CS 407(CS 503) Theory of Computation - Spring 2022

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

	NAME/SCHEDULE	***EMAIL/TEL***	***OFFICE HOUR***
INSTRUCTOR	***Kemal İNAN***	*inan*	*by appointment*
ASSISTANT(S)	***Çağrı Uluç Yıldırımoğlu***	*cagriuluc*	
LECTURES	***M 13:40 – 15:30*** ***T 8:40 – 9:30***	***https://sabanciuniv.zoom.us/j/3542877213*** ***https://sabanciuniv.zoom.us/j/3542877213***	
RECITATION	***T 10:40 – 11:30***		

***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 2022 Schedule

(yeşil renkler 2 saatlik dersleri gösteriyor)

Feb./March	***28*** ***1***	***1*** ***1,2***	***7*** ***2,3*** ***HW1***	*8* ***3***	***14*** ***3*** ***HW2***	*15* ***4***	***21*** ***4,5***	*22* ***5***
March, April	***28*** ***5,6*** ***HW3***	*29* ***6***	***4*** ***6,7***	*5* ***7***	***11*** ***8*** ***HW4***	*12* ***8***	***18*** ***9*** ***HW5***	*19* ***9***
April,May	***25*** ***10*** ***HW6***	*26* ***Midterm***	***2-6 May*** ***SPRING BREAK***	***9*** ***11,12***	*10* ***12***	***16*** ***13,14***	*17* ***14***	
May, June	***23*** ***14*** ***HW7***	*24* ***15***	***30*** ***15***	*31* ***16***	***6*** ***16*** ***HW8***	*7* ***16***		

TENTATIVE COURSE OUTLINE

1- Turing Machines : Definition, Representations and Computational Concepts

(Main Text 4.1- 4.2) 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