ECTS COURSE INFORMATION FORM

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

Course Code	COMP 454			
Course Title in English	Theory of Computation			
Course Title in Turkish	Hesaplama Kuramı			
Language of Instruction	English			
Type of Course				
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	80%	20%	0%	0%
Semester Offered	Spring			
Contact Hours per Week	Lecture: 3	Recitation: -	Lab: -	Other: -
Estimated Student Workload	143 hours			
Number of Credits	6 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	MATH321 – Automata Theory and Formal Languages			
Expected Prior Knowledge	Automata Theory and Formal Languages			
Co-requisites	None			
Registration Restrictions				
Overall Educational Objective	To be able to obtain a scientific perspective on the nature of computational problems.			
Course Description	Overview of types of formal languages and automata and recursively enumerable languages, computation models and computability, decidability and reducibility, introduction of advanced topics in theory of computation, space and time complexity, intractability, introduction of advanced topics in theory of complexity.			
Course Description in Turkish	Biçimsel dil ve otomat tipleri ve özyinelemeli sıralanabilen dillerin gözden geçirilmesi, hesaplama modelleri ve hesaplanabilirlik, karar verilebilirlik ve indirgenebilirlik, hesaplama teorisinde ileri konulara giriş, zaman ve bellek karmaşıklığı, hesaplaması zor problemler, karmaşıklık teorisinde ileri konulara giriş.			
Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to: 1. apply computability and complexity analysis on a computation problem; 2. describe and analyze decidability characteristics of a computation problem; 3. describe complexity classes and apply reduction on problems; 4. comprehend the basic idea of intractability of a computation problem.			

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
Program 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	Exams
(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			
(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			
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies			

Prepared by and Date	Assoc.Prof.Dr.Tolga Ovatman / December 2020	
Semester	Spring 2020-2021	
Name of Instructor	Assoc.Prof.Dr.Tolga Ovatman	
Course Contents	Week	Topic
	1.	Formal Languages and Automata Theory
	2.	Recursively Enumerable Languages
	3.	Computation Models
	4.	Computability
	5.	Decidability – Decidable Languages
	6.	Decidability – Undecidable Languages
	7.	Reducibility
	8.	Advanced Topics in Computability Theory
	9.	Practical Applications of Complexity Theory
	10.	Time Complexity – Complexity Measurement and P Class Problems
	11.	Time Complexity – NP Class Problems and NP-Completeness
	12.	Space Complexity
	13.	Intractability
	14.	Advanced Topics in Complexity Theory
	15.	Final Exam/Project/Presentation
	16.	Final Exam/Project/Presentation
Required/Recommended Readings	• Sipser M., Introduction to the Theory Of Computation 3rd Edition, Cengage Learning, 2013 • Martin J.C., Introduction To Languages And The Theory Of Computation 4th Edition, Mcgraw-Hill, 2011 • Attalah M.J., Blanton M., Algorithms And Theory Of Computation Handbook Vol.2:Special Topics And Techniques 2nd Edition, CRC Press, 2010	
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,	

Laboratory Work	
Computer Use	
Other Activities	
Assessment Methods	Quiz (5): 60% Final (1): 40%
Course Administration	Instructor's office and phone number, office hours, email address - Instructor's office and phone number, office hours, email address: To be announced - Office: İTÜ Faculty of Computer and Informatics, MEF Univ. 5th Floor - Email address: ovatman@itu.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	1,5	3	1,5	84	A*(B+C+D)
Quizes	5	6	1		35	A*(B+C+D)
Midterms						
Projects						
Final Examination	1	20	3		24	A*(B+C+D)
Total Workload					143	
Total Workload/25					5.72	
ECTS					6	