

# EE 511 Course Syllabus

## Introduction to Communication Systems

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Instructor: Laurence Hassebrook

Email: lgh@engr.uky.edu

URL: <http://www.engr.uky.edu/~lgh/>

Office/Phone: 473 AH/ (859) 257-8040

Class Hours and Location: 11:00am-12:15pm TuThr, FPAT 265.

Text: Digital and Analog Communication Systems by Leon W. Couch II, Seventh Edition, Prentice Hall, 2001. ISBN13: 9780131424920

Office hours: 3:15pm-4:30pm Tuesday and Thursday.

TA:

Course is compliant with Departmental Baseline [EE511 Syllabus](#):

### Outcomes

Students completing this course should demonstrate the:

1. Ability to analyze basic communication systems involving random signals, filtering, sampling, and modulation.
2. Ability to design basic communication systems.
3. Ability to describe the reasoning behind design decisions.

### Class Content and Objective:

The content of "Communication Systems" represents the basic knowledge necessary for transmitting and receiving information using today's communication technologies. The techniques that will be studied involve coding information onto a carrier (modulation) which is then transmitted. The received signal is then decoded (demodulated) yielding the original information. Emphasis will be given to analog modulation of both analog and digital signals. Transmission medium models for coherent light and acoustic waves will be studied and related to scalar models of electromagnetic wave models.

This course will cover the concepts associated with the Fourier transform, active filtering, spectral analysis, sampling theory and signal modulation/demodulation. Filter design will include active higher order bandpass, lowpass, highpass and linear phase filtering. Matched filtering and quadrature detection for binary demodulation will be studied. Sampling theory will cover impulse, natural and sample and hold types of sampling design. The modulation techniques covered will include Amplitude Modulation (AM), Frequency Modulation (FM), Time-Division Modulation (TDM) and Frequency Shift Keying (FSK). Time permitting, additional material on scalar wavefront models will be introduced and

applied to beam forming of acoustic, electromagnetic and coherent (laser) light waves. Homework will be in the form of problem sets and MATLAB based visualizations.

### **Grading Policy:**

- Homework: 25%: Once a week, Due one week after assignment, No late homework, drop the lowest 1. Assignments may include MATLAB visualizations.
- Exam 1: 25% (Date to be announced, closed book, 1 page crib sheet).
- Exam 2: 25% (Date to be announced, open book).
- Final Project: team MATLAB Simulation, 25% (Due Thursday of Finals Week, 9pm, 12/18/08)
- In accordance with SACS Recommendation 10 in the Provost memo dated March 12, 2004, graduate students will have a different grade scale than undergraduate students.

### **Reference:**

1. Digital and Analog Communication Systems by Leon W. Couch, Fourth Edition.
2. Principles of Communications, Systems, Modulation, and Noise by R. E. Ziemer and W. H. Tranter, Fourth Edition.
3. Principles of Communications, Systems, Modulation, and Noise by R. E. Ziemer and W. H. Tranter, Third Edition.
4. Introduction to Fourier Optics by J. W. Goodman, McGraw Hill.
5. Digital Communication by E. A. Lee and D. G. Messerschmitt.
6. Digital Transmission of Information by R. E. Blahut.
7. Introductory Probability and Statistical Applications by P. L. Meyer.
8. Probability and Statistics by M. H. DeGroot.
9. Discrete-Time Signal Processing by Oppenheim and Schaffer.
10. Digital Communication Systems by Simon Haykin.
11. An Introduction to Analog & Digital Communications by Simon Haykin.
12. Communication Systems by Simon Haykin, Second Edition.

**Equipment Required:** Access to MATLAB, email and the web.

**Infrastructure Required:** The students will be required to obtain computer accounts to enable them to communicate with email (probably ewl), run MATLAB (probably ewl) and read web pages. For home access, the students may want to get special accounts (probably pop). Communications to the students will be done by the EE511 web page and also through the EE511 email list. Individual correspondence by email will be encouraged.