

**EE 370 INTRODUCTION TO COMMUNICATION SYSTEMS**  
**Spring 2015**

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**Instructor's office hours:** Tue 11am-12pm, Thu 10am-11am, and by appointment.

**Class Website:** Announcements regarding the course and any supplementary material will be posted on the instructor's website [www.isikun.edu.tr/~onurkaya](http://www.isikun.edu.tr/~onurkaya), and Course Online. You are strongly encouraged to check the class website frequently to get updated information such as new problem sets, exam dates etc.

**Class hours:** Tue 9am-11am @ DMF 213, Thu 9am-10am, @ DMF 301.

**Problem Session:** Tue 12pm-1pm, @ DMF 410

**Course Synopsis:**

Introduction to Communication Systems is a junior level treatment of communication systems, with an emphasis on analog communications, as well as some introductory material on digital communications. The goals of this course are

- To introduce mathematical tools and concepts, such as Hilbert transform, and ways to obtain more manageable representations of pass-band signals and systems,
- To develop an understanding of the fundamental stages of a communication system, such as modulators and demodulators, and how they work,
- To convey the principals of several modulation (analog and digital) techniques, their practical usage areas and their performances under several channel models,
- To introduce the concept of random processes, they key properties, and their relevance to communication system analysis, especially modelling of noise,
- To investigate the challenges of the communication channel such as noise, bandwidth limitation, interference, and to present methods to overcome these challenges.
- To provide the students with some hands on experience on how to design, and simulate basic communication systems using computer tools.

**Required Textbook:** S. Haykin, M. Moher. *Introduction to Analog & Digital Communications, 2<sup>nd</sup> Edition*. John Wiley & Sons Inc., 2007.

**Suggested Reading:** J. G. Proakis and M. Salehi. *Communication Systems*, Pearson Prentice Hall, 2005.

**CLASS POLICIES**

**Attendance:** The attendance to lectures is automatically assumed, and not formally recorded. However, be advised that your attendance to the class will be indirectly assessed by frequent pop-up quizzes. Also, please note that your attendance to the lectures, and your participation in the in-class discussions may be taken into account in determining your overall letter grade in situations involving borderline decisions. The problem session is an essential part of this course, and will be frequently used as a regular lecture hour, so please plan your attendance accordingly.

**Homeworks:** There will be quasi-weekly homework sets consisting of problems which target the timely practice of the covered course material. Solutions to homework problems will be provided for feedback, but the homeworks will not directly contribute to the final grade. However, each student's attempt on homework problems will be tested by frequent quizzes on homework problems.

**Quizzes:** There will be four (4) **unannounced** quizzes throughout the semester. The quizzes will test either the topics recently covered in class, or your work on the homework problems that have already been turned in. The quizzes may be held during the problem session. **Each quiz will constitute 5% of your overall semester grade.**

**Exams:** There will be two midterms (25% each) and one final exam (30%). Some of the exams may be open book, in which case you will only be allowed to bring an **original** copy of the mandatory text book. Attempt to use any other document will be considered as academic dishonesty (see below). In case an open book exam is administered, writing problem solutions, formulas, or notes on the textbook will not be allowed, and will also be treated as cheating. Your books will be checked before open book examinations. Use of cellular phones is strictly prohibited in any of the examinations.

**Academic Dishonesty:** Cheating, attempting to cheat, facilitation of cheating, fabrication of information, plagiarism and illegal use of copyrighted material are considered acts of academic dishonesty. Students conducting any of these acts will

receive an automatic F from this course, and will face suspension/expulsion from the program, according to university rules and regulations.

**Make-up Policy:**

There will not be any make-ups for the quizzes. In the event of failure to attend **at most one** quiz due to a formally documented excuse, your quiz grade will be determined by suitably projecting your performance in all of the remaining exams, after the date of that quiz. Excuses for more than one quiz will not be accepted.

There will not be any make-ups for the midterms. If you are able to formally document your excuse, and it is accepted, your final exam grade will be projected to obtain your overall grade.

I will not accept any medical report covering less than 3 days. The medical reports should either be taken from, or approved by a state hospital. This applies to both the quizzes and the midterms.

Here is a sample list of cases which will **not** be accepted as valid excuses:

- Conflict in class hours.
- Working part/full time somewhere.
- Missing the shuttle, urgently having to go to the city for business.
- Fake medical reports or medical reports from private hospitals / doctors.
- Accidents, illness in family, loss of relatives etc.; unless proper legal documents are supplied.

Make-up policy for the final exam will follow the university rules and regulations.

**Exam Dates and Grading Policy:**

<b>Quizzes</b>	<b>20%</b>	: Pop-quizzes, dates will not be announced.
<b>Midterm I</b>	<b>25%</b>	: <b>Tuesday Mar 10<sup>th</sup>, 9am-11am.</b>
<b>Midterm II</b>	<b>25%</b>	: <b>Tuesday Apr 21<sup>st</sup>, 9am-11am</b>
<b>Final</b>	<b>30%</b>	: To be announced.

The letter grades will be determined according to the following grade table, which is firm. No exceptions will be made, therefore please adjust your course-load accordingly, if you intend to take this course.

Overall Semester Total	Letter Grade
[85,100]	AA
[75,85)	BA
[65,75)	BB
[55,65)	CB
[45,55)	CC
[35,45)	DC
[30,35)	DD
[0,30)	F

**Topics:**

Below is the list of topics that will be covered in the course, along with a tentative schedule.

Week 1	Representation of signals and systems, Fourier analysis, frequency and bandwidth.
Week 2	Hilbert transform, complex representations of signals and systems.
Week 3	Amplitude Modulation, Linear Modulation Techniques
Week 4	FDM, Phase Modulation, Frequency Modulation (FM)
Week 5	Frequency Modulation (FM) continued
	Midterm I (Mar 10th, 9am- 11am, in class)
Week 6	Review of probability and random variables.
Week 7	Review of probability and random variables, Cnt'd.
Week 8	Introduction to random processes. Autocorrelation, power spectral density, Gaussian processes, white processes, filtering of noise.
Week 9	Noise in CW modulation systems, Signal to Noise Ratio, Linear Receivers, Envelope Detectors
Week 10	Noise in FM receivers
Week 11	Sampling, Pulse Amplitude Modulation, Quantization
	Midterm II (Apr 21st, 9am- 11am, in class)
Week 12	Pulse Code Modulation, Multiplexing, Modifications of PCM
Week 13	Baseband Pulse Transmission: Matched Filter Receiver
Week 14	Bandlimited Channels, Intersymbol Interference, Nyquist Criterion for no ISI