



MARMARA UNIVERSITY - FACULTY OF ENGINEERING

2017-2018 Fall

CSE 2025 Data Structures

COURSE DESCRIPTION FORM

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|--|---|--|---|------------|------------------|------------|------------|------------|
| Offering Department | Department of Computer Engineering | | Undergraduate must course (3th semester) | | | | | |
| Course Code | CSE 2025 | | | | | | | |
| Course Name | Data Structures | | | | | | | |
| Language of Instruction | English | | | | | | | |
| ECTS | 8 | | | | | | | |
| Contact Hours | Theoretical (T):3 | | Practice (U):2 | | Laboratory (L):- | | | |
| Pre-requisites | CSE1142 Computer Programming II | | | | | | | |
| Instructor | Name | Borahan Tümer | | | | | | |
| | E-mail | borahan.tumer@marmara.edu.tr | | | | | | |
| Course Materials | Mandatory | Thomas H. Cormen, Charles E. Leiserson, Ronald L. Livest and Clifford Stein, <i>Introduction to Algorithms</i> , 2 nd edition, MIT Press, 2009 | | | | | | |
| | Recommended | Mark Allen Weiss, <i>Data Structures & Algorithms Analysis in C</i> 2 nd edition, Addison-Wesley Publishing Company, 1999 | | | | | | |
| Course Objectives | To actively and efficiently use and process data; to explain basic data structures and their advantages and disadvantages, to discuss and apply performance analysis methods to algorithms that construct and process data structures, design and implement such algorithms, perform a comparison among algorithms realizing the same task to select the better. | | | | | | | |
| Course Content | Introduction and a math review; basic analysis of algorithms, recursion and recurrences; basic data structures (linkd lists, stacks and queues); trees (general trees, binary and binary search trees) and special trees (AVL trees, splay trees, B trees and Red-Black trees); graphs and graph algorithms (topological sort, breadth-first search and depth-first search, Dijkstra's algorithm for SSSP, Prim's and Kruskal's MST construction algorithm); hashing; priority queues and sorting | | | | | | | |
| Learning Outcomes | LO1 | To explain basic data structures and their advantages and disadvantages | | | | | | |
| | LO2 | To discuss and apply performance analysis methods to algorithms that construct and process data structures | | | | | | |
| | LO3 | Design algorithms that construct and process data structures and apply such algorithms on sample problems | | | | | | |
| | LO4 | Implement algorithms that construct and process data structures using a programming language Programlama kavramları ile temel veri yapılarını geliştirebilmek ve kullanabilmek. | | | | | | |
| | LO5 | Compare algorithms fulfilling the same task by algorithm analysis concepts to select the better | | | | | | |
| Program Outcomes | | LO1 | LO2 | LO3 | LO4 | LO5 | | |
| PO1 | Adequate knowledge in mathematics, science (a) and computer engineering subjects (b) pertaining to the relevant discipline (1); ability to use theoretical and applied information in these areas to model and solve engineering problems (2). | | | 1a | 1b | 1b,2 | | |
| PO6 | Ability to work efficiently in intra-disciplinary (a) and multi-disciplinary teams (b); ability to work individually (c). | | | | | c | | |
| PO14 | Knowledge of data structures and algorithm analysis (a), database management systems (b), operating systems (c), software engineering (d), computer architecture (e) and automata theory (f) in computer engineering. | | a | a | a | a | a | |
| Subjects (Knowledge, Skills and Behaviours), Contributions of Subjects to Learning Outcomes, Assessment Methods | No | Week | Subjects | LO1 | LO2 | LO3 | LO4 | LO5 |
| | S1 | 1 | Introduction and a math review | Q,M F | | | | |
| | S2 | 2 | Review of basic data structures (arrays, etc.) | | Q, MF,P | | | |
| | S3 | 2 | A discussion of static versus dynamic data structures and their use | Q, MF | | P | P | Q, MF,P |
| | S4 | 3-4 | Studying algorithm analysis and applying it on sample problems | | Q, MF | | | |
| | S5 | 5 | Exploring recursive algorithms and their analysis on various examples | Q, MF | Q, MF | | | |
| S6 | 6-7 | Simple data structures (Linked | Q, | | | P | Q, | |

