PRAIRIE VIEW A&M UNIVERSITY
ROY G. PERRY COLLEGE OF ENGINEERING DEPARTMENT
OF ELECTRICAL & COMPUTER ENGINEERING
ELEG 4003-P02 – COMMUNICATION THEORY – FALL 2018

"The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency." – Bill Gates	*"Technology gives us power, but it does not and cannot tell us how to use that power. Thanks to technology, we can instantly communicate across the world, but it still doesn't help us know what to say."* – Jonathan
"We are in an age of technology where we sit in our little cubicles and we IM each other and Skype each other and never connect as human beings." – Sarah McLachlan	Sacks *"The advance of technology is based on making it fit in so that you don't really even notice it, so it's part of everyday life."* – Bill Gates

Lecturer: A. Anil Kumar, Ph.D.
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Lectures: Tuesdays and Thursdays 11:00 AM – 12:20 PM
Room 126, Electrical Engineering Building

Office Hours: Monday: 11 AM – 5 PM
Tuesday: 2 PM – 4 PM
Wednesday: 11 AM – 4 PM
and by appointment

Course Prerequisites:
ELEG 3023 – Signals and Systems & MATH 3023 – Probability and Statistics.

Required Textbook:
B. P. Lathi and Zhi Ding, Modern Digital and Analog Communication Systems, Fifth Edition, Oxford University Press, 2019. ISBN: 9780190686840

Supplementary Texts:
1. Analog and Digital Communications, Hwei P. Hsu, Schaum's Outline Series, 2003, ISBN: 0-07-140228-4
2. Fundamentals of Communications Systems – Michael Fitz, McGraw-Hill Education; First Edition, 2007, ISBN-13: 978-0071482806

References: **Videos:**

1. Excellent lectures by Robert Gallager from MIT https://www.gaussianwaves.com/digital-communications/
2. Digital Communications, Lectures by Ivica Kostanic, https://www.youtube.com/watch?v=2KvK8hPN_uc
3. Stanford Seminar: Neuromorphic Chips: Addressing the Nanostransistor Challenge https://www.youtube.com/watch?v=vHlbC74RJGU
4. The Road Ahead for Wireless Technology: Dreams and Challenges https://www.youtube.com/watch?v=Ktt-RLd2a_c
5. Fundamentals of 5G Mobile Communication https://www.youtube.com/watch?v=7y75iBuW_6s
6. OFC 2017 Plenary Keynote "Internet of Skills" by Prof Mischa Dohler https://www.youtube.com/watch?v=kLjn2Kg2i2w

Catalog Description:
(3-0) Credit 3 semester hours, Signals and spectra. Transmission and processing of signals. Continuous-wave modulation and pulse modulation. Baseband pulse transmission and passband digital transmission. Signal space analysis. Information measures. Prerequisites: ELEG 3023 and MATH 3023.

Course Objectives:
The objective of this course is to provide an introduction to the basic principles in the analysis and design of communication systems. Areas of study include signals and spectra, transmission and processing of signals, continuous-wave modulation and pulse modulation, baseband pulse transmission and passband digital transmission, signal space analysis, and information measures. Modern communication systems will also be introduced and used as examples. The use of computer is emphasized through class assignments, projects using MATLAB/SIMULINK and generation of graphical results. Students are expected to gain an understanding of communication theory methodologies employed to design communication systems.

Expected Outcomes:
Upon successful completion of ELEG 4003, the student should be able to:

1. Demonstrate an understanding of basic principles in the analysis and design of communication systems.
2. Demonstrate the representation of signals and systems in communications systems.
3. Demonstrate a working knowledge of MATLAB.
4. Distinguish and explain the theoretical and practical concepts of continuous-wave modulation, and pulse modulation.
5. Provide specific examples of information measures and data compaction.

