CS 407(CS 503) Theory of Computation - Spring 2024

	NAME/SCHEDULE	***EMAIL/TEL***	***OFFICE HOUR***
INSTRUCTOR	***Kemal İNAN***	*inan*	*by appointment*
ASSISTANT(S)	***Alperen Doğan***	***alperend / Appointment Link***	*Tue 13.40-15.30*
LECTURES	***W 10:40 – 11:30*** ***F 10:40 – 12:30***	***FASS G006*** ***FASS G006***	
RECITATION	***T 17:40 – 18:30***	***FENS L062***	

Main Text *:* ***H. R. Lewis & C. H. Papadmitriou*** *, Elements of Theory of Computation, 2nd ed. Prentice Hall 1998 (out-of-print; e-copy available)*

AuxiliaryTexts *:*

*(1)****M. Sipser****, Introduction to the Theory of Computation, 3rd ed., Cengage Learning 2003 (2)* ***M. A. Garey& D. S. Johnson*** *, Computers and Intractability, Bell Telephone Labs 1979*

Grading: 20% *midterm ,* ***10%*** *HWs ,* ***35%*** *quizzes,* ***35%*** *Final*

A total of ***10 quizzes*** *each of* ***20*** *minutes duration will be given during chosen class lectures ; minimum* ***7*** *quiz entries are required for a passing grade irrespective of health or similar legitimate-looking excuses.*

Tentative Spring 2024 Schedule

(2-hour lectures are shown by green numbers)

February/March				***16*** ***iptal***	***21*** *1*	***23*** *1,2* ***HW1***	***28*** *2*	***1*** *3*
March	***6*** *4*	***8*** *4* ***HW2***	***13*** *4,5*	***15*** *5,6*	***20*** *6,7*	***22*** *7,8* ***HW3***	***27*** *8*	***29*** *9*
April/May	***3*** *9* ***HW4***	***5*** *10*	***10,12*** ***Holiday***	***17*** ***Midterm***	***19*** *11* ***HW5***	***24*** *12*	***26*** *12,13*	***1*** ***Holiday***
May	***3*** *13,14*	***8*** *14*	***10*** *14,15* ***HW6***	***15*** *15*	***17*** *15*	***22*** *16*	***24*** *16*	***29*** *Review*

TENTATIVE COURSE OUTLINE

1- Turing Machines : Definition, Representations and Computational Concepts

(Main Text 4.1- 4.2) Slide Set S1

2 – Extended Turing Machines : Multitape, RAM Machine and Equivalences

(MT 4.3 – 4.4) S2

3 – Nondeterministic TM (MT 4.5) S2

4 – Grammars and Computation (MT 4.6) S3

5 – Numerical functions : primitive recursion and μ- recursion (MT 4.7) S3

6 – Computational equivalence of grammars, TMs and recursive functions (MT 4.7) S3

7– Up-down counter and Universal Turing Machines (MT Prob. 5.4.5, 5.2) S4

8– Decidability: Church Turing thesis and the Halting Problem (MT 5.3) S5

9 – Reducability and Unsolvable Problems (MT 5.4 – 5.7) S5

10 – Recursion (Sipser, Chapter 6 , pp. 197-203) S5

11 – Computational Complexity: Concepts and Definitions S6

(MT 6.1 – 6.3 &Garey and Johnson 3.1)

12 – The Class P and NP (MT 6.4) S6

13 – Polynomial Reductions and NP-Completeness (MT 7.1) S6

14 – Cook's Theorem (MT 7.2 &Garey 2.6) S6

15 – Some NP- Complete Problems (MT 7. &Garey 3.1) S6

16 – Space Complexity (Sipser, Chapter 8 selections) S6