The University of Texas at Tyler
Department of Electrical Engineering

EENG 4312.040– 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: Ali 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
	Ali Ghorshi		Aug 20, 2016
			Aug 24, 2019
			May 28, 2020

EENG 4312.040: Communication Theory
2022 Fall Semester

COURSE OUTLINE

Course Coordinator:	Ali Ghorshi, PhD, Electrical Engineering Office: A215 Phone: 903-566-6137 E-mail: aghorshi@uttyler.edu

Class Location/Time:	A218 and via zoom 9:05AM to 10:00AM MWF
Office Hours	To be arranged then posted
Text	Communication Systems Engineering by John G. Proakis, Masoud Salehi, 2nd Edition, Prentice Hall, ISBN-13: 9780130617934
Prerequisites	EENG 4311 (signals and systems) Math 3351 (probability and statistics)-Co or pre
Related subjects	Electronics I, Digital Systems, Matlab programming

(Tentative pending assignment -grader)	Grading rubric
Homeworks	30%
Computer Programming	10%
Midterm Exam	30%
Final Exam	30%

IMPORTANT: Please maintain a class folder with all your work including class notes, homework and lab assignments, quizzes, and mid-term exam. This folder should be submitted on the day of the final exam. It will be returned after the semester.

Please note that this is an **absolute requirement** and failure to submit a complete Student Course Folder will result in an **INCOMPLETE** grade for the course.

Course Content:
Introduction
Review of Signals, Systems, Fourier Series
Review of Signals and Systems, Fourier Transform,
DFT
AM
Spectral Density
Information Theory
Correlation and Noise
FM, Phase lock loops
TDM PCM base band digital
Probability of bit error
Digital Modulations

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. If after reviewing notes, book and HWs if you are having trouble digesting the concept or procedure involved you are highly encouraged to come to an office hour or make an appointment with me.

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:

Regular homework assignments will be handed out and posted on Blackboard. Students will take quizzes at regular intervals corresponding to assignments. Solutions to the homework assignments will be made available through Blackboard. 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.

Grade Replacement Policy:

If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grape point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2006-08 Catalog, p. 35)