

Old Dominion University
Batten College of Engineering and Technology
Department of Electrical and Computer Engineering

ECE 451/551 – Communication Systems – Spring 2018
Course Syllabus

Course Description: ECE 451/551 – Communication Systems (3 credits).

Basic concepts of information transmission using electrical signals and systems. Modulation methods including continuous waveform modulation (amplitude, angle). Design of modulation systems and the performance in the presence of noise. Communication simulation exercises through computer experiments. Prerequisites: ECE 304 and ECE 302.

Textbook (required):

- J. Proakis and M. Salehi, *Fundamentals of Communication Systems*, second edition, Pearson/Prentice Hall, 2014.

Instructor: Dr. Dimitrie C. Popescu.

Office: Kaufman Hall room 231-G. Phone: 757-683-5414. E-mail: dpopescu@odu.edu.

Course Goals:

1. To learn fundamental principles of information transmission and understand application of Fourier analysis to communication systems.
2. Learn how to use random processes to model noise in communication systems.
3. 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. Introduction to modulation. Amplitude modulation (AM), implementations of modulators/demodulators, frequency translation, signal multiplexing. [Ch.3]
4. Angle modulation. Phase and frequency modulation schemes (PM and FM), spectral characteristics, implementations of modulators/demodulators. [Ch. 4]
5. Review of probabilities and random variables. Basic concepts on random processes (stationarity, correlation function, power spectral density). Gaussian processes and noise. Filtered noise, noise power, narrowband noise. [Ch. 5]
6. Effects of noise effects on analog communications systems. Signal-to-noise ratio (SNR). Characterization of noise sources and transmission losses. [Ch. 6]
7. Analog-to-digital conversion: sampling, quantization, encoding. [Ch. 7]
8. Introduction to digital modulation: pulse modulation/detection, matched filters. [Ch. 8]

Class and Exam Schedule for Spring 2018:

Meeting time and place: Monday & Wednesday, 4:20 – 5:35 pm in Kaufman Hall 215.

Office hours: Monday & Wednesday, 3:00– 4:15 pm, or by appointment.

Exam 1: Mar. 14, in class, during lecture time.

Exam 3: Apr. 23, in class, during lecture time.

NO EXAM will be administered during final exam week.

Evaluation:

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

	ECE 451 weights	ECE 551 weights
Computer experiments:	15%	10%
Homework:	15%	10%
In-class quizzes:	10%	10%
Exam 1:	30%	30%
Exam 2:	30%	30%
Term paper:	–	10%

Grading scale for ECE 451:

Weighted score	90-100	85-89	80-84	75-79	70-74	65-69	60-64	50-59	0-49
Letter grade	A	A-	B+	B	B-	C+	C	D	F

Grading scale for ECE 551:

Weighted score	90-100	85-89	80-84	75-79	70-74	65-69	60-64	0-59
Letter grade	A	A-	B+	B	B-	C+	C	F

Course Policies:

- Both 400 and 500 level students use the same textbook. A more in depth understanding of the material is expected from 500 level students, who are required also to complete a term project. Specific instructions regarding the term project will be given in a separate handout.
- Homework will be assigned throughout the semester approximately every other week. Completed homework must be submitted in-person to the instructor at the beginning of the lecture on the day it is due. No homework will be accepted after solutions are released. Students who are unable to submit a homework assignment due to medical reasons or other emergencies should contact the instructor before the due date.
- Quizzes will not be announced during the semester and no makeup quizzes will be offered.
- All quizzes and exams will be closed books and notes. Students are not allowed to receive or give assistance on exams and quizzes.
- Students are expected to attend all lectures and to notify the instructor when classes are missed due to legitimate reasons such as medical, work, or family emergencies.
- Students are expected to have read and follow the ODU Honor Code. Cheating is absolutely prohibited. Any acts of cheating will result in severe penalties. Students may discuss problem assignments with each other; however, submitted solutions are to be one's own original work. Identical homework solutions from different students are not acceptable.
- Students are encouraged to self-disclose disabilities that have been verified by the Office of Educational Accessibility by providing accommodation letters to instructors early in the semester in order to start receiving accommodations. Accommodations will not be made until the accommodation letters are provided to instructors each semester.