6. Demonstrate an application of methodologies of communication theory to the design of communication systems.

Relevant ABET Student Outcome Criteria:
The original eleven EAC outcomes, a-k, under the newly approved Criterion 3, are reduced to seven, effective 2018-2019:

Outcome 1: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Outcome 6: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Outcome 7: An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Course Contents:
1. Introduction to communication theory
2. Review of probability and random processes
3. Introduction to source coding
4. Review of signals and systems
5. Continuous-wave modulation
6. Project #1
7. Pulse modulation
8. Baseband pulse transmission
9. Signal-space analysis
10. Passband digital transmission
11. Project #2
12. Spread-spectrum modulation (optional)
13. Wireless communications
14. New developments in communications

HOMEWORK
I will be assigning several problems throughout the semester. However, I will assume a certain level of maturity and independence from you. In other words, I will not be "policing" you. However, student notebooks should be maintained regularly and will be evaluated at the end of the course. These notebooks should include, at the minimum: examinations, take home assignments, homework problems, other worked out problems and design project papers.

EXAMINATIONS
There will be four examinations, including the mid-term and the final. Exams are closed-book and closed-notes. Every student must take all exams on the assigned dates. Any student who misses an exam without a valid excuse will

automatically receive zero for that exam. Make-up exams will be administered in accordance with university policy.

Examination I	September 20
Examination II (Mid-Term)	October 18
Examination III	November 15
Final Examination	As determined by Registrar

PROJECTS

There will be two assigned projects using MATLAB/SIMULINK. The projects will help the students to absorb the lectures through an interactive approach. Students are required to hand in the project reports.

GRADING POLICY

Your grade, in particular the final grade, will be determined on a combination of your examination performance, projects and your participation in the class. In order to obtain a proper grade, I need to be convinced that you have acquired the necessary knowledge from the course.

The semester grade will be determined by the following system:

Examination I	10%
Examination II (Mid-Term)	15%
Examination III	15%
Final Examination	25%
Projects (2)	20%
Quizzes	15%
Total	100%

The final examination will be comprehensive.

No makeup examinations will be given except in cases of emergency. No "WP"s will be given, except under very special circumstances, and even then only while passing. No "I"s will be given, unless the stringent conditions specified in the University Catalog are satisfied.

CONDUCT AND ETHICS – Honor Code

A strict code of ethics will be imposed in the class and in the examinations. It is a sign of impoliteness and disrespect to your professor and to your colleagues if you make a practice of coming to the class late. Absolutely no talking or cheating will be permitted during the examinations. You shall take a pledge that you will not copy, steal or plagiarize someone else's work nor will you

tolerate anyone else doing the same. You may confer with your colleagues on interpretation and approach to homework problems, but the solutions should be your own work. All work on examinations should be your own unaided work. Projects should conform to accepted academic standards, with any outside references properly documented. It shall be the policy in this course to discourage any dishonest activity to the extent possible rather than punish. HOWEVER, IN FAIRNESS TO ALL CONCERNED, CHEATING AND PLAGIARISM WILL BE DEALT WITH SEVERELY WHEREVER THEY ARE FOUND. You are advised to read and abide by the rules and the regulations of the University as mentioned in the Catalog, in particular the Topics Student Life and Academic Regulations. Graduating means more than completing a certain number of hours and obtaining a reasonable GPA. You must strive to develop a code of strict conduct, acquire a sense of discipline, serve as a role model to your juniors and in particular experience the feeling of accomplishment.

If you have any questions or have any problems that you think I may be able to help with, please do not hesitate to contact me. I am here to help.

LET'S PROVE THAT LEARNING CAN BE BOTH FUN AND PRODUCTIVE!

University Rules and Procedures

Disability statement (See Student Handbook):
Students with disabilities, including learning disabilities, who wish to request accommodations in class should register with the Services for Students with Disabilities (SSD) early in the semester so that appropriate arrangements may be made. In accordance with federal laws, a student requesting special accommodations must provide documentation of their disability to the SSD coordinator. There is an Office of Disability Services on the campus located in Evans Hall Room 317, Tel: (936)261-3585.

Academic misconduct (See Student Handbook):
You are expected to practice academic honesty in every aspect of this course and all other courses. Make sure you are familiar with your Student Handbook, especially the section on academic misconduct. Students who engage in academic misconduct are subject to university disciplinary procedures.

Forms of academic dishonesty:
Cheating: deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not mastered; giving or receiving aid unauthorized by the instructor on assignments or examinations.

Academic misconduct: tampering with grades or taking part in obtaining or distributing any part of a scheduled test.

Fabrication: use of invented information or falsified research.

