

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: Joseph Kamto, PhD

Topic Covered Paragraph of topics separated by semicolons)

Amplitude Modulation; Frequency modulation; Information Theory; Digital

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! 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 ratios 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]

¹Numbers 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]

²Numbers 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
 2018 Fall Semester

COURSE OUTLINE

<u>Course Coordinator:</u>	Dr. Joseph Kamto, Electrical Engineering E-mail rpieper@uttyler.edu
<u>Class Location/Time:</u>	HEC OA216/OC203 12:30 PM to 01:50 MW
<u>Office Hours</u>	To be arranged then posted
<u>Text</u>	Introduction to Communication Systems Ferrel G. Stremler, 3 rd 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

Homework	20%
Exam1/Exam2	25%
Midterm Exam	25%
Final Exam	30%

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.

Tentative Semester Schedule:

27 Aug 2018	Introduction / Signal Analysis	2.1-2.3	
29 Aug 2018	Orthogonality and signal representation	2.4-2.6	HW1 Assigned
03 Sep 2018	Exponential/trigonometric Fourier Series	2.7-2.11	
05 Sep 2018	Exponential/trigonometric Fourier	2.12-20	HW1 Due,
10 Sep 2018	Fourier Transform	3.1-3.6	
27 Aug 2018	Introduction / Signal Analysis	2.1-2.3	
12-17 Sep 2018	Fourier Transform	3.7, 3.14	HW2 Assigned

19 Sep 2018	Linear Systems, Filter	3.15-3.17	
24 Sep 2018	Test1		
26 Sep 2018	Sampling Theorem		HW2 Due,
01 Oct 2018	Spectral Density and Correlation	4.1-4.9	
03 Oct 2018	Amplitude Modulation	5.1-5.2	
08 Oct 2018	Review		
10 Oct 2018	Midterm		HW3 Assigned
15 Oct 2018	Amplitude Demodulation	5.2	
17 Oct 2018	Single Sideband	5.4	
22 Oct 2018	Single Sideband, Vestigial Sideband	5.5	
24 Oct 2018	Performance of Amplitude Modulation	5.6-5.7	
29 Oct 2018	Angle Modulation/Frequency	6.1	HW3 Due
31 Oct 2018	Angle Modulation/Frequency	6.4	HW4 Assigned
05 Nov 2018	Review		
07 Nov 2018	Test2		
12 Nov 2018	Angle Modulation /Phase	6.7	HW4 Due
14 Nov 2018	Angle Modulation /Phase	6.8	HW5 Assigned
19-21 Nov 2018	Pulse Amplitude Modulation	7.1	
26-28 Nov 2018	Pulse Coded Modulation	7.6	HW5 Due,
03 Dec 2018	Review		
05 Dec 2018	Final Exam		
10-12 Dec 2018	Digital Data Transmission		
	Probability Theory		
	Information Theory		

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 your comfort level with the material. The amount of time a student should study cannot always be easily quantified due to differences between students.
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.
Homework and Lab Project Policy	Homework and project reports will be due in class or lab one week after assignment. Project reports should be written as per the guidelines provided. A 25% penalty will be assessed per week for late project reports and homework. The progressive nature of the class means that perfect attendance is recommended if a good grade is desired.
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 take 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
Student Responsibility	To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: http://www.uttyler.edu/wellness/rightsresponsibilities.php <i>Adult behavior is expected. Disruptive behavior/activities that interfere with teaching and/or learning will not be tolerated and may result in an administrative withdrawal without refund.</i>