EC415 Communication Systems

2008-2009 Catalog Data:

Prereq: ENG EC 401 or equivalent. Signal analysis and transmission: amplitude modulation, angle modulation, pulse-amplitude and pulse-code modulation; amplitude shift-keying, frequency shift-keying, phase-shift keying. Case studies of practical communication systems. Includes lab. 4 cr.

Class/Lab Schedule:

LEC: 4 hrs/wk (TR 10-12noon); LAB (TBA)

Textbooks and other required materials:

"Digital and Analog Communication Systems", by Leon W. Couch II, 7th edition, Prentice Hall

Reference:

"Digital Communications" 5th edition, Proakis and Salehi, McGraw-Hill

Coordinator:

Jeffrey Carruthers, Associate Professor, ECE Department

Prerequisites by topic:

ENG EC 401: Signals and Systems

Goals:

To provide students with:

- Understanding of theoretical foundations for classical (analog) and digital modulation.
- Understanding of methods of signal analysis in time domain and spectral domain.
- Understanding of principles and methods of design of basic communication systems.
- Experience in design of simple transmitting and receiving systems performing given task, at the level of block diagrams.

Course Outcomes:

As an outcome of completing this course, students should be able to:

1. Understand the fundamental roles of information and noise in communication systems
2. Understand the properties of transmission media and channels
3. Understand methods for time- and frequency- domain analysis of signals and systems encountered in communication systems
4. Understand the relationship between analog communication and digital communication and reasons behind the increasing use of digital communications.
5. Understand the need for both baseband communication systems and passband communication systems
6. Understand the central role of the communication channel and its constraints: distortion, attenuation, bandwidth, and noise.

7. Understand modulation schemes for analog passband communication: AM, FM, PM, and variations
8. Understand the representation of digital signals using binary and multilevel line codes.
9. Understand modulation schemes for digital passband communication: PSK, FSK, QAM, and variations.
10. Design communication systems to satisfy a wide range of engineering requirements
11. Understand how to use computer-based simulation and analysis tools to design communication systems
12. Understand and evaluate new communication technologies
13. Write reports on communication design projects
14. Understand that the development of communication systems is not governed solely by technical or engineering considerations but also by broader issues such as standardization, government regulation, economics, and market forces.
15. Assess the societal impact of communication systems and the engineer's responsibilities in this regard.
16. Work in teams to solve communication design problems.

Topics in Project Assignments:
These are updated frequently. Typical assignments are to design, build, and evaluate models of communication systems (such as FM transmission and reception or digital baseband systems with noise and matched filter detection) using MATLAB.

Course Outcomes mapped to Program Outcomes:

Program Outcomes:	**a**	**B**	C	d	e	f	g	h	i	j	k
Course Outcomes:	1-9	3,10	10 ,14	16	1-10	15	13	14	12	14,15	11
Emphasis:	5	4	3	2	5	2	2	2	3	3	4

Contribution of Course to Meeting the Professional Component:
Engineering topics: 100%
Math & Basic Science: 0%
General Education: 0%

Prepared by: Jeffrey Carruthers, Associate Professor **Date:** June 25, 2009