Plagiarism: unacknowledged quotation and/or paraphrase of someone else's words, ideas, or data as one's own in work submitted for credit. Failure to identify information or essays from the Internet and submitting them as one's own work also constitutes plagiarism.

Nonacademic misconduct (See Student Handbook)
The university respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with either (1) the instructor's ability to conduct the class, (2) the inability of other students to profit from the instructional program, or (3) campus behavior that interferes with the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated by the Dean of Students under nonacademic procedures.

Sexual misconduct (See Student Handbook):
Sexual harassment of students and employers at Prairie View A&M University is unacceptable and will not be tolerated. Any member of the university community violating this policy will be subject to disciplinary action.

Attendance Policy:
Prairie View A&M University requires regular class attendance. Excessive absences will result in lowered grades. Excessive absenteeism, whether excused or unexcused, may result in a student's course grade being reduced or in assignment of a grade of "F". Absences are accumulated beginning with the first day of class.

Student Academic Appeals Process
Authority and responsibility for assigning grades to students rests with the faculty. However, in those instances where students believe that miscommunication, errors, or unfairness of any kind may have adversely affected the instructor's assessment of their academic performance, the student has a right to appeal by the procedure listed in the Undergraduate Catalog and by doing so within thirty days of receiving the grade or experiencing any other problematic academic event that prompted the complaint.

ACADEMIC CALENDAR – FALL 2018

Aug 27 Monday	Tuition payment deadline is 5:00 p.m. for all students who registered for the fall semester
Aug 27 - Aug 29 Monday through Wednesday	Late registration for the fall semester for all students who have not yet registered. To complete registration, students must pay by 5:00 p.m. on Wednesday, September 19
Aug 27 - Aug 31 Monday through Friday	Add/Drop for all students for the fall semester. Tuition payment for all students who add/drop for fall must pay by 5:00 p.m. on Wednesday September 19
Aug 27 Monday	First Class Day
Sep 03 Monday	Labor Day Holiday (University closed)
Sep 04 Tuesday	Class resumes
Sep 12 Wednesday	12th class day (Census Date)
Sep 12 Wednesday	Last day to withdraw from course(s) without academic record
Sep 13 - Nov 02 Thursday through Friday	Withdrawal from course(s) with academic record (“W”)
Sep 19 Wednesday	Tuition payment deadline is 5:00 p.m. for all students who late registered and add/drop for fall semester
Sep 24 Monday	20th class day
Sep 25 - Dec 04 Tuesday through Tuesday	Submit application for Tuition Rebate for fall graduation undergraduate candidates
Oct 18 - Oct 20 Thursday through Saturday	Mid-semester examination

Oct 23 Tuesday	Mid-semester grades due by 11:59 p.m.
Oct 31 Wednesday	Last day to apply for fall graduation (ceremony participation)
Nov 01 - Dec 04 Thursday through Tuesday	Apply for degree conferral only for fall graduation (no ceremony participation or name listed in program)
Nov 02 Friday	Last day for withdrawal from course(s) with academic record (“W”)
Nov 05 Monday	60% of term
Nov 12 - Nov 16 Monday through Friday	Priority registration for continuing students for spring semester. https://www.pvamu.edu/registrar/priority-registration-schedule/
Nov 19 - Jan 11, 2019 Monday through Friday	Pre-registration for all students for the spring semester
Nov 22 - Nov 24 Thursday through Saturday	Thanksgiving Holidays (University closed)
Nov 26 Monday	Class resumes
Dec 03 - Dec 04 Monday through Tuesday	Course Review Days (classes must convene and instructors will prepare students for final exams)
Dec 04 Tuesday	Last day to apply for degree conferral only for fall graduation (no ceremony participation or name listed in program)
Dec 04 Tuesday	Last Class Day
Dec 04 Tuesday	Last day to submit application for Tuition Rebate for fall graduation undergraduate candidates
Dec 04	Last day to withdraw from the University

Tuesday	
Dec 05 - Dec 11 Wednesday through Tuesday	Final Examinations
Dec 13 Thursday	Final grades due for graduation candidates by Noon
Dec 15 Saturday	Fall Commencement
Dec 18 Tuesday	Final grades due for all other students by 11.59 p.m.

FINAL EXAM SCHEDULE FOR FALL 2018 SEMESTER

This schedule will be communicated to you when it is posted on the university website.