

 OSTİM TEKNİK ÜNİVERSİTESİ A N K A R A	FACULTY OF ENGINEERING COURSE SYLLABUS FORM	Doküman No	MF.FR.003
		Revizyon Tarihi	13.11.2024
		Revizyon No	01
		Sayfa No	1 / 4

SENG305 – Formal Languages and Automata				
Course Code	Course Name			Semester
SENG305	Formal Languages and Automata			Fall ☒ Spring ☐ Summer ☐
Hours			Credit	ECTS
Theory	Practice	Lab	3	7
3	0	0		

Course Details	
Department	Computer Engineering
Course Language	English
Course Level	Undergraduate ☒ Graduate ☐
Mode of Delivery	Face to Face ☐ Online ☒ Hybrid ☐
Course Type	Compulsory ☒ Elective ☐
Course Objectives	The objective of this course is to provide an understanding of the theory of automata, computability of problems and complexity of computations. Different models of computation will be introduced and their comparisons will be done.
Course Content	Deterministic finite automata. Non-deterministic finite automata. Regular expressions. Context free grammars. Push down automata. Turing machine. Decidability and undecidability. P and NP classes.
Course Method/ Techniques	Lecture ☒ Question & Answer ☒ Presentation ☐ Discussion ☐
Prerequisites/ Corequisites	

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Work Placement(s)	
Textbook/References/Materials	
- John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, 3rd Edition - Michael Sipser, Introduction to the theory of computation. - Peter Linz, An Introduction to Formal Languages and Automata.	

Course Category			
Mathematics and Basic Sciences	☒	Education	☐
Engineering	☒	Science	☐
Engineering Design	☒	Health	☐
Social Sciences	☐	Profession	☐

Weekly Schedule		
No	Topics	Materials/Notes
1	Introduction Mathematical Preliminaries	Chapter 1
2	Finite Automata (FA)	Chapter 2
3	Finite Automata (FA): Deterministic FA, Nondeterministic FA	Chapter 2
4	Regular Expressions, Regular Grammars	Chapter 3
5	Properties of Regular Languages The pumping lemma	Chapter 4
6	Context Free Grammars (CFGs)	Chapter 5
7	Properties of CFGs Normal Forms for CFGs	Chapter 7
8	Midterm Exam	
9	Pushdown Automata (PDA)	Chapter 6
10	Equivalence of PDA and CFG	Chapter 6
11	Properties of Context Free Languages The pumping lemma for Context Free Languages	Chapter 7
12	Turing Machines	Chapter 8
13	Decidability	Chapter 9
14	P & NP, NP-completeness	Chapter 10
15	P & NP, NP-completeness	Chapter 10
16	Final Exam	

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Assessment Methods and Criteria		
In-term studies	Quantity	Percentage
Attendance	1	5
Lab		
Practice		
Fieldwork		
Course-specific internship		
Quiz/Studio/Criticize		
Homework	1	20
Presentation / Seminar		
Project		
Report		
Seminar		
Midterm Exam	1	30
Final Exam	1	45
Total		100%
Contribution of Midterm Studies to Success Grade		40
Contribution of End of Semester Studies to Success Grade		60
Total		100%

ECTS Allocated Based on Student Workload			
Activities	Quantity	Duration (Hrs)	Total Workload
Course Hours	14	3	42
Lab			
Practice			
Fieldwork			
Course-specific Work Placement			
Out-of-class study time	14	3	42
Quiz/Studio/Criticize			
Homework	1	10	10
Presentation / Seminar			
Project			
Report			
Midterm Exam and Preparation for Midterm	1	20	20
Final Exam and Preparation for Final Exam	1	25	25
Total Workload			139
Total Workload / 25			5.56
ECTS Credit			5

Course Learning Outcomes

No	Outcome
L1	Understand and construct Deterministic Finite-State Automata (DFA), Nondeterministic Finite-State Automata (NFA)
L2	Recognize the equivalence between NFA and DFA
L3	Understand and construct Context-Free Grammars (CFG) with simple examples
L4	Construct push down automata accepting a given context free language
L5	Recognize the equivalence between CFG and pushdown automata
L6	Apply the pumping lemma to demonstrate whether or not the language is regular or context free
L7	Understand computation through Turing Machines performing simple tasks
L8	Solve problems using formal languages
L9	Develop a fundamental understanding of computational theory and models including decidability and intractability
L10	Develop fundamental understanding of complexity theory

Contribution of Course Learning Outcomes to Program Competencies/Outcomes

Contribution Level: 1: Very Slight, 2: Slight, 3: Moderate, 4: Significant, 5: Very Significant

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	Total
L1	5	4		3		2						14
L2	5	4		3		2						14
L3	4	5		3		2						14
L4	5	4		3		2						14
L5	5	4		3		2						14
L6	5	4		3		2						14
L7	4	5		3		2						14
L8	4	5		3		2						14
L9	4	4		3		2						13
L10	4	4		3		2						13
Total												138