FORM VERSION: 5/95
DATE REVISED: 2/96

PALOMAR COLLEGE
COURSE OUTLINE OF RECORD FOR
DEGREE CREDIT COURSE

_X_ Transfer Course _X_ A.A. Degree Applicable Course
(check all that apply)

COURSE NUMBER AND TITLE: ECHT 205 Telecommunication Systems

UNIT VALUE: 4.5 units
Lecture: 3 units
Lecture/Lab: 1.5 units

MINIMUM NUMBER OF SEMESTER HOURS: 96 hours: Lecture: 48/Lecture/Lab 48

BASIC SKILLS REQUIREMENTS: Appropriate language and computational skills.

ENTRANCE REQUIREMENTS:

PREREQUISITE: None

COREQUISITE: None.

RECOMMENDED PREPARATION: ECHT 102 and ECHT 203

SCOPE OF COURSE:

Review of basic electronic analog and digital principles. Communication of information using analog /digital electronic circuits and systems. AM, FM, PM modulation techniques, transmission lines, antennas, testing and troubleshooting, as they relate to RADIO, RADAR, TV, Computers, Modems, Networks (Internet, World Wide Web [WWW]), Satellites, Cellular phones, and Fiber optic systems will be addressed.

SPECIFIC COURSE OBJECTIVES:

Upon completing this course of study, the student will be able to:

1. Draw the block diagrams for various telecommunication systems.

2. Describe the principles/concepts relating to modulation, single and double side-band carriers, and signal-to noise (S/N) ratio.

3. Describe the principles/concepts relating to superheterodyne receivers, analog/digital circuits and systems, computers/modems/telephone interfaces, networks (ISDN), UARTS and USARTS.

4. Compare the advantages/disadvantages of AM vs FM communication systems.

5. Perform calculations relating to the determination of typical parameters and transfer functions.

6. Perform measurements using meters, oscilloscopes, spectrum analyzers, distortion analyzers, and impedance bridges in order to verify the calculations determined in objective 5.

7. Assemble, test, analyze, and troubleshoot laboratory experiments covering the topics referred to in objective 5.

8. Design, analyze, assemble, test, and troubleshoot a superheterodyne receiver project.

9. Maintain a laboratory notebook according to standard engineering practice.

10. Compare the characteristics of transmission systems such as "normal" transmission lines, wave-guides, and fiber-optic lines.

11. Compare the characteristics of Microwave, RADAR, LASER, and Satellite communication systems.

12. Explain the advantages/disadvantages of digital and data communication systems.

CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:

I. Introductory Telecommunication Topics

   A. RADIO, RADAR, TV, Computers, Modems, Networks (Internet, World Wide Web [WWW]), Satellites, Cellular phones, Fiber optics.
   B. Information and bandwidth.
   C. Oscillators
   D. Noise/noise measurement

II. Digital and Data Communications

   A. Telephone
   B. Pulse/pulse-code modulation
   C. Telemetry
   D. Code transmission
   E. The UART
   F. Data communication networks
   G. Basic network protocols

H. Local area networks (LAN)

III. Analog vs Digital Modulation (transmission)

A. Amplitude modulation fundamentals
B. Per cent (%) modulation
C. Circuits for AM generation
D. AM transmitter systems
E. Stereo broadcasting
F. Transmitter measurements

IV. Analog vs Digital Modulation (reception)

A. Receiver characteristics
B. AM detection (demodulation)
C. Superheterodyne receivers
D. Automatic gain control
E. AM receiver systems

V. Single Sideband Communications

A. Single sideband characteristics
B. Balanced modulator
C. SSB filters, transmitters, demodulation
D. SSB receivers

VI. Frequency Modulation (Transmission)

A. Angle modulation (phase/frequency)
B. FM generation (direct/indirect)
C. Phase-locked-loop (PLL) FM transmitter
D. Stereo FM

VII. Frequency Reception

A. Block diagram
B. RF/IF amplifiers
C. Limiters
D. Demodulation
    1. Discriminators
E. Phase-locked-loop (PLL)
F. Stereo demodulation
G. FM receivers

VIII. Television

A. Transmitter/receiver synchronization
B. Resolution
C. The television signal
D. The front end
E. IF amplifiers
F. The video section
G. Horizontal/vertical synchronization
H. Color TV
I. Demodulator section

