EEE 431: Telecommunications I (Fall 2021)

I. INSTRUCTOR:

Sinan Gezici, (312) 290-3139, gezici@ee.bilkent.edu.tr, Office: EE-503. (Office Hour: Appointment via e-mail)

II. MEETING TIMES/LOCATION:

Section I: Wed. 8:30-10:20, Fri. 13:30-14:20. Spare hour: Fri. 14:30-15:20. EE-517.

Section II: Mon. 8:30-10:20, Wed. 13:30-14:20. Spare hour: Wed. 14:30-15:20. EA-Z03.

III. TEACHING ASSITANTS:

Cuneyd Ozturk, cuneyd@ee.bilkent.edu.tr, Office: EE-514.

IV. TEXTBOOK (REQUIRED):

J. G. Proakis and M. Salehi, Fundamentals of Communication Systems, 2nd edition, Pearson, 2013.

V. OTHER REFERENCES:

J. G. Proakis and M. Salehi, Communications Systems Engineering, 2nd edition, Prentice- Hall, 2001.

H. N. Nguyen and E. Shwedyk, A First Course in Digital Communications, Cambridge University Press, First Edition, 2009.

Leon W. Couch, Digital and Analog Communication Systems, 7th ed., Prentice Hall, 2007.

S. Haykin, Communication Systems, Fourth Edition, Wiley, 2001.

B. P. Lathi, Modern Digital and Analog Communication Systems, 3rd ed., Oxford University Press, 1998.

A. V. Oppenheim and A. S. Willsky, Signals and Systems, Second Edition, Prentice-Hall, 1996.

VI. PREREQUISITES:

EEE 321 (Signals and Systems)

MATH 255 (Probability and Statistics)

Working knowledge of Matlab

VII. COURSE OBJECTIVES:

This course covers basics of communication systems with emphasis on digital communications. Specific list of topics to be explored is the following:

- Communications overview (Chp. 1)
- Digital Representation of Sources
  - Review of probability and random variables (Sec. 5.1)
  - Modeling of information sources (Sec. 12.1 brief)
  - Source coding (Sec. 12.2 brief, Sec. 12.3)
  - Review of Fourier Transform and sampling theorem (Chp. 2 brief, Sec. 7.1)
  - Quantization (Sec. 7.2)
  - Waveform coding, pulse code modulation (Sec. 7.3)
- Analog Communications and Random Processes
  - AM and FM signals (Sec. 3.1, Sec. 3.2-brief, Sec. 4.1)

  - Random processes and noise (Sec 5.2, Sec. 5.3)
- Linear Modulation
  - Signal representations and signal space concepts (Sec. 8.1)
  - Digital modulation, demodulation, and probability of error analysis (Secs. 8.2-8.7, Sec. 9.5, Sec. 9.7)
    * Basic digital modulation schemes
    * Optimum receiver, matched filter
    * Error rate analysis
- Capacity and Reliable Transmission
  - Channel modeling and capacity (Secs. 12.4-12.6 - brief)
  - Linear block codes (Sec. 13.2)
  - Transmission losses, noise figure, link budget analysis (Sec. 6.4, Sec. 8.10, as time permits)

VIII. Grading:

Quiz 1 (10%)
Quiz 2 (10%)
Quiz 3 (10%)
Midterm (25%)
Matlab Based Projects (10%)
Final Exam (35%)

Several homework sets will be assigned, however, you will not be asked to turn your work in. You are expected to solve the assigned problems to review the material covered and to get prepared for the quizzes and the exams. There will be Matlab based projects which will be graded.

IX. Minimum Requirements to Qualify for the Final Exam:

To qualify for the final exam (to avoid FZ), both of the following conditions must be met:

- Total of three quizzes and midterm is at least 20 (out of 55).
- Matlab based projects are completed satisfactorily.

X. Academic Integrity:

Cheating will not be tolerated under any circumstances. Discussions with your friends about the assignment(s) are allowed. However, you must do your own work. If a student copies his/her assignment from another student, both will be responsible.