

ETec475 Course Specifications

Catalog Information

Course Number and Title: ETec475 - Digital Communication Systems

Credit Hours: 4

Course Description: An upper-division study of modern, digital communications concepts and techniques. Topics include sampling, quantizing, digital modulation and detection methods, baseband signaling and line codes, bandpass signaling, synchronization, and error detection. Several case examples will be presented throughout the course.

Prerequisites: ETec374, 455 and EET major or written permission.

Prerequisite Outcomes:

Schedule Information

Quarter: Spring 2007

Meeting Times and Rooms

Days	Times	Instructor	Room(s)
MWF	9:00-9:50	Todd Morton	ET333
R	2:00-3:50	Todd Morton	ET340

Lab Fee: None

Enrollment Limit: 18

Student Resources

Student Syllabus: <http://eet.etec.wvu.edu/etec475/475sp07syl.pdf>

Course Website: <http://eet.etec.wvu.edu/etec475/index.html>

Facilities and Materials

Required Text: Digital and Analog Communication Systems, Sixth Edition, Leon Couch

Lab Equipment: Low-Frequency Spectrum Analyzer (1)

Software: None

Course Outcomes

1. Understand importance and implications of communications standards and the layered model
2. Be able to calculate and apply information, average information rate, and channel capacity to a given encoding scheme and transmission channel
3. Be able quantitatively and qualitatively determine the magnitude spectrum and power spectral density in one-sided polar form, based on mathematical techniques, transform tables, and/or software.
4. Understand transmission distortion and be able calculate and analyze thermal signal-to-noise ratio in a system with analog or digital repeaters. Be able to find the bit error rate for a given signal-to-noise ratio, data rate, and coding, based on given tables and/or equations.
5. Calculate and apply analog encoding techniques including the effects of sampling rate, quantization, and companding on dynamic range, resolution, and distortion in PCM and differential encoding systems.
6. Be familiar with common baseband encoding techniques and be able to analyze data rate, modulation rate, spectral efficiency, bit synchronization, and other system implications.
7. Be familiar with common bandpass signaling techniques and be able to analyze data rate, modulation rate, spectral efficiency, frequency division multiplexing, and echo cancellation.
8. Be introduced to real network protocols and understand the details of the lower layers of the standard including the physical layer and medium access control. Be introduced to, at least, one real-time network protocol.
9. Be introduced to real systems, components, and technologies currently in use for outcomes 4 - 9.
10. Understand the need for completing work in a timely manner.

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Courses Contribution to the Program Outcomes

P – Primary to the purpose of the course. Course contains significant instruction and opportunities for practice.

S – Secondary to the purpose of the course. Course contains limited instruction and opportunities for practice.

N – Not a significant part of this course.

Program Outcome		Course Contrib	Applicable Course Outcome(s)
a	An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.	P	1, 2, 3, 4, 5, 6, 7, 8, 9
b	An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology	P	1, 2, 3, 4, 5, 6, 7, 8, 9
c	An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes	N	
d	An ability to apply creativity in the design of systems, components or processes appropriate to program objectives	N	
e	An ability to function effectively on teams,	N	
f	An ability to identify, analyze and solve technical problems	S	2, 3, 4, 5, 6, 7, 8
g	An ability to communicate effectively,	N	
h	A recognition of the need for, and an ability to engage in lifelong learning	S	1, 9
i	An ability to understand professional, ethical and social responsibilities,	N	
j	A respect for diversity and a knowledge of contemporary professional, societal and global issues,	N	
k	A commitment to quality, timeliness, and continuous improvement.	S	10
A	The application of circuit analysis and design, computer programming, associated software, analog and digital electronics, and microcomputers to the building, testing, operation, and maintenance of electrical/electronic(s) systems	S	4, 5, 6, 7
B	The applications of physics or chemistry to electrical/electronic(s) circuits in a rigorous mathematical environment at or above the level of algebra and trigonometry	S	3, 4
C	The ability to analyze, design, and implement control systems, instrumentation systems, communications systems, computer systems, or power systems	P	1, 2, 3, 4, 5, 6, 7, 8, 9
D	The ability to apply project management techniques to electrical/electronic(s) systems	N	
E	The ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of electrical/electronic(s) systems	P	3, 4, 5, 6, 7

Outcome Assessment Tools

1. Homework and Tests
2. Communications Module Senior Survey