IX. Communication Techniques (non-entertainment)

A. Frequency conversion
B. Receiver noise, sensitivity, and dynamic range relationships
C. Frequency synthesis
D. Transceivers
E. Cellular telephone

X. Transmission Lines

A. Electrical characteristics of transmission lines
B. Resonant/non-resonant lines
C. Standing wave ratio (SWR)
D. The Smith chart
E. Transmission line applications

XI. Wave Propagation

A. Electromagnetic waves
B. Ground/space/sky wave propagation
C. Satellite communications

XII. Antennas

A. Hertz/Marconi antennas
B. Radiation resistance
C. Antenna feed-lines
D. Antenna arrays
E. Special purpose antennas

XIII. Waveguides and RADAR

A. Comparison of transmission systems
B. Types of waveguides

C. Termination and attenuation
D. RADAR

XIV. Microwaves/Lasers/Fiber Optics

A. Solid state microwave devices
B. Microwave antennas
C. Ferrites
D. LASERS
E. Nature of light
F. Optical fibers
G. Light sources
H. Detectors
I. Fiber connections
J. Systems

XV. Error Detection, Correction, and Data Security

A. Parity
B. Cyclic redundancy codes
C. Data encryption standard

XVI. Test Techniques and Instrumentation

A. Basic tests
B. Breakout box and line monitors
C. Loopbacks
D. Pattern generators and bit error rate analyzers
E. Protocol analyzers
F. Time Domain Reflectometry (TDR)
G. Testing fiber optic systems
H. LAN-Ethernet diagnostic tools
I. Spectrum analyzers

REQUIRED READING:

One of several text/laboratory manuals are suitable (college level) for this course:

Miller, Gary M. Modern Electronic Communication. Sixth Edition. Englewood Cliffs, NJ: Prentice-Hall, 1999.

Oliver, Mark E. Laboratory Manual To Accompany Modern Electronic Communications. Sixth Edition. Englewood Cliffs, NJ: Prentice-Hall, 1999.

Dungan, Frank R. Electronics Communications Systems. Third Edition. Albany, NY: Delmar Publishers, 1998.

Sinnema, William and Robert McPherson. Electronic Communications. Scarborough, Ontario: Prentice-Hall Canada & Company, 1998.

Miller, Michael A. Introduction to Digital and Data Communication. Los Angeles, CA: West Publishing, Co, 1992.

Instructor handouts.

SUGGESTED READING:

Floyd, Thomas L. Electronic Fundamentals, Circuits, Devices, and Applications. Fourth Edition. Englewood Cliffs, NJ: Prentice-Hall, 1998.

Malvino, Paul V. Electronic Principles. Sixth Edition. Westville: McGraw-Hill, 1999.

REQUIRED WRITING:

1. A formal laboratory report (at least five (5) typewritten pages), describing the design, assembly, test, and troubleshooting of a superheterodyne receiver project is required. This report will reflect the standard engineering requirements for a well-documented electronic industrial project.

2. A technologist's notebook will be developed by each student that will contain the results of all laboratory experiments.

OUTSIDE ASSIGNMENTS:
Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments. Reading assignments are from the text, laboratory manuals, and handouts in preparation for quizzes and tests. Approximately 300 pages in the textbook and 200 pages in the laboratory manual are required readings for the course.

A laboratory notebook and formal lab report will be prepared. The formal report will consist of at least five (5) typewritten pages.

INSTRUCTIONAL METHODOLOGY:

Check all that apply:
_X_ lecture
____ laboratory
_X_ lecture-laboratory combination
____ directed study

This may be offered as a distance education course and meets Title 5 regulations 55370, 55372, 55374, 55376, 55378, and 55380.
_____ Yes __X__ No

If yes, check all that apply:
____ telecourse
____ mediated instruction
____ computer assisted instruction

GRADING POLICY AND STANDARDS (includes methods for determining whether the stated objectives have been met by students):

Class participation/oral & Written reports	20 Points
Quizzes/Tests	20 Points
Technologist's notebook	20 Points
Special Project/report	20 Points
Final Exam	20 Points
	100 Points

Grading procedure:

A = 90-100 Points
B = 81-90 Points
C = 71-80 Points
D = 61-70 Points
F = Less than 61 Points

IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?
_____ Yes __X__ No Number of times course may be taken for credit: 1.

If yes, identify specific provision of Title 5 Division 2 section(s) 55761-55763 and 58161 which qualifies course as repeatable:

CONTACT PERSON:

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