Course title	**ELE 435 Communication Systems (3 Cr) With ELE436 Lab (1 Cr)**
Catalog description	Representation of signals and noise. Basic principles of modulation and demodulation. Waveform and digital transmission systems. Design of a component of a communication system.
Prerequisite	ELE 313 and 314
Text book	*Simon Haykin Michael Moher,* ***Introduction to Analog & Digital Communications***, 2nd edition, 2006, John Wiley & Sons Inc. ISBN: 978-0-471-43222-7
Course Objectives	To Understand – The fundamentals of communication theory, some aspects of information theory, communication channels, communication system components, and properties of communication systems and modulation methods. To Question – Think critically about design tradeoffs in communication systems based on the analysis of spectral and statistical properties of signals and noise. To Design and Implement - An independent project on signal processing and/or components of communications systems. To Communicate – Written report of the final project.
Topics covered	Communication theory is the study of the representation, transmission and reception of *information* (e.g. speech, music, text, images etc.) using electrical/acoustic signals and systems. Specifically we will be concerned with two types of problems in this course: 1) how to code and transmit information across a communication channel (cable, wires, space, waveguide etc.) and 2) how to analyze and reduce the interference and noise that distort or interfere with the transmitted signals. We will use Fourier transform methods (learned in ELE 313/314) and ideas from probability to understand various communication systems. By the end of the course, the student should have an understanding of analog (AM and FM), analog-pulse (PAM) and digital-pulse (PCM/FSK/ASK) modulation methods.
Class schedule	Class meets for 2 sessions, 2.5 hrs/week of Lectures and 3hrs/week of Lab 1. Lecture: 40 hours (ELE 435) 2. Exams: 6 hours (ELE 435) 3. Lab and Matlab Experiments (ELE 436)
Course outcomes	1. Knowledge about the theory of communications; representation, transmission and reception of information; frequency and statistical properties of communication systems; communication channels including cable, wires, space, and waveguide; analysis and reduction of interference and noise in transmitted signals; analog (AM and FM), analog-pulse (PAM) and digital-pulse (PCM/FSK/ASK) modulation methods. 2. An independent Telecommunication Instructional Modelling System(TIMS)-based design project on signal processing and/or components of communications systems, including a written report.
Assessment Methods	1. Examinations ELE 435: exam 1 (15%), exam 2 (15%), final exam (40%) 2. Quizzes/homework (30%) ELE435 3. Lab Experiments and Matlab Project (100% ELE 436)

Relationship of course to program objectives	1. Produce graduates who can practice electrical engineering to serve state and regional industries, government agencies. 2. Produce graduates with the necessary background and technical skills to work professionally in communication systems. 3. Prepare graduates who are capable of entering and succeeding in an advanced degree program in the field of communications.
Contribution of course to professional component	Engineering science: 3 credits Engineering design: 1 credit
Accommodations	Any student with a documented disability is welcome to contact me as early in the semester as possible so that we may arrange reasonable accommodations. As part of this process, please be in touch with Disability Services for Students office at 330 Memorial Union. 874-2098
Revised by	Ramdas Kumaresan
Date	September 1, 2012