

**Syllabus for ECE4304**  
**Communication Systems Engineering**  
**C Term, 2007**

**Instructor:**

Prof. D. Richard Brown

- Office: Atwater Kent 307
- Office Hours: Thursdays 2–4pm in AK307
- email: drb@ece.wpi.edu

**Teaching Assistant:**

Jie Yang

- Office: Atwater Kent 311
- Office Hours: Wednesdays 1–4pm in AK311 (spinlab)
- email: abbyyang@wpi.edu

**Class Meets:**

AK233, MTWRF 4:00–4:50pm, January 11 – March 1 but not February 15 (academic advising day).

**Examination Schedule:**

- Exam 1: Thursday, January 25, 4:00–4:50pm
- Exam 2: Friday, February 9, 4:00–4:50pm
- Exam 3: Thursday, March 1, 4:00–4:50pm.

**Expected Background:**

Students taking ECE4304 should have a basic understanding of continuous signals and linear systems (ECE2311 or equivalent) including a working knowledge of Fourier transform techniques and frequency domain interpretation. Students should also have a basic understanding of the various analog and digital modulation/demodulation techniques (ECE3311 or equivalent). A first course in probability (MA2631 or equivalent) is recommended. Finally, students in ECE4304 are expected to have some experience programming in Matlab and an understanding of basic matrix/vector operations in Matlab.

## Required Textbooks:

- *Communications Systems*, Simon Haykin (Wiley)

## Other Useful Books:

There are many excellent books on the topic of communication systems engineering. Here are some of the very best ones:

- *Communication Systems Engineering*, Second Edition, John G. Proakis and Masoud Salehi.
- *Digital and Analog Communication Systems*, Leon W. Couch (Prentice Hall).
- *Principles of Communications: Systems, Modulation, and Noise*, Rodger E. Ziemer and William H. Tranter (Wiley).
- *Contemporary Communication Systems Using MATLAB*, John G. Proakis, Gerhard Bauch, and Masoud Salehi (Brooks/Cole).
- *Telecommunications Breakdown: Concepts of Communication Transmitted via Software-Defined Radio*, C. Richard Johnson Jr. and William A. Sethares (Pearson Prentice Hall).

## Tentative Course Outline

Topic	Lectures	Reading Assignments
Course introduction	1	None
Probability review, random processes, and noise	6	Appendix 1, Ch. 1
Effect of noise on analog communication systems	3	Ch. 2.10-2.12
Baseband/passband digital communication systems	2	Ch. 4.7, Ch. 6.3-6.5
Performance of digital communications in noise	8	Ch. 4.1-4.3, Ch. 5
Information theory fundamentals	3	Ch. 9.1-9.2, 9.5-9.6
Lossless source coding	2	Ch. 9.3-9.4
Channel capacity	3	Ch. 9.7-9.12
Error-control coding and performance analysis	3	Ch. 10.1-10.4
Open topics and course review	1	TBA

## Course Web Page and Announcements

The official web page for this course is:

<http://spinlab.wpi.edu/courses/ece4304/>

All course materials including homework assignments, solutions, any announcements, and useful links will be made available here.

Important course announcements such as schedule changes will be sent via the course email distribution list:

[ece4304@ece.wpi.edu](mailto:ece4304@ece.wpi.edu)

A test email was sent prior to the first lecture. If you did not receive it, send an email to the Instructor and we will correct the problem.

## Grading, Exams, Lab Reports, and Homework Policy

Grading for the course is on a 1000-point scale, with the points distributed as follows:

<b>Homework Assignments (6 worth 80 points each)</b>	480
<b>Exam 1</b>	160
<b>Exam 2</b>	160
<b>Exam 3</b>	200
<b>Total</b>	<hr/> 1000

Exams are closed-book and closed-notes. If you wish, you may bring one sheet of letter-sized paper with notes (in your own handwriting – no photocopies) on one or both sides. Calculators are permitted in all examinations.

### Late Policy

Late submission of work is discouraged. The course policy on late homework is as follows. A homework assignment is late if not handed in by 4:50pm on its due date. 20 points are deducted per day for a late homework. Weekends count as one day. No late homework will be accepted after solutions are posted on the course web page.

Please refer to the ECE4304 academic honesty policy on the course web page regarding makeup examinations.