The University of Texas at Tyler
Department of Electrical Engineering

Course: EENG 4312– Communications Theory (Required)

Syllabus

Catalog Description:

Signals Systems and analog modulation techniques, effects of noise in modulation, signal to noise ratio, digital data transmission, probability of error

Prerequisites: EENG 4311, Co- MATH 3351

Credits: (3 hours lecture, 0 hours laboratory per week)

Text(s): Introduction to Communication Systems, F. Stremler, Addison Wesley, third Edition, ISBN 0-201-18498-2

Additional Material: Schaum's Outline of Mathematical Handbook of Formulas and Tables (Recommended)

Course Coordinator: Ron J. Pieper, PhD, PE

Topics Covered: (paragraph of topics separated by semicolons)

Amplitude Modulation; Frequency modulation; Information Theory; Digital Communications

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Report / Paper
4. Computer Programming
5. Project / Model
6. Presentation
7. Course Participation

Course Learning Objectives[1]: By the end of this course students will be able to:

1. Compute symbol information, information transmission rate, channel [1]
2. Select mixer filter combinations that will upshift and down shift spectra to desired specifications.[1]
3. Apply Fourier analysis to characterize communication Signals [4]
4. Design communication filter or circuit test it using simulation software [4]
5. Use simulation software to solve problems in time and frequency domain for communication systems[4]
6. Analyze and predict bandwidth and power distribution properties for amplitude modulation systems AM (with carrier, suppressed carrier, single side band, vestigial sideband)[1,4]
7. Analyze and predict bandwidth and power distribution properties for angle modulation systems phase modulation, frequency modulation[1,4]
8. Explain operation for AM circuits, modulation schemes, demodulation schemes, envelope detectors[1]
9. Explain operation of FM circuits, modulation schemes, demodulation schemes, limiters [1]
10. Explain operation of phase lock loops and solve examples taken from applications in communication [1]

11. Explain advantages and disadvantages of super-heterodyne receivers and be able to solve for the local oscillator frequency and potentially interfering image frequencies[1]
12. Compute signal to noise power rations for AM and FM systems[1]
13. Compute parameters for quantization, and transmission bandwidth for analog to a pulse code modulation process, also TDM, digital data transmission[1]
14. Predict bit error probabilities in presence of additive white Gaussian noise [1]
15. Demonstrate knowledge of terminology, concepts, FCC rules to provide basis to communicate effectively with others in the technical community[1]
16. Find article from IEEE Spectrum, or other source that has relevance. Describe in short essay to describe this items.[3]
17. Write short one page report on role and provide short description for a communications on the role impact of on the role and impact of engineering on Society based on instructor supplied article [3,6]

[1]Numbers in brackets refer to method(s) used to evaluate the course objective.

Relationship to Program Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering;[3]
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering;[5]
3. have the ability to analyze electrical circuits, devices, and systems;[1, 6, 7, 8, 9, 10, 11, 12, 13, 14]
4. have the ability to design electrical circuits, devices, and systems to meet application requirements;[2, 4]
5. have the ability to design and conduct experiments, and analyze and interpret experimental results;
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods;
7. have effective written, visual, and oral communication skills;
8. possess an educational background to understand the global context in which engineering is practiced, including:
   a. knowledge of contemporary issues related to science and engineering;[16]
   b. the impact of engineering on society;[17]
   c. the role of ethics in the practice of engineering;
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams;
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers.[15]

[2]Numbers in brackets refer to course objective(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:		hours
Engineering Sciences and Design:	3	hours
General Education Component:		hours

Prepared By:	Ron J. Pieper	Date:	Aug 17, 2012
Modified By:	Hector A. Ochoa		June 3, 2013
	Hector A. Ochoa		Aug 18, 2014
			Aug 20, 2015
	Ron J. Pieper		Aug 20, 2018