TED UNIVERSITY, COURSE SYLLABUS

Faculty	Engineering	**Department**	CMPE

Course Code & Number	CMPE 223 (242)	**Course Title**	Data Structures and Algorithms I
Type of Course	☑ Compulsory ☐ Elective	**Semester**	2022-2023 ☑Fall ☐Spring ☐ Summer
Course Credit Hours	(3+0+0) 3	**Number of ECTS Credits**	6
Pre-requisite	N/A	**Co-requisite**	N/A
Mode of Delivery	☑ Face-to-face ☐ Distance learning	**Language of Instruction**	☑ English ☐ Turkish
Course Coordinator	Prof. Tolga Çapın	**Course Lecturer(s)**	Asst. Prof. Ulaş Güleç (Sec. 1-2) Prof. Tolga Çapın (Sec. 3-4) Asst. Prof. Aslı Gençtav (Sec. 5) Asst. Prof. Bora Çelikkale (Sec. 6)
Required Reading	Robert Sedgewick and Kevin Wayne, *Algorithms, 4th Edition*, 2011.	**Recommended Reading**	M. A. Weiss, Data Structures and Algorithm Analysis in Java, 3rd edition, Pearson, 2012.

Course Catalog Description	Analysis of algorithms. Stacks and queues. Elementary sorts. Mergesort. Quicksort. Priority queues. Elementary symbol tables. Binary search trees. Balanced search trees. Geometric applications of BSTs. Hash tables. Searching applications.
Course Objectives	The objective of this course is to teach students the basic data types in computer science and how to use these data types to create compound data types and mathematically model problems. This course focuses on tree structures and set operations.
Course Learning Outcomes	Upon successful completion of this course, students will be able to 1. Identify and use fundamental abstract data structures 2. Use basic data types to mathematically model complex problems 3. Use tree structures for solving problems 4. Design and develop algorithms for solving simple problems 5. Implement efficient operations on basic ADT and sets
Course Contents	Design and Analysis of algorithms. Stacks and queues. Elementary sorts. Mergesort. Quicksort. Priority queues. Heaps. Symbol tables. Binary search trees. Balanced search trees. Hash tables.

Teaching Methods & Learning Activities	☑ Telling/Explaining ☐ Discussions/Debates ☑ Questioning ☑ Reading ☐ Peer Teaching ☑ Scaffolding/Coaching ☐ Demonstrating ☑ Problem Solving ☐ Inquiry ☐ Collaborating ☐ Think-Pair-Share ☐ Predict-Observe-Explain ☐ Microteaching ☐ Case Study/Scenario Analysis	☐ Simulations & Games ☑ Video Presentations ☐ Oral Presentations/Reports ☐ Concept Mapping ☐ Brainstorming ☐ Drama/Role Playing ☐ Seminars ☐ Field Trips ☐ Guest Speakers ☑ Hands-on Activities ☐ Service Learning ☐ Web Searching ☑ Experiments ☐ Other(s): .....
Assessment Methods (Formal & Informal)	☑ Test/Exam ☑ Quiz/Homework ☐ Oral Questioning ☐ Performance Project ☐ Written ☐ Oral	☐ Observation ☐ Self-evaluation ☐ Peer Evaluation ☐ Portfolio ☐ Presentation (Oral, Poster) ☑ Other(s): ……..Programming Assignment ……

Student Workload (Total 182 Hrs)	☑ Lectures .....**42**.. hrs ☑ Course Readings .....**10**.. hrs ☐ Workshop ..... hrs ☐ Online Discussion ..... hrs ☐ Debate ..... hrs ☐ Work Placement ..... hrs ☐ Field Trips/Visits ..... hrs ☐ Observation ..... hrs ☐ Lab Applications ..... hrs ☐ Hands-on Work ..... hrs ☑ Quizzes and Homeworks.....**70**.. hrs ☑ Midterm I……..**20**.. hrs ☑ Midterm II…….**20**.. hrs ☑ Final……..**20**.. hrs	☐ Resource Review ..... hrs ☐ Research Review ..... hrs ☐ Report on a Topic ..... hrs ☐ Case Study Analysis ..... hrs ☐ Oral Presentation ..... hrs ☐ Poster Presentation ..... hrs ☐ Demonstration ..... hrs ☐ Web Designs ..... hrs ☐ Mock Designs ..... hrs ☐ Team Meetings..... hrs ☐ Other ..... hrs

COURSE POLICIES
Attendance: **At least 70% of class attendance is mandatory**. Course attendance will be assessed based on attendance handouts distributed at each lecture.

