

ECSE 4520 - Section 01 - Fall 2005 Communication Systems

Instructor:	Alejandra Mercado	Office:	JEC 7024
Office hours:	Tuesdays & Fridays 1:20 - 2:20 PM.	Telephone:	(518) 276-6075
Lectures:	Tuesdays and Fridays 12:00-1:20PM, Carnegie Building room 112	e-mail:	mercaa@rpi.edu

T.A.:	Masoud Farshchian	Office:	JEC 6209
Office hours:	Wednesdays 10:30-12:00 & 2:00-2:30.	Telephone:	(518) 276-6528
email:	farshm@rpi.edu		

Course Description

An introduction to signals and noise in electrical communication systems. Spectral analysis and filtering, including random signals. Modulation theory and techniques. System performance in the presence of noise. Other topics include digital communications and information theory.

Course Prerequisites

Electric Circuits ECSE-2010, Signals and Systems ECSE-2410. It is desirable to have Probability for Engineering Applications ECSE-4500.

Course web page:

<http://www.ecse.rpi.edu/Courses/F05/ECSE4520>

check this before each class for class cancellations/rescheduling, updates, office hour changes, homework solutions, exam dates, etc.

Text:

<i>Communication Systems Engineering Second Edition,</i> Prentice Hall 2002	John G. Proakis and Masoud Salehi, ISBN 0-13-061793-8
--	--

Reference books:

<i>Communication Systems,</i> Wiley library call number (one copy is on reserve at the library)	Simon Haykin (ISBN 0-471-09691-1) TK5101 .H37 1983
<i>Communication Systems: An Introduction to Signals and Noise in Electrical Communication</i> McGraw Hill library call number (one copy is on reserve at the library)	A. Bruce Carlson, Paul B. Crilly, and Janet C. Rutledge (ISBN 0-07-112175-7) TK5102.5 .C3 2002
<i>Digital Communications: Fundamentals and Applications</i> Prentice Hall PTR library call number (one copy is on reserve at the library)	Bernard Sklar (ISBN 0-13-084788-7) TK5103.7 .S55 1988
<i>Modern Digital and Analog Communication Systems</i> Oxford University Press	B.P. Lathi, (ISBN 0-19-511009-9)

Homework

Homework will be assigned more or less biweekly and solutions will be posted on-line a week later. I STRONGLY URGE YOU TO DO THE HOMEWORK BEFORE THE SOLUTIONS ARE PRESENTED!

Practice solving problems is an excellent way to learn the material and test whether you fully understand it. There is no substitute for the mental processes you have to go through to solve the problems on your own.

It is strongly recommended that students gather in groups to discuss their understanding of the homework problems as well as different approaches to solving the problems. However, each student must hand in *their own work*.

A random subset of the problems assigned will be graded each time.

Grades

There will be two midterm exams during the semester and a comprehensive final exam. The following dates are subject to change:

	Nature	TENTATIVE date	% of final grade
EXAM 1	in-class, closed book, closed notes	October 18	25 %
EXAM 2	in-class, closed book, closed notes	November 29	25 %
FINAL	closed book, closed notes	during finals week	30 %
Homework	take home		20 %

Letter grades will not be assigned until the end of the class, after the final exam has been graded. ANY letter grade assignment posted before the end of the class must be regarded as tentative and subject to (significant) change.

Courtesy and Etiquette in Class

Much as I sympathize at the inconvenient timing of the lectures, please eat a quick snack before the lecture and have your lunch after the lecture. Other than a (non-alcoholic) beverage *NO FOOD IS ALLOWED DURING MY LECTURES*. It causes distraction to both the instructor and surrounding students, and it prevents the eater from paying full attention to the lecture. Any person eating in class will be asked to leave.

Students who cannot attend some classes due to religious observance should inform the instructor **at the beginning of the semester, NOT a week ahead of time**. Arrangements must be made for notes, exams, etc. Please, do not postpone informing the instructor, as this would cause undue complications.

Disabilities/Religious Observance

Students with disabilities should inform the instructor of their needs at the beginning of the semester. Students *must* register as disabled in order to receive proper attention and benefits. Please contact Debra Hamilton (Assistant Dean of Students, ext. 2746, hamild@rpi.edu).

Students who cannot attend some classes due to religious observance should inform the instructor **at the beginning of the semester**.

Grades Appeals/Academic Dishonesty

For grade appeals procedures, see

<http://www.pde.rpi.edu/academics/policies/appeals.shtml>

Academic dishonesty will not be tolerated. Any student found to have participated in academic dishonesty will receive an "F" in the course, and may be subject to further disciplinary action. The University Code of Academic Integrity prohibits students from committing the following acts of academic dishonesty: academic fraud (ex., changing solutions to appeal a grade), copying or allowing one's work to be copied, use of crib sheets, fabrication/falsification, plagiarism, sabotage of others' work, substitution (ex., taking an exam for someone else). For more details, see

<http://www.pde.rpi.edu/academics/policies/dishonesty.shtml>

Though working together to discuss problems and evaluate methods to find solutions is strongly recommended, outright copying is not allowed.

COURSE OUTLINE

- I. Introduction and Review (chapter 2)
 - Fourier transforms
 - systems
 - power and energy
- II. Amplitude modulation (chapter 3.2)
 - A. conventional AM (section 3.2.2)
 - B. suppressed carrier AM (section 3.2.1)
 - C. single-sideband AM (section 3.2.3)
 - time and frequency representation
 - bandwidth requirements
 - power efficiency
 - coherent and envelope detection
- III. Frequency modulation (chapter 3.3)
 - Time/frequency representation
 - bandwidth requirements
 - demodulation techniques
- IV. Performance of AM and FM in the presence of noise (chapter 5)
 - Introduction probability for communications (chapter 4)
- V. An introduction to digital modulation (chapter 7)
 - A. amplitude shift keying (chapter 7.2)
 - B. phase shift keying (chapter 7.3)
 - C. frequency shift keying (chapter 7.4)
- VI. Optional topics:
 - A. intersymbol interference and equalization (chapter 8)
 - B. introduction to information theory and source coding (chapter 6)
 - C. error control codes and channel coding (chapter 9)