, such as arrays, lists, stacks and queues, to algorithmic design		1, 13, 15, 16, 4, 9		A, D	
4. Student can define tree, binary tree, heap, hash tables, and graph data structures and use them in problem solutions		1, 13, 15, 4		A	
5. Student can choose the right data type for efficient solution of a problem.		1, 13, 15, 16, 4		D	
Teaching Methods	1: Lecture, 13: Experiment / Laboratory, 15: Problem solving, 16: Project Based Learning, 4: Exercise, Practice, 9: Simulation				
Assessment Methods	A: Written Exam, D: Project / Design				
Lecture Schedule					
Sequence	Topics	Preliminary Preparation			
1	Introduction to data structures and algorithms; Introduction to Basics of C	Book Chapter 1, Lecture Slides 1			
2	Functions, Arrays, and Pointers	Book Chapter 1 and 3, Lecture Slides 2			
3	Strings, Structs, and Memory Allocation	Book Chapter 4 ve 5, Lecture Slides 3			
4	Algorithm analysis and complexity notations	Book Chapter 2, Lecture Slides 4			
5	Fundamental data structures: Linked Lists	Book Chapter 6, Lecture Slides 4			
6	Abstract data types: Stack	Book Chapter 7, Lecture Slides 6			
7	Abstract data types: Queues	Book Chapter 8, Lecture Slides 7			
8	Trees and Binary Search Trees	Book Chapter 9, Lecture Slides 8			
9	Efficient Binary Trees and Multi-way Search Trees	Book Chapter 10-11, Lecture Slides 9			
10	Priority Queues and Heaps	Book Chapter 12, Lecture Slides 10			
11	Graphs	Book Chapter 13, Lecture Slides 11			
12	Searching and Sorting	Book Chapter 14, Lecture Slides 12			
13	Hashing and Collision	Book Chapter 15, Lecture Slides 13			
14	Files and Their Organization	Book Chapter 16, Lecture Slides 14			
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			

Resources
Course Textbook: Data Structures Using C 2nd Edition by Reema Thareja ISBN-10: 0198099304 Supplementary Material: Data Structures and Algorithms in C++, 4th Edition, Mark A. Weiss, ISBN: 978-0132847377 Lecture presentations and notes