Course Description
EE 4388-Digital Communications

2000-02 Catalog Data: Techniques of sampling; digital baseband transmission; digital modulation schemes; introduction to coding and fundamental limits on system performance. Prerequisites: EE 3353 and EE 3384, each with grade of “C” or better.

Prerequisite by Topic:
1. Fourier transforms
2. Probability and random variable
3. Linear system theory


Course Outcomes: Students completing EE 3488 will be able to:
1. Design a matched filter for a prescribed signal or signal set (I).
2. Understand the principles of operation of binary baseband and bandpass modulation systems (C).
3. Understand the principles of operations of m-ary bandpass modulation systems (C).
4. Determine bandwidth and probability of error of binary and m-ary systems.
5. Select and design a digital modulation system to satisfy specified requirements and constraints (C).

Topics Covered:
1. Signal transmission, spectral analysis, sampling and multiplexing (7hrs.)
2. Concepts of random process, representation of narrowband noise (5hrs.)
3. Binary baseband transmission (2hrs.)
4. Matched filter and error probability (3hrs.)
5. Binary digital modulation schemes (4hrs.)
6. Digital transmission over bandlimited channels (3hrs.)
7. M-ary digital modulation schemes (10hrs.)
8. Spread spectrum communication systems (5hrs.)
9. Introduction to information theory (3hrs.)

Class Schedule: Three hours lecture per week.

Contribution to Professional Component:

EE 3488 is a senior elective course which builds on topics covered primarily in junior required courses. It is one of a group of courses normally taken by students seeking a
specialization in communication and signal processing. It may also be taken as an elective by students seeking additional breadth in their curriculum.

Relationship to Program Outcomes:

1. Have and ability to apply knowledge of mathematics, science and engineering.

Student’s use concepts from calculus, linear systems theory and probability theory in the analysis and design of digital communication systems. (Course Outcomes 2 and 3).

3. Have and ability to design a system or component to meet desired needs.

Students have homework problems that incorporate design issues. There are one or two group design projects where students identify and design a system to meet customer requirements (Course Outcomes 1 and 5).

5. Have and ability to identify, formulate and solve engineering problems.

Students are able to hone these skills while working homework problems and performing design calculations (Course Outcomes 1 and 5).

7. Have an ability to communicate affectively.

Students make oral presentations of homework problems to the class. They write a critique of a technical paper dealing with some aspect of digital communications (Course Outcomes 2 and 3).

Course Outcomes do not relate to Program Outcomes 2, 4, 6, 8-11. They do correlate strongly with Educational Objective 1 (70%) and Educational Objective 2 (30%).

Computer Usage: Students may use Matlab to complete some problem assignments. Group projects will require Matlab usage.

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