Rutgers University, Department of Electrical and Computer Engineering
ABET COURSE SYLLABUS
COURSE: 14:332:322

Course Catalog Description:	14:332:322 Principles of Communication Systems Analog Communication, Random processess and Noise, Quantization, Digital Communication
Pre-Requisite Courses:	14:332:226, 345
Co-Requisite Courses:	None
Pre-Requisite by Topic:	1. Signals 2. Fourier Series and Transforms 3. Linear Systems Theory 4. Probability
Textbook & Materials:	S. Haykin, *Communication Systems,* 4th Ed, John Wiley, 2001.
References:	None

Overall Educational Objective: To understand basic analog and digital communication system theory and design, with an emphasis on wireless communications methods.

Course Learning Outcomes: A student who successfully completes Principles of Communication Systems will

1. Understand the basic concept of information
2. Understand how information is put into electronic for storage and delivery.
3. Have detailed understanding of amplitude and frequency modulation and demodulation methods including synchronous demodulation, nonlinear demodulation and phase-locked loops.
4. Have an understanding of design considerations for multiple access/use spectrum and multiplexing
5. Have detailed understanding of digital communication basics including matched filters, signal space methods and optimal receiver design
6. Understand basic principles of Gaussian noise processes and their use/utility in communication system design.

How Course Outcomes are Assessed:
Lecture Discussion (5%)
Homework (5%)
Two Mid-Term Exams (60%)
Final Exam (30%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams, Lecture Discussion
(b) an ability to design and conduct experiments and interpre data	N	
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	S	HW Problems, Exams, Lecture Discussion
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Exams, Lecture Discussion
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems, Lecture Discussion
(h) the broad education necessary to understand the impact o electrical and computer engineering solutions in a global, economic, environmental, and societal context	S	HW Problems, Exams, Lecture Discussion
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Home-work, discussions during lectures
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for electrical and computer engineering practice	H	HW Problems, Exams
Basic disciplines in Electrical Engineering	H	HW Problems, Exams
Depth in Electrical Engineering	S	HW Problems, Exams
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	N	
Variety of instruction formats	S	Lecture, office hour discussions

Topics Covered week by week:

Week 1: Introduction and Linear Systems Review
Week 2: AM Modulation/Demodulation/Receivers, Multiplexing
Week 3: FM Modulation/Demodulation/Receivers, Multiplexing
Week 4: Noise Characterization, Noise in AM/FM Systems
Week 5: Review, Quiz I
Week 6: Sampling and PAM, Probability Review
Week 7: Simple Quantization, Convexity, Loyd-Max Quantization
Week 8: Delta Modulation, Adaptive Modulation
Week 9: Probability review, Basic Stochastic Processes
Week 10: Gaussian Processes and LTI systems, Quiz II
Week 11: Matched Filters, Hypothesis tests and BER
Week 12: Orthogonality and Signal Space
Week 13: Optimum Receivers, Distance-Based Decoding
Week 14: Digital Modulation Menagerie
Week 15/16: Review and Final Examination

Computer Usage: None.

Laboratory Experiences: None.

Design Experiences: Homework problems have design components for RF systems

Independent Learning Experiences:

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 2.75 credit hours
(c) General Education: 0 credit hours

Prepared by: Christopher Rose

Date: October 4, 2007