Course Description:
Basic concepts of information transmission using electrical signals and systems. Modulation methods including amplitude, angle, pulse and digital forms. Design of modulation systems and the performance in the presence of noise. Communication simulation exercises using MATLAB.

Prerequisites: ECE 202 and ECE 304.

Textbook (required):

Instructor:
Dr. Dimitrie C. Popescu.
Office: Kaufman 231-G
Phone: 683-5414
E-mail: dpopescu@odu.edu

Course Goals and Objectives:
1. To gain knowledge about modern communication systems (terminology, classifications, and methods).
2. To learn fundamental principles of information transmission and understand application of Fourier analysis to communication systems.
3. Learn how to use random processes to model noise in communication systems.
4. Understand the basics of amplitude and angle modulation systems.

Topics:
1. Introduction to communication systems. [Ch.1]
2. Review of linear systems and signals, Fourier analysis, Hilbert transform, and canonical representation for bandpass signals and systems. [Ch. 2]
3. Continuous wave modulation: AM, linear modulation schemes, frequency translation, signal multiplexing. [Ch.3]
4. Angle modulation (PM and FM) [Ch. 4]
5. Random processes: stationarity, correlation function, power spectral density, Gaussian noise, noise power, narrowband noise. [Ch. 5]
6. Noise effects in CW modulation systems, signal-to-noise ratio (SNR). [Ch. 6]
7. Analog-to-digital conversion: sampling, quantization, encoding. [Ch. 7]
8. Introduction to digital modulation: pulse modulation/detection, matched filters. [Ch. 8]
Evaluation:

Final grade is determined based on a weighted score in which the weights are as follows:

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<thead>
<tr>
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<th>ECE 451 weights</th>
<th>ECE 551 weights</th>
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<tbody>
<tr>
<td>Computer experiments:</td>
<td>15%</td>
<td>10%</td>
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<tr>
<td>Homework:</td>
<td>15%</td>
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<tr>
<td>In-class quizzes:</td>
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<td>Exam 1:</td>
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<td>Exam 2:</td>
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<td>Term paper:</td>
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Course Policies:

- Both 400 and 500 level students use the same textbook. However, a more in depth understanding of the material is expected from 500 level students. As part of the final grade, 500 level students will have to work also on a term paper.
- Homework must be handed in-person to the instructor at the beginning of the lecture on the day it is due. No late homework will be accepted, as solutions will be posted in Blackboard promptly after the homework is collected. Students who are unable to submit a homework assignment due to medical reasons or other emergencies should contact the instructor before the due date.
- Students are expected to have read and follow the ODU Honor Code. Cheating is absolutely prohibited. Students may discuss homework assignments with each other; however, submitted homework solutions and/or reports are expected to be original work. Identical homework solutions or reports from different students are not acceptable and will be penalized by taking off points from the full credit.
- Quizzes and exams are closed-book closed-notes. Students are not supposed to receive or give assistance on examinations and quizzes. For exams, a formula sheet will be provided.

Term Paper Information (for ECE 551 students):

ECE 551 level students will work on a term paper related to Communication Systems. A proposal must be submitted to the instructor no later than February 27, 2014, in which the paper topic is clearly identified and the bibliography is specified. A written paper report must be submitted at the end of the semester, no later than the last lecture.

Class Schedule for Spring 2014:

Lectures: Tuesday & Thursday, 4:20 – 5:35 pm in Constant Hall 1059.
Office hours: Tuesday & Thursday, 3:00– 4:15 pm, or by appointment, in Kaufman 231-G.

Homework and Examination Schedule for Spring 2014:

Homework problems and/or computer experiments will be assigned approximately every other week. Due dates will be specified at the time of assignment. Quizzes will not be announced.
Exam 1: March 18, in class, during lecture time.
Exam 2: April 29, in class, during lecture time.
Final exam: NO FINAL EXAM will be given during final exam week.