

TED UNIVERSITY, COURSE SYLLABUS

Faculty	Engineering	Department	CMPE
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Course Code & Number	CMPE 343 / CMPE 224	Course Title	Data Structures and Algorithms II
Type of Course	<input checked="" type="checkbox"/> Compulsory <input type="checkbox"/> Elective	Semester	2021-2022 <input checked="" type="checkbox"/> Fall <input type="checkbox"/> Spring <input type="checkbox"/> Summer
Course Credit Hours	(3+0+0) 3	Number of ECTS Credits	6
Pre-requisite	N/A	Co-requisite	N/A
Mode of Delivery	<input checked="" type="checkbox"/> Face-to-face <input type="checkbox"/> Distance learning	Language of Instruction	<input checked="" type="checkbox"/> English <input type="checkbox"/> Turkish
Course Coordinator	Asst. Prof. Ulaş Güleç	Course Lecturer(s)	Prof. Tolga Çapın Asst. Prof. Ulaş Güleç
Required Reading	Sedgewick, Wayne, Algorithms, 4 th Edition, 2011.	Recommended Reading	Marc Allen Weiss, Data Structures and Algorithms in Java, 3 rd Ed.

Course Catalog Description	Undirected graphs. Directed graphs. Minimum spanning trees. Shortest paths. Maximum flow and minimum cut. Radix sorts. Tries. Substring search. Regular expressions. Data compression. Reductions. Intractability. Linear programming.
Course Objectives	The general objective of this course is to introduce advanced data structures. This course introduces the use of graphs in problem solving and algorithm development and describes how to develop algorithms using advanced graph data structures. This course then focuses on advanced string data structures and operations. The course includes the use of different algorithm-design techniques, such as greedy, divide-and-conquer, and linear programming techniques, to solve particular problems.
Course Learning Outcomes	Upon successful completion of this course, a student will be able to <ol style="list-style-type: none"> 1. Understand graph and string processing concepts and applications. 2. Recognize and use graph data structures in modeling and solving problems. 3. Recognize and use advanced string data structures in modeling and solving problems. 4. Develop computer programs using efficient data structures and algorithms. 5. Use different algorithm-design techniques, including, but not limited to, greedy, divide-and-conquer, and dynamic programming techniques, to solve problems. 6. Analyze an algorithm or a data structure to measure its time and space complexity.

Course Contents	Undirected graphs. Directed graphs. Minimum spanning trees. Shortest paths. Maximum flow and minimum cut. Radix sorts. Tries. Substring search. Regular expressions. Data compression. Reductions. Intractability. Linear programming.
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Teaching Methods & Learning Activities	<input checked="" type="checkbox"/> Telling/Explaining <input checked="" type="checkbox"/> Discussions/Debates <input checked="" type="checkbox"/> Questioning <input checked="" type="checkbox"/> Reading <input type="checkbox"/> Peer Teaching <input type="checkbox"/> Scaffolding/Coaching <input type="checkbox"/> Demonstrating <input checked="" type="checkbox"/> Problem Solving <input type="checkbox"/> Inquiry <input type="checkbox"/> Collaborating <input type="checkbox"/> Think-Pair-Share <input type="checkbox"/> Predict-Observe-Explain <input type="checkbox"/> Microteaching <input type="checkbox"/> Case Study/Scenario Analysis	<input type="checkbox"/> Simulations & Games <input type="checkbox"/> Video Presentations <input type="checkbox"/> Oral Presentations/Reports <input checked="" type="checkbox"/> Concept Mapping <input type="checkbox"/> Brainstorming <input type="checkbox"/> Drama/Role Playing <input type="checkbox"/> Seminars <input type="checkbox"/> Field Trips <input type="checkbox"/> Guest Speakers <input checked="" type="checkbox"/> Hands-on Activities <input type="checkbox"/> Service Learning <input type="checkbox"/> Web Searching <input type="checkbox"/> Experiments <input type="checkbox"/> Other(s):
Assessment Methods (Formal & Informal)	<input checked="" type="checkbox"/> Test/Exam <input checked="" type="checkbox"/> Quiz/Homework <input type="checkbox"/> Oral Questioning <input type="checkbox"/> Performance Project <input type="checkbox"/> Written <input type="checkbox"/> Oral	<input type="checkbox"/> Observation <input type="checkbox"/> Self-evaluation <input type="checkbox"/> Peer Evaluation <input type="checkbox"/> Portfolio <input type="checkbox"/> Presentation (Oral, Poster) <input type="checkbox"/> Other(s):

Student Workload (Total 182 Hrs)	<input checked="" type="checkbox"/> Lectures 42.. hrs <input checked="" type="checkbox"/> Course Readings 10.. hrs <input type="checkbox"/> Workshop hrs <input type="checkbox"/> Online Discussion hrs <input type="checkbox"/> Debate hrs <input type="checkbox"/> Work Placement hrs <input type="checkbox"/> Field Trips/Visits hrs <input type="checkbox"/> Observation hrs <input type="checkbox"/> Lab Applications hrs <input type="checkbox"/> Hands-on Work hrs <input checked="" type="checkbox"/> Quizzes and Homeworks 80.. hrs <input checked="" type="checkbox"/> Midterm I..... 25.. hrs <input type="checkbox"/> Midterm II..... 0. hrs <input checked="" type="checkbox"/> Final..... 25.. hrs	<input type="checkbox"/> Resource Review hrs <input type="checkbox"/> Research Review hrs <input type="checkbox"/> Report on a Topic hrs <input type="checkbox"/> Case Study Analysis hrs <input type="checkbox"/> Oral Presentation hrs <input type="checkbox"/> Poster Presentation hrs <input type="checkbox"/> Demonstration hrs <input type="checkbox"/> Web Designs hrs <input type="checkbox"/> Mock Designs hrs <input type="checkbox"/> Team Meetings..... hrs <input type="checkbox"/> Other hrs
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ATTENDANCE

