Communication Systems  
ENEE 420  
Spring 2005

Time/Venue  
TuTh 11:00 – 12:15 EST  
Room EGR 2103 (ITV Classroom)

Instructor  
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Office hours  
Tu Th 2:00 – 3:15 pm EST  
Also by appointment.

Textbook  
The following textbook is required:  

Course objectives  
Communication is the process by which a message generated at one point is represented by a signal which is transmitted through an imperfect medium to a receiver, where the message is reconstructed. The goals of this course include:

• an understanding of the basics of transmitter and receiver processing, including data compression, modulation and demodulation;
• an appreciation of the time/frequency representation of signals and its application in studying various kinds of modulation schemes;
• a sound understanding of how the characteristics of various analog and digital modulation schemes affect their performance;
• insight into the role of random processes in communication systems analysis – both as a model for system noise and as a model for message generation.

Prerequisites  

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>ENEE 322</td>
<td>Signals and systems</td>
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<tr>
<td>ENEE 324</td>
<td>Engineering probability</td>
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(or equivalent)

Required topics: (i) elementary signal theory (Fourier series, Fourier/Laplace transforms, convolution); (ii) random variables (probability distribution functions, probability mass functions, expectations, transformations, etc.).
Grading system

The final grade for the course will be based on two tests and a final exam, as well as homework; their respective contributions to the final grade are given below. All three examinations, which will be of the closed–book variety, will be conducted in the classroom.

(a) Exam 1 (30%) In–class mid-March (Tentative)
(b) Exam 2 (30%) In–class mid-April (Tentative)
(c) Final (30%) In–class May 16 (8:00–10:00) (as in UMCP Schedule of Classes)

(c) Homework (10%)

During the course of the semester, several homework sets will be assigned. A subset of the answers for each homework set will be graded for credit. Solutions will be provided subsequently.

Course topics

1. Pulse modulation: Sampling, pulse-amplitude modulation, quantization, pulse code modulation.
2. Data compression.
3. Amplitude modulation: Conventional AM, suppressed carrier AM, single sideband AM; time and frequency representation, bandwidth requirements, power efficiency, coherent and envelope detection.
4. Frequency modulation: Time and frequency representation, bandwidth requirements, demodulation techniques.
4. Digital modulation – phase shift keying, frequency shift keying, amplitude shift keying.
5. Performance of modulation systems in the presence of noise.