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 (as:
Amplitude Modulation; Frequency modulation; Information Theory; Digital Communications paragraph of topics separated by semicolons)

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

The University of Texas at Tyler
Department of Electrical Engineering

EENG 4312: Communication Theory
2019 Fall Semester

COURSE OUTLINE

<u>Course Coordinator:</u>	Dr. Ron J. Pieper, Electrical Engineering E-mail rpieper@uttyler.edu

<u>Class Location/Time:</u>	RBN 2012 11:15 AM to 12::10 MWF
<u>Office Hours</u> <u>Text</u>	To be arranged then posted Introduction to Communication Systems Ferrel G. Stremler, 3rd edition Addison Wesley ISBN 0-201-18498-2
<u>Prerequisites</u>	EENG 4311 (signals and systems) Math 3351 (probability and statistics)-Co or pre
<u>Related subjects</u>	Electronics I, Digital Systems, Matlab programming

(Tentative pending assignment -grader)   Grading rubric

Exam 1-55min	20%
Exam 2-55 min	20%
Quiz/HW	10%
Computer problems	10%
Final exam-120 min	40%

IMPORTANT: Recommendation maintain a class folder with all your work including class notes, homework and lab assignments, quizzes, and mid-term exams.. Some assignments will be read and prepare short report on technical article related to communications.

<u>Tentative Semester Schedule:</u>

Chapter 1, Sec 9.1,9.2	2 week	Intro and Information Theory
Chapter 2 (Exclude Sec 2.4,2.5, 2.16,2.17)	1 week	Review, Signals, Systems, Fourier Series
Chapter 3 (Exclude Sec 3.16, 3.17,3.18)	2.0 weeks	Review Fourier Transform, Signals and Systems
Chapter 5 (Exclude Sec 5.6, Sec 5.7, 5.8)	2 weeks	AM
Midterm 50 minutes, first part of AM	Midterm 1 55 minutes	Midterm 50 minutes

Chapter 6 FM (Exclude 6.3.1, 6.7.2)	3 weeks	FM, Phase lock loops
AM 2, and FM	Midterm 2 AMII and FM	
Chapter 7, Baseband digital Section 9.5	2 weeks	TDM PCM base band digital, probability of bit error
Chapter 10	1 week	Digital Modulations
Final Exam 120 minutes	Final Exam 120 minutes	Final exam 120 minutes

ClassRoom Etiquette

Please remember to turn off cell phones before coming to class. Working on class assignments or surfing the web while class is going on is not acceptable. If these activities are important for you on a particular day it would be better you did them outside the class environment. That being said attendance is important and will taken periodically during the semester. If you know you have an emergency schedule conflict that comes up please inform me (email OK). Although I do not plan to integrate attendance data in with student evaluation it can and will provide additional information if a student is experiencing problems keeping up.

Background on grading and study habits

Typical ranges for grades in this class run as follows, 91-100% A, 80-90% B, 69% to 79% C. The class examples and HW problems provide a basis for gauging you comfort level with the material. The amount of time a student should study can not always be easily quantified due to differences between students.

Advance Information on exams, quizzes

Not open book, limited equation reference allowed and provided. General policy is: you should get your questions answered before the day of exams. On exam day I will typically be involved with steps getting your exam ready. "needs of many outweigh needs of one "

Homework, MATLAB and HW Policy:

homework assignments or alternatively quizzes will be used Students will take quizzes at regular intervals corresponding to assignments. Solutions to the homework assignments will be made available through Canvas. Students are encouraged to keep their own problem solving notebook and compare with the solutions after making as serious effort at solving the problem without review of the solution, Homework assignment when requested for turn in should be written as per the guidelines provided.

Academic Integrity:

Students should be aware that absolute academic integrity is expected of every student in all undertakings at The University of Texas at Tyler. Failure to comply can result in strong university-imposed penalties.

Note:If you have a disability, including a learning disability, for which you request disability support services/accommodation(s), please contact Ida MacDonald in the Disability Support Services office so that the appropriate arrangements may be made. In accordance with federal law, a student requesting disability support services/accommodation(s) must provide appropriate documentation of his/her disability to the Disability Support Services counselor. For more information, call or visit the Student Services Center located in the University Center, Room 282. The telephone number is 566-7079 (TDD 565-5579)." Additional information may also be obtained at the following UT Tyler Web address: http://www.uttyler.edu/disabilityservices.

<u>Grade Replacement Policy</u>: See registrar policy if you think relevant