COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
THEORY OF ALGORITHMS	**CSE511**		**3+0**	**3**	**10**

Prerequisites	

Language of Instruction	English
Course Level	Master's Degree
Course Type	
Course Coordinator	
Instructors	Assist. Prof. Onur Demir
Assistants	
Goals	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.
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 Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
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.	3,2,4	1,2	A,C
2) Adequate knowledge in algorithmic design techniques, algorithmic solutions to basic problems;	3,2	1,2	A,C
3) Ability to use design techniques to model and solve problems; Ability to apply basic algorithms to more complex problems	3,2	1,2	A,C,D
4) Ability to devise, select, and use modern techniques and tools needed for the design and implementation of algorithms.	3	1,2	A,C,D
5) Ability to analyze scientific publications.	4	4	D

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

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

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

RECOMMENDED SOURCES	
Textbook	R. Neapolitan, and K. Naimipour, Foundations of Algorithms
Additional Resources	Lecture Notes: http://cse.yeditepe.edu.tr/v2/en/academic/course-pages

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT

IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-terms	2	61
Programming Assignment	3	22
Homework	5	7
Presentation	1	10
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		30
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		70
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Knowledge in the advanced computer architecture field					
2	Knowledge in advanced system design for computer engineering		**X**			
3	Knowledge in the theoretical topics of computer science					**X**
4	Ability to comprehend, analyse and critique academic publications and conduct scholarly research at the frontiers of computer engineering				**X**	
5	Ability and knowledge in the fields of Next-Generation and contemporary computer networks					

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	3	36
Hours for off-the-classroom study (Pre-study, practice)	14	3	42
Midterm examination	2	2	4
Homework	5	15	75
Programming Assignment	3	20	60
Presentation	1	20	20

Final examination	1	3	3
Total Work Load			240
Total Work Load / 25 (h)			9.6
ECTS Credit of the Course			10