ECTS COURSE INFORMATION FORM

Faculty	**Faculty of Engineering**	
Program	**B.Sc. in Civil Engineering**	**Elective**
	B.Sc. in Computer Engineering	**Required**
	B.Sc. in Electrical-Electronics Engineering	**Elective**
	B.Sc. in Industrial Engineering	**Elective**
	B.Sc. in Mechanical Engineering	**Elective**

Course Code	COMP 303			
Course Title in English	Analysis of Algorithms			
Course Title in Turkish	Algoritma Analizi			
Language of Instruction	English			
Type of Course	Flipped Classroom			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	20	10	60	10
Semester Offered	Fall			
Contact Hours per Week	Lecture: 3 hours	Recitation: -	Lab: -	Other: -
Estimated Student Workload	159 hours			
Number of Credits	6 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	COMP 201			
Expected Prior Knowledge	Object Oriented Programming, Data Structures			
Co-requisites	None			
Registration Restrictions	Only Undergraduate Students			
Overall Educational Objective	To evaluate the efficiency of algorithms used to solve a computational problem.			
Course Description	This course provides a comprehensive introduction to some fundamental aspects of Analysis of Algorithms. The following topics are covered: Introduction, mathematical foundations; asymptotic analysis; recurrences; sorting algorithms, merge sort, heap sort; randomized algorithms, Hashing, searching, Binary search Trees, 2-3 Tress, Red and Black trees, Binomial Heaps; Fibonacci Heaps Given a computational problem, we want to (a) find an algorithm to solve the problem, (b) prove that the algorithm solves the problem correctly, (c) prove that we cannot solve the problem any faster, and (d) implement the algorithm. The course focuses on these topics by studying useful algorithmic design techniques and methods for analyzing algorithms.			
Course Description in Turkish	Bu derste; Algoritma Analizinin temel kavramları şu konu başlıklar altında kapsamlı bir şekilde incelenmektedir: Giriş, Matematiksel temeller, asimptotik analiz, yineleme, sıralama algoritmaları, birleştirme sıralama, yığın sıralama, rastsal algoritmalar, özütleme, arama, ikili arama ağaçları, 2-3 Ağaçları, Kırmızı-Siyah ağaçlar, İkiterimli yığınlar, Fibonacci yığınları			
Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to: 1. analyze the performance of algorithms by using asymptotic notation; 2. solve recurrences; 3. understand and compare sorting algorithms; 4. identify complicated data structures such as Hashing, B-trees, Red-Black trees, heap structures; 5. analyze graphs; 6. Design and implement efficient algorithms to solve a computational problem; 7. Analyze and interpret algorithms to solve a computational problem.			

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
Student Outcomes	N=None S=Supportive H=High		Exam, Project, HW, Experiment, Presentation, etc.
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	H	1,2,3,4,5	Exams, Project
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	S	6	Projects
(3) an ability to communicate effectively with a range of audiences			
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives			
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	S	7	Projects
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies			

Prepared by and Date	Prof. Dr. Muhittin Gökmen / June 2019	
Semester	Fall 2019-2020	
Name of Instructor	Prof. Dr. Muhittin Gökmen	
Course Contents	Week	Topic
	1.	Introduction
	2.	Asymptotic Analysis
	3.	Recurrences
	4.	Probabilistic Analysis and Randomized Algorithms
	5.	Heap Sort and Merge sort
	6.	Quicksort, sorting in linear time
	7.	Medians and Order Statistics
	8.	Elementary Data Structures and overview
	9.	Hash tables
	10.	Hash functions
	11.	Binary search tree, 2-3 trees
	12.	2-3-4 trees, Red-Black trees
	13.	B-trees
	14.	Graphs
	15.	Final Exam/Project/Presentation
	16.	Final Exam/Project/Presentation
Required/Recommended Readings	Introduction to Algorithms , Third Edition, T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein MIT Press, 2009, ISBN 978-0-262-03384-8	
Teaching Methods	Lecturing and exercises in the classroom with computers. In-class exercises and Project will be carried out by students	
Homework and Projects	In-class exercises, Projects	
Laboratory Work	Programming exercises	
Computer Use	For Programming	

Other Activities	
Assessment Methods	Quiz (6): %30 Project (1): %20 Midterm (2): % 50
Course Administration	Instructor's office and phone number, office hours, email address: To be announced -Office: 5th Floor, #18 -Phone number: 0 212 395 36 26 - Email address: gokmenm@mef.edu.tr **Rules for attendance:** Minimum of 70% attendance required. **Missing a quiz:** Provided that proper documents of excuse are presented, each missed quiz by the student will be given a grade which is equal to the average of all of the other quizzes. No make-up will be given. **Missing a midterm**: Provided that proper documents of excuse are presented, each missed midterm by the student will be given the grade of the final exam. No make-up will be given. **Missing a final**: Faculty regulations. **A reminder of proper classroom behavior, code of student conduct**: YÖK Regulations **Statement on plagiarism**: YÖK Regulations

ECTS Student Workload Estimation

Activity	No/Weeks	Hours			Calculation	Explanation
	No/Weeks per Semester (A)	Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
Lecture	14	1	3	1	70	A*(B+C+D)
Quizzes	6	4	1		30	
Midterm(s)	2	10	2		24	A*(B+C+D)
Projects	1	30	2	2	34	A*(B+C+D)
Final Examination					0	A*(B+C+D)
Total Workload					158	
Total Workload/25					6.32	
ECTS					**6**	