CS 407(CS 503) Theory of Computation - Spring 2021

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 *:*

	NAME/SCHEDULE	***EMAIL/TEL***	***OFFICE HOUR***
INSTRUCTOR	***Kemal İNAN***	***inan***	***by appointment***
ASSISTANT(S)	***Çağrı Uluç Yıldırımoğlu***	***cagriuluc***	***Tu 16:40-17:30 (or by appointment)***
LECTURES	***Tu 11:40 – 13:30 Th 13:40 – 14:30***		
RECITATION	***Tu 17:40 – 18:30***		

*(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 2021 Schedule

Feb., March	*23* ***1***	*25* ***1,2***	*2* ***2,3*** ***HW1***	*4* ***3***	*9* ***3*** ***HW2***	*11* ***4***	*16* ***4,5***	*18* ***5***
March, April	*23* ***5,6*** ***HW3***	*25* ***6***	*30* ***6,7***	*1* *7*	*6* ***8*** ***HW4***	*8* ***8***	*13* ***9*** ***HW5***	*15* ***9***
April,May	*20* ***10***	*22* ***11***	*27* ***11,12*** ***HW6***	*29* ***Midterm***	*4* ***13,14***	*6* ***14***	*11* ***15*** ***HW7***	*13* ***Holiday***
May, June	*18* ***15***	*20* ***15***	*25* ***16*** ***HW8***	*27* ***16***	***Final***			

TENTATIVE COURSE OUTLINE

1- Turing Machines : Definition, Representations and Computational Concepts

(Main Text 4.1- 4.2)

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

(MT 4.3 – 4.4)

3 – Nondeterministic TM (MT 4.5)

4 – Grammars and Computation (MT 4.6)

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

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

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

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

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

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

11 – Computational Complexity: Concepts and Definitions

(MT 6.1 – 6.3 &Garey and Johnson 3.1)

12 – The Class P and NP (MT 6.4)

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

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

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

16 – Space Complexity (Sipser, Chapter 8 selections)