The University of Texas at Tyler
Department of Electrical Engineering

EENG 4312– Communications Theory (Required)

Syllabus

Catalog Description:

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

Prerequisites: EENG 4311, Co-requisite MATH 3351

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

Text(s): Communication Systems Engineering by John G. Proakis, Masoud Salehi, 2nd Edition, Prentice Hall, ISBN-13: 9780130617934

Additional Material: Lecture Handouts

Course Coordinator: Seyed Ghorshi, PhD

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

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics; [1, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14]
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors; [2, 4]
3. an ability to communicate effectively with a range of audiences;
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts; [16, 17]
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions; [5]
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. [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:	0	hours
Engineering Sciences and Design:	3.0	hours
General Education Component:	0	hours

Prepared By:	Ron J. Pieper	Date:	Aug 17, 2012
Modified By:	Hector A. Ochoa		June 3, 2013
	Hector A. Ochoa		Aug 18, 2014
	Ron J. Pieper		Aug 20, 2015
	Seyed Ghorshi		Aug 20, 2016
			Aug 24, 2019
			May 28, 2020