Analysis of Algorithms

Course Code:
CSE 311
Course Period:
Autumn
Course Type:
Core
Credits:
4
Theoric:
3
Practice:
2
Laboratory Hour:
0
ECTS:
7
Prerequisite Courses:
<u>Data Structures</u> [1] Course Language:
English

Course Objectives:

The aim of this course is to provide students with knowledge to introduce well-known algorithmic design techniques and well-known algorithms, to analyze sequential and recursive algorithms, to utilize well-known algorithms for similar problems, and to introduce theory of NP.

Course Content:

Concepts of designing algorithms and complexity analysis of algorithms, solving recurrence equations and formal proofs, an intuitive and formal introduction to the concept of order and growth, brute force approach, divide and conquer approach, dynamic programming, greedy approach, graph algorithms, theory of NP.

Course Methodology:

1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study

Course Evaluation Methods:

A: Testing, B: Experiment, C: Homework, D: Project

Course Learning Outcomes	Program	Teaching Methods	Assessment Methods	
	Learning Outcomes			
1) Adequate knowledge in analyzing algorithms; ability to use theoretical and empirical methods to analyze both sequential and recursive algorithms; Adequate knowledge in theory of NP.	1,5,6	1,2,3	A, B, C	
 Adequate knowledge in algorithmic design techniques, algorithmic solutions to basic problems; 	1,3	1,2,3	A, B, C	
3) Ability to use design techniques to model and solve problems; Ability to apply basic algorithms to more complex problems.	1,2,3,6	1,2,3	A, B, C	
4) Ability to devise, select, and use modern techniques and tools needed for the design and implementation of algorithms.	4,6	1,2,3	В	

COURSE CONTENT

Week	Topics	Study Materials
1	THEORETICAL BACKGROUND	Textbook, Lecture Notes
2	EFFICIENCY, ANALYSIS AND ORDER	Textbook, Lecture Notes
3	RECURRENCE	Textbook, Lecture Notes
4	RECURRENCE II	Textbook, Lecture Notes
5	BRUTE FORCE ALGORITHMS	Textbook, Lecture Notes
6	DIVIDE AND CONQUER I	Textbook, Lecture Notes

7	DIVIDE AND CONQUER II, MIDTERM I	Textbook, Lecture Notes
8	DYNAMIC PROGRAMMING I	Textbook, Lecture Notes
9	DYNAMIC PROGRAMMING II	Textbook, Lecture Notes
10	GREEDY APPROACH	Textbook, Lecture Notes
11	GRAPH ALGORITHMS I, MIDTERM II	Textbook, Lecture Notes
12	GRAPH ALGORITHMS II	Textbook, Lecture Notes
13	THEORY OF NP	Textbook, Lecture Notes
14	REVIEW	Textbook, Lecture Notes

ECOMMENDED SOURCES

Textbook	R. Neapolitan, and K. Naimipour, Foundations of Algorithms
Additional	Lecture Notes:
Resources	<u>http://cse.yeditepe.edu.tr/v2/en/academic/course-pages</u> [2]

ASSESSMENT

IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-terms	2	71
Programming Assignment	3	22
Homework	5	7
Total		100
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		30
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		70
Total		100

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.					X

2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.		X
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.)	K
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.)	K
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.)	K
6	Ability to work efficiently in intra-disciplinary and multi- disciplinary teams; ability to work individually.	X	
7	Ability to communicate effectively both orally and in writing; knowledge of a minimum of one foreign language.		
8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.		
9	Awareness of professional and ethical responsibility.		
10	Information about business life practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development.		
11	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety; awareness of the legal consequences of engineering solutions.		

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam weeks: 12x Total course hours)	12	4	60
Hours for off-the-classroom study (Pre-study, practice)	14	2	42
Midterm examination	2	2	4
Homework	5	5	25

Programming Assignment	3	14	42
Final examination	1	3	3
Total Work Load			176
Total Work Load / 25 (h)			7.0
ECTS Credit of the Course			7