Hands-On Activities

You will be assigned a hands-on activity each week. You are expected to submit your answers to hands-on activities (you are expected to upload your answers to Moodle for online sessions, or submit your work for face-to-face lectures). The hands-on activities are ungraded but they will be used to assess your active participation in the lectures.

Class Readings

Class readings are necessary but not mandatory. The material covered in class by your instructors 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 (24 hrs.) that the assignment is late after due date, 20% of the maximum will be deducted** from the assignment score. 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. Two Midterm Exams [20 + 25%]
Two closed-book written exams. The exams will be held in the weekend. The exam hours and classrooms will be announced over Moodle.
B. Programming Assignments [20%]
4 programming assignments. These will require implementation of a project in Java, and writing a report on your work. Zoom meetings will be held to provide detailed information about the project requirements. Attendance to these online meetings is not mandatory, but valuable information will be provided to help you in your assignments.
C. Final Exam [35%]
Closed book exam
Important Notes: **Note 1: A weighted midterm and final exam average of 30 points (out of 100) is required to pass this course. Students, who cannot satisfy this condition, will get an automatic F grade.** For example, a student who gets: 28 points (out of 100) from midterm 1; 32 points (out of 100) from midterm 2;

30 points (out of 100) from final exam
will satisfy this condition and will not get an automatic F : (28 x 20 + 32 x 25 + 30 x 35)/(20 + 25 + 35) = 30,125 > 30. However, the student may still get an F grade depending on the overall course performance.

Note 2: To pass the course, a minimum 40/100 weighted grade is required for programming assignments. Students, who cannot satisfy this condition, will get an automatic F grade.
The weighted average of programming assignments is calculated in a similar way to the exam grades, as explained above.

TENTATIVE COURSE OUTLINE

W	Day	Topics	Readings	Assignments
1	26.09 - 02.10	Introduction Review of Programming		
2	03.10 - 09.10	Elementary Data Structures Linked Lists, Arrays	Chapter 1	
3	10.10 - 16.10	Stacks and Queues	Chapter 1	
4	17.10 - 23.10	Stacks and Queues	Chapter 1	Programming Assignment 1 out
5	24.10 - 30.10	Analysis of Algorithms	Chapter 1	
6	31.10 - 06.11	Elementary Sorts	Chapter 1	Programming Assignment 2 out
7	07.11 - 13.11	Mergesort and Quicksort	Chapter 2	**Midterm Exam 1**
8	14.11 - 20.11	Mergesort and Quicksort Trees (intro.)	Chapter 2	
9	21.11 - 27.11	Trees Binary Search Trees	Chapter 2 Chapter 2	Programming Assignment 3 out
10	28.11 - 04.12	Balanced Search Trees	Chapter 3	
11	05.12 - 11.12	2-3 Trees, 2-3-4 Trees	Chapter 3	**Midterm Exam 2**
12	12.12 - 18.12	Tables, Priority Queues Heaps, Heapsort	Chapter 3	
13	19.12 - 25.12	Hashing	Chapter 3	Programming Assignment 4 out
14	26.12 - 02.01	Applications	Chapter 3	
15		**FINAL EXAMS WEEK**		

COURSE ASSESSMENTS & LEARNING OUTCOMES MATRIX	
Assessment Methods	**Course Learning Outcomes**
HW1-4, Midterm 1, Midterm 2, Final	LO1
HW1-4, Midterm 1, Midterm 2, Final	LO2
HW1-4, Midterm 2, Final	LO3
HW1-4, Midterm 1, Midterm 2, Final	LO4
HW1-4, Midterm 1, Final	LO5

Prepared By & Date	Prof. Dr. Tolga Çapın 19/09/2022	**Revision Date**	19/09/2022