<p>Attendance:</p> <ul style="list-style-type: none"> At least 70% of class attendance is mandatory. Course attendance will be assessed based on answers to hands-on activities (you are expected to upload your answers to Moodle
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for online sessions, or submit your work for face-to-face lectures; otherwise that lecture will not be counted towards your attendance.)

Class Readings

Class readings are necessary but not mandatory. The material covered in class by your instructor will only provide a fundamental understanding of the general context. If you are willing to effectively learn a topic, you must actively work on it yourself. Reading is one of the most successful ways of learning about a topic.

Missed Work

Make ups for midterm and final exams will be provided if the student can provide a legal document confirming a significant health issue at the time of the examination or with the approval of the instructor.

Assignment Rules

All assignment works must be done individually, unless explicitly stated in the homework assignment. A student can submit only one work. In case of multiple submissions, only the latest submission will be considered. Students cannot submit work on other students' behalf.

Late Assignment Submission

Assignments are expected to be completed by due date. For every day that the assignment is late after due date, 20% of the maximum will be deducted from the assignment score. Following a very brief grace period (which students should confirm with an instructor beforehand), one minute late is the same as one day late.

No assignments will be accepted once they are four or more days late.

Extra Credits

Extra credits will not be provided.

Plagiarism

All of the following are considered plagiarism:

- turning in someone else's work as your own
- copying words or ideas from someone else without giving credit
- failing to put a quotation in quotation marks
- giving incorrect information about the source of a quotation
- changing words but copying the sentence structure of a source without giving credit
- copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not” (www.plagiarism.org)

Plagiarism is a very serious offense and will be penalized accordingly by the university disciplinary committee. The best way to avoid accidentally plagiarizing is to work on your own before you ask for

the help of other resources.

Cheating

Cheating has a very broad description which can be summarized as “acting dishonestly”. Some of the things that can be considered as cheating are the following:

- Copying answers on examinations, homework and laboratory works,
- Using prohibited material on examinations,
- Lying to gain any type of advantage in class
- Providing false, modified or forged data in a report
- Plagiarizing
- Modifying graded material to be regraded.

Causing harm to colleagues by distributing false information about an examination, homework or laboratory

COURSE ASSIGNMENTS

A. Mid-term [25%]

The written exam covers all course material up to the exam date.

B. Quiz [15%]

3 quizzes (5% each)

C. Programming Assignments [25%]

5 programming assignments

C. Final [35%]

Closed book exam. The written exam covers all course material for the whole semester, i.e. the topics include both the midterm exam topics and the later ones (with more weight to the newer topics).

TENTATIVE COURSE OUTLINE				
W	Day	Topics	Readings	Assignments
1	04.10-10.10	Review of Algorithms and Data Structures, Hashing	Ch.4, Section 4.1	
2	11.10-17.10	Hash Tables	Ch.4, Section 4.1	Assignment 1: Hash Tables
3	18.10-24.10	Undirected Graphs	Ch.4, Section 4.1	
4	25.10-31.10	Undirected Graphs	Ch.4, Section 4.1	Assignment 2: Undir. Graphs
5	01.11-07.11	Directed Graphs	Ch.4, Section 4.2	
6	08.11-14.11	Directed Graphs	Ch.4, Section 4.2	Assignment 3: Dir. Graphs
7	15.11-21.11	Minimum Spanning Trees	Ch.4, Section 4.3	
8	22.11-28.11	Shortest Paths	Ch.4, Section 4.4	Midterm 1
9	29.11-05.12	Strings, String Sorts	Ch.5, Section 5.1	Assignment 4: Shortest Paths
10	06.12-12.12	Tries	Ch.5, Section 5.2	
11	13.12-19.12	Substring Search	Ch.5, Section 5.3	
12	20.12-26.12	Regular Expressions	Ch.5, Section 5.4	Assignment 5: Strings
13	27.12-02.01	Data Compression	Ch.5, Section 5.5	
14	03.01-09.01	Algorithm Design Paradigms, Intractability, Context	Lecture Notes	
	10.01-16.01	FINAL EXAMS		

COURSE ASSESSMENTS & LEARNING OUTCOMES MATRIX	
Assessment Methods	Course Learning Outcomes
MT, Quiz	L01
Programming Homeworks, Quiz 1-3, MT, Final	L02
Programming Homeworks, Quiz 3, MT, Final	L03
Programming Homeworks, Quiz 2, MT, Final	L04
Programming Homeworks, Quiz 1, MT, Final	L05
Programming Homeworks, Quiz 2, MT, Final	L06

Prepared By & Date	Prof. Dr. Tolga Çapın 24/09/2021	Revision Date	24/09/2021
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