ECE 5700 Syllabus, Fall 2011

No: ECE 5700

Title: Analog and Digital Communication Circuits.
Credits: 4

WSU Catalog Description: Amplitude, frequency, pulse modulation and digital modulation. Detection, operational amplifiers; introduction to linear integrated circuits. Digital modulation.
Prerequisite: ECE4570 and ECE 4700.
Coordinator: John Liu, Associate Professor of Electrical and Computer Engineering.

Instructor: John Liu, Associate Professor of Electrical and Computer Engineering
Office Hours: Tuesday Thursday 2:30–3:30PM
Office: 3119 Engineering Building
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Course Meeting Time: 3:30 am - 5:17 PM, Tuesday, Thursday Location: 150 MANO

Goals: To understand fundamental random processes for digital communications, develop capabilities to design, analyze and simulate digital communications systems.

Learning Objectives: At the end of this course, students will be able to:

1. Describe digital communication signals and systems
2. Describe digital modulations including M-ary PSK and M-ary FSK
3. Derive optimum receivers for the AWGN channel, including correlator receivers and matched filter receivers
4. Analyze probability of bit errors for communications systems using digital modulation methods with orthogonal signal set or PSK
5. Simulate digital communications systems using PSK

TEXT:

REFERENCES:
John M. Wozencraft and Irwin Mark Jacobs, Principles of Communication Engineering. Wave-
land Press.
Marvin K. Simon, Sami M. Hinedi, William C. Lindsey, Digital Communication Techniques: Sig-

EXAMS:
One closed-book (1 "cheat sheet" allowed) in-class midterm exam. One closed-book (2 "cheat
sheets" allowed) Final exam.

GRADING:
Homeworks 15%, Projects 20%, Midterm 30%, Final 35%
COLLABORATION:
Students can discuss possible solutions to homework. Every student is required to write up the final form of his/her submission entirely on his/her own.

SCHEDULE:

Chapter 1 Introduction
Chapter 2 Probability and Stochastic Processes
Chapter 4 Characterization of Communication Signals and Systems
Midterm exam
Chapter 5 Optimum Receivers for the Additive White Gaussian Noise Channel
Final exam

Outcome coverage:
(a) an ability to apply knowledge of mathematics, science, and engineering: The exercises/projects/exams in the course require direct application of mathematical, scientific, and engineering knowledge for signal and system analyses. Students are required and trained to analyze random processes and random communications signals.

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability: The projects require students to do research and design digital communications systems to achieve system specifications. Design concepts and procedures are taught, discussed and checked against current practices in telecommunications industry.

(e) an ability to identify, formulate, and solve engineering problems: The course requires students to understand foundations in digital communications. Through lecturers, homeworks and projects linked with the state-of-the-art industrial applications, students are trained to select appropriate modulation methods for information transmission, design the corresponding optimum digital receiver, analyze and simulate communications systems.

(i) a recognition of the need for, and an ability to engage in life-long learning: Students should understand digital communications is widely used in daily life. It is used for TV, telephones, cellular phones, computer communications, deep space communications, and underwater communications, etc. Fundamental concepts and systems taught in this course enable students to continue to learn new concepts and knowledge in a variety of areas by themselves.

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice: Students will be able to use mathematical skills for signal and system analyses, system evaluation, and general calculations. They are required to use computer software packages including Matlab, C/C++, to design and analyze the performance of digital communications systems.

Computer Skills: Require Matlab, C/C++ for homework assignments and projects.
Laboratory Resources: None.
Laboratory Policy: Not required.
Equipment Handling Policy: Not required.