UEE3504:

Introduction to Communication Systems

Fall Semester 2014
Prof. Dr. Stefano Rini

Brief

Instructor: Stefano Rini
Office: Engineering Building 4, Room 729
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Lecture: Tuesday 10:10-12:00,
Friday 13:20-15:10
in room B07, Engineering Building 4.

Office Hours: Tuesday and Thursday 15:20-16:20
in room ED716a, Engineering Building 4.

Pre-req. Probability (UEE2102) and Linear Algebra (UEE1061) or permission of the instructor

Grading: 40 % Final Exam
20 % Midterm Exam
20 % Homework
20 % Class participation

Syllabus

Course Objectives

The course covers the fundamentals of communication systems such as analog modulation and demodulation, digital transmissions, quantization, sampling and bandlimited transmissions. While studying these topics, we will also review basic concepts such as linear time invariant systems, Fourier transform and random processes analysis.

The course will cover approximately the following topics:

- Linear time invariant systems
- Fourier series
- Fourier transform
- Amplitude modulation
- Sampling
- Quantization
- Random signals
- Random processes and linear systems
- Effect of noise on analog communication systems
- Effect of noise on digital communication systems
- Digital transmission through band limited systems

The first half of the course will focus on a deterministic description of a communication systems while, in the second part, we will focus the random aspects of a transmission system.

We hope that a student who finishes the course will be able to better understand the principles underlying all state-of-the-art communication systems and the difficulties encountered when designing and trying to improve upon them.

Textbook

The course will follow a widely adopted textbook

- G. Proakis and M. Salehi, *Essentials of Communication Systems Engineering*, Prentice-Hall, 2005.

This book essentially presents the same material as

- S. Haykin and M. Moher, *Communication Systems*, 5th Edition, Wiley, 2010,

with some differences in the notation and the presentation.

Other Recommended textbooks are:

- G. Proakis and M. Salehi, *Digital Communications*, 5th Edition, McGraw-Hill Science, 2007.
- A. Lapidoth , *A Foundation in Digital Communication* Cambridge University Press, 2009.
- B. P. Lathi, Modern Digital and Analog Communication Systems, 3rd Edition, Oxford University Press, 1998.

Exercises

Every week, a new homework assignment will be posted on the course website. This homework will consist of several problems that need to be solved at home and handed in during the class of the following week. Each homework will also contain a numerical simulation exercise which must be solved using MATLAB or a similar mathematical simulation software.

A model solution will be published online after the homework has been collected.

To pass the course you need to hand in at least 10 exercises.

Exams

There will be one mid-term and one final exam, each lasting two hours and covering approximatively three chapters.

Special Remarks

The lecture will be held in English.