Spring 1-1-2020

ECET 214-102: Introduction to Communication Systems

Mohammad Rabie

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NEWARK COLLEGE OF ENGINEERING

*TENTATIVE SYLLABUS AND COURSE INFORMATION, SPRING 2020***

Course Name: Introduction to Communication Systems

Course Number: ECET 214 - 101

Course Structure: 2-2-3 (lecture hr/wk – lab hr/wk – course credits)

Course Description: A study of amplitude modulation, frequency modulation, and pulse modulation systems of transmission and reception, including applications of these systems in radio, television and telemetry. Introduces the latest digital communications theory and applications. Computer simulation and laboratory experiments are designed to support the theory and obtain measurement skills.

Prerequisites: ECET 202 or ECE 232

Co-requisites: ECET 205

Required, Elective or Selected Elective: Required

Required Materials: **Text:** Name: Modern Electronic Communication
Author: Beasley and Miller
Year: 2007
ISBN: 978-0-13-225113-6

Course Learning Outcomes: By the end of the course students are able to:

1. Describe a basic communication system and the need for modulation
2. Define electrical noise and explain its effect a receiver
3. Understand circuits used to generate AM/FM
4. Analyze various power, voltage, and current calculations in AM/FM systems
5. Define the sensitivity and selectivity of a radio receiver
6. Analyze the operation of a complete AM/FM transmitter/receiver system
7. Understand the basic principles, benefits, and drawbacks of digital baseband and bandpass communication systems
8. Perform measurements of AM/FM Transmitter/Receiver using multimeters, oscilloscopes, and spectrum analyzers
9. Perform a test analysis on the power levels (dBm) at each stage of AM/FM transmitters/receivers system
10. Discuss various types of SSB and explain their advantages compared to AM
11. Explain how a PLL can be used to generate FM
12. Describe the basics of a wireless digital communications link.
13. Provide detail on the various schemes used to transmit digital signals, including FSK, PSK, BPSK, QPSK, DPSK, and QAM

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Class Topics:

Modulation	Signal-to-Noise Ratio
Filters	Oscillators
Amplitude Modulation	Frequency Modulation
Phase Modulation	Amplifiers
Receivers	Transmitters
Digital Modulation	Eye Patterns

Student Outcomes:

The Course Learning Outcomes support achievement of the following Student Outcomes from the ETAC of ABET Criterion 3 requirements.

Student Outcome a: An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities.
Related Course Learning Outcomes: 1

Student Outcome b: An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.
Related Course Learning Outcomes: 1, 8, & 9

Student Outcome c: An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.
Related Course Learning Outcomes: 1, 8, & 9

Student Outcome d: An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives.
Related Course Learning Outcomes: 12

Student Outcome f: An ability to identify, analyze, and solve broadly defined engineering technology problems.
Related Course Learning Outcomes: 6, 10, & 12

Academic Integrity:

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. Please visit the Dean of Students website at http://www.njit.edu/doss for a list of student policies relating to academic integrity and student conduct.

Modification to Course:

The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course Outline.

Prepared By: Daniel Brateris
Course Coordinator: Daniel Brateris

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COURSE MEETS	LECTURE	05:45 pm – 07:40 pm	Wednesday	FMH 310
	LAB	07:50 pm – 09:45 pm	Wednesday	FMH 316

COURSE BY

Name: Mohammad Rabie
Office: GITC 2108
Email: mrabie@njit.edu
Phone: 973 – 596 – 5775

OFFICE HOURS Wednesday 01:30 pm – 04:00 pm

LECTURE SCHEDULE

WEEK	CONTENT/TOPIC	ASSIGNEMENT
1	Introduction, groups, Signals, Modulation, Noise (Chapter 1)	
2	Filters and Oscillators (Chapter 1)	TBD ON CANVAS
3	AM Waveforms, Phasor Representation of AM, Analysis of AM (Chapter 2)	TBD ON CANVAS
4	Circuits for AM Generation, AM Transmitter Systems, Spectrum Analyzers (Chapter 2)	TBD ON CANVAS
5	**Test 1**	
6	Sensitivity and Selectivity, Diode Detector, Super heterodyne Receivers (Chapter 3)	TBD ON CANVAS
7	Automatic Gain Control, AM Receiver System, Troubleshooting (Chapter 3)	TBD ON CANVAS
8	Power Distribution, Advantages of SSB, Balanced Modulator (Chapter 4)	TBD ON CANVAS
9	**Test 2**	
10	SSB Filters, SSB Transmitters (Chapter 4)	TBD ON CANVAS
11	Mixer SSB Demodulator, Product Detector, SSB Receiver (Chapter 4)	TBD ON CANVAS
12	Angle Modulation, Simple FM Generator, Deviation Constant, Frequency Deviation (Chapter 5)	TBD ON CANVAS
13	Modulation Index, Bessel Functions, Carson's Rule, Deviation Ratio of FM (Chapter 5)	TBD ON CANVAS
14	**Test 3**	
15	Limiters, Discriminator, Slope Detector, Ratio Detector, Quadrature Detector (Chapter 6)	TBD ON CANVAS
16	Phase-Locked Loop, Stereo Demodulation, FM Receivers, Troubleshooting (Chapter 6)	TBD ON CANVAS
17	**Final Exam**	

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GRADING POLICY	
Homework and Professionalism	10 %
Quizzes and Projects	10 %
Tests	25 %
Laboratory	25 %
Final Exam	30 %

Note: *Grading Policy may be modified by Instructor for each Section in the Course).*

Note: Cannot pass course if you having failing grades on tests and final exam There are three tests during the semester. The lowest grade will be dropped. However, if you achieve an A for all three tests, you will not be excused from the final. Students achieving an A on **all three** tests will receive 5 bonus points that will count for the final grade, so there is an incentive to take all three tests.
There will be no makeup tests – if you miss one test, then that is the test you will drop.
***Note tests tentatively scheduled for weeks 5, 9, and 14.**

Notes Regarding Laboratory Work:

1. All calculations are to be done outside the lab and before the experiment is implemented.
2. Only one report is required per group but a work distribution sheet must be handed in with the report with a different member of the team writing each part.
3. All lab reports are due at the beginning of the lecture class one week after the lab session.
4. Ten percentage points will be deducted for each week the report is late. Lab reports will not be graded if late for more than 2 weeks.
5. All Lab reports items must be typed in any handwritten portion of you Lab report will be penalized.

Note Regarding Homework Canvas Submission:

- Don't return homework by email; I don't have automated way to organize files received by email.
- Please do not send individual images of page scans. It is tedious for you and I to make sure that they are all included/printed.
- The edge of your paper must aligned to the edge of your scan.
- To submit your homework online, scan your homework and upload the scanned document (as a single pdf file) using the homework link on the course Canvas site.
- Convert your homework documents to PDF, which you should be able to create directly from your word processor or editor. *No other format is acceptable for turning in homework*.
- Homework must have your name, homework number, date and page number PRINTED CLEARLY on the front page. Your name and homework page number must appear on subsequent pages.
- Ragged paper scans and/or ragged edges scan will not be accepted.

Note: Cannot pass course if you have failing grades on tests and final exam. There will be three exams during the semester. The lowest grade will be dropped. There will be one comprehensive makeup exam at the end of the semester, which a student may take if an exam is missed.

**** The instructor reserves the right to amend this schedule depending on dynamics of the class and the progress throughout the semester.**