| | | | | | | | | | |
|---|---|---|---|--|---------|------------|--|------------|--------------|
| | | | lists, stacks and queues) | MF | | | | MF,P | |
| S7 | 8-9 | Trees | | Q, MF | | Q, MF,P | P | Q, MF,P | |
| S8 | 101 | Special Trees | | | | Q, MF, | | Q, MF | |
| S9 | 11 | Graphs | | Q, MF | MF | Q, MF,P | P | Q, MF,P | |
| S10 | 12 | Hashing | | Q, MF | | | | Q, MF | |
| S11 | 13 | Priority Queues | | Q, MF | | | P | Q, MF,P | |
| S12 | 14 | Sorting Techniques | | | | | | Q, MF | |
| Assessment Methods and Weights | No | Type | Weight | Implementation Rule | | | Make-up Rule | | |
| | MF | Midterm, Final | 55% | Any relevant material such as books, lecture notes and use of a calculator is allowed during the exams. | | | Marmara University regulations will be followed for make-up exams. | | |
| | Q | Quiz | 5% | Subjects are covered in pop-up quizzes. | | | - | | |
| | P | Project | 40% | Students are assigned a total of three projects where their skills on analysis, design and implementation on relevant algorithms are assessed. | | | | | |
| | TOTAL | | | 100% | | | | | |
| Determining Letter Grades | <ul style="list-style-type: none"> The letter grades will be determined based on the midterm and final exams, quizzes and projects. In order to determine the letter grade, a curve or catalog based method will be followed based on the total average scores of the students. The final exam score and the total average score of the student must be at least 35 to pass the course. According to Marmara University Undergraduate regulations, the weight of the final exam must be at least 40 out of 100. | | | | | | | | |
| | Assessment | | Midterm | Quizzes | Project | Final | TOTAL | | |
| Weight | | 15 | 5 | 40 | 40 | 100 | | | |
| Teaching Method, Student Work Load | Time Applied by Instructor | | | | | | | | |
| | No | Method | Explanation | | | | | | Hours |
| | 1 | Lectures | Lectures are given in class using the board or via presentations. Example questions are solved to enhance the concepts. | | | | | | 14x3=42 |
| | 2 | Problem Session/ Practice | Problems related to the course topics are solved on the board. | | | | | | 14x2=28 |
| | 3 | Laboratory | Experiments are done in the laboratory or theoretical concepts covered during the lectures are practiced using computer exercises. | | | | | | |
| | 4 | Interactive Courses | Questions are asked to students during lectures and they are encouraged to guess the answers (peer learning is also in this category) | | | | | | |
| | 5 | Field Work | Students attend activities outside the campus. | | | | | | |
| | 6 | Midterm | Midterm exam is given during the midterm week. | | | | | | 2 |
| | 7 | Final | Final exam is given during the final exam week. | | | | | | 2 |
| | Estimated Time to be Allocated by a Student | | | | | | | | |
| | 8 | Project | The students carry out research about the problem given in the project, design and implement their solution and prepare a report. | | | | | | 25x3=75 |
| | 9 | Homeworks | The students solve the problems given as homework. | | | | | | |
| | 10 | Pre-class learning of Course Material | The students study and learn the new subjects from course materials. | | | | | | 13x1=13 |
| 11 | Review of Course Material | Students review the course subjects from course materials to prepare for the exams and homeworks. | | | | | | 36 | |
| 12 | Office Hour | Students ask questions to the instructor or the assistant during office hours. | | | | | | 2 | |
| Total | | | | | | | 200 | | |
| Academic Honesty | Violations of scholastic honesty include, but are not limited to cheating, plagiarizing, fabricating information or citations, facilitating acts of dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. | | | | | | | | |
| | In case academic dishonesty is observed, the first authority is the instructor of the course. The instructor may decide to give the student zero for the homework(s)/lab(s)/exam(s), give the letter grade FF, or may take disciplinary action. | | | | | | | | |