Introduction to Communication Systems

Fall Semester 2012/2013

Prof. Dr. Stefan M. Moser

Syllabus

http://moser.cm.nctu.edu.tw/nctu/ics/

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1 Website

There is a website which is always kept up-to-date:

http://moser.cm.nctu.edu.tw/nctu/ics/

You will find there all necessary information and current announcements about this course. All handouts and exercises that are handed out during classes will also be available for download on this page. Note that while the website is available worldwide, most documents can only be downloaded from within the National Chiao Tung University (NCTU) and the National Tsing Hua University (NTHU).

2 Course Objective

The major goal of *Introduction to Communication Systems* (or, as it was called before, *Principles of Communication Engineering I*) is to teach students about the basic principles underlying the operation and design of a communication system. It is a core course for students in communications. The course will cover the following topics:

- Random processes
- Basics of modulation
- Continuous-wave modulation
- Pulse modulation
- Baseband digital transmission
- Signal-space analysis

These topics follow very roughly the first five chapter of the class' textbook (Haykin).

We expect a student who finishes the course to be able to understand the basic operating principles of current communication systems. Moreover, we sincerely hope that a student who learns the course material will be equipped with the ability to analyze and design a communication system.

3 Prerequisites

The following lectures/topics are recommended:

- Probability
- Basics in real analysis
- Basics in complex numbers
- Basics in linear algebra

4 Instructor

Prof. Stefan M. Moser
Engineering Building IV, Office 727 (ED727)
phone: 03-571 21 21 ext. 54548
e-mail: `stefan.moser@ieee.org`

5 Time and Place

There will be two lectures per week:

- Tuesday, 13:20–15:10 (EF), Engineering Building IV, Room 303 (ED303)
- Thursday, 13:20–15:10 (EF), Engineering Building IV, Room 303 (ED303)

The course starts on Tuesday, 18 September, and finishes on Thursday, 17 January. For a more detailed program see the above mentioned website.

6 Office Hours

NCTU requests that every teacher offers two hours per week where students may come to ask questions. I will, of course, also do so. The exact time will be announced once it is decided.

However, we would like to encourage you to show up in the teacher's or teaching assistant's office at any time in case you have questions about the class or related subjects. Moreover, we are always available during and after classes.

7 Textbook

The course will be based on

- Simon Haykin: *Communication Systems*, 4th ed., Wiley, 2001.
- Amos Lapidoth: *A Foundation in Digital Communications*, Cambridge University Press, 2009.

Additional recommended readings:

- Robert G. Gallager: *Principles of Digital Communication*, Cambridge University Press, 2008.

Further readings:

- R. E. Ziemer and W. H. Tranter: *Principles of Communications*, 5th ed., Wiley, 2002.
- John G. Proakis: *Digital Communications*, 4th ed., McGraw-Hill, 2001.

For certain topics there will be additional handouts during classes.

8 Exercises

Every week, an exercise will be distributed in class and also made available online for download. This exercise will consist of several problems that need to be solved at home and handed in during the class of the following week. A model solution will be distributed and made available online afterwards.

We believe the exercises to be extremely important and crucial to the understanding of the course. They also serve as a preparation for the mid-term and final exams and we therefore highly recommend to solve them. **To pass the course you need to hand in at least 10 exercises.**

9 Exams

There will be a mid-term exam and a final exam. Both exams are going to last three hours and be open-book. Details about the covered material in the mid-term exam will be published in due time. The final exam will cover everything taught in class.

10 Grading

The grade will be an average of

- the homework and class participation (15%),
- the mid-term exam (35%), and
- the final exam (50%).

The grade of the homework will not be based on the correctness of the answers, but rather on the effort the student shows in trying to solve them. Moreover, I will try to reward students who participate actively in class.

This course is worth 3 credits.

11 Special Remarks

The lecture will be held in English.