

Mercer County Community College

Division of Business and Technology

EET 214

COMMUNICATIONS ELECTRONICS

COURSE DESCRIPTION

Covers solid-state circuits including RF voltage and power amplifiers and oscillators, noise, coupling circuits, tuned circuits, and AM and FM receivers and transmitters, used in the transmission of both analog and digital signals.

Text (s): **Electronic Communications Systems**
By Frenzel
Publisher: Glencoe/McGraw Hill
Latest Edition

Electronic Communications Systems (Lab Manual)
By Frank R. Dungan
Publisher: Delmar Publishing Inc.

Prerequisites:

Co-requisites: EET219

Credits: 4

Lecture Hours: 3

Studio/Lab Hours: 3

Course Coordinator: **Dominic T. DeFino**

Latest Review: **Fall 2003**

I. GENERAL OBJECTIVES

The student will gain an understanding of the following:

A. Relevant Concepts in Communication Electronics

1. Filters
2. Attenuation, gain, and decibel (dB)
3. Semiconductor devices
 - a) Bandwidth
 - b) Noise
 - c) Classes of operation
4. Oscillation, stability, and signal generation

II. INFORMATION TRANSMISSION

- A. Information content vs. bandwidth
- B. Sources of internal and external noise
- C. Signal-to-noise ratio
- D. System performance
- E. Spectra of waveforms

III. MODULATION THEORY AND TECHNIQUES

- A. Types and purposes of analog modulation (AM, FM, PM)
 1. Generation and detection principles
 2. Efficiencies in power and bandwidth
 3. Frequency division multiplexing
 4. Special cases (DSB, SSB, VSB)
- B. Digital communication techniques (PCM, Delta-modulation)
 1. Quantization
 2. Coding
 3. Sampling theorem
 4. Time division multiplexing
 5. Special cases (ASK, FSK, QPSK, PAM, PPM, PWM)

IV. TRANSMITTERS AND RECEIVERS

- A. Transmitter block diagrams
- B. Receiver block diagrams

V. DATA TRANSMISSION

- A. Data rates
- B. Error rates
- C. Coding and parity
- D. Modems

VI. WAVE PROPAGATION

- A. Reflection, refraction, polarization, interference, diffraction
- B. Antennas
- C. Transmission lines
 1. Types (coaxial cable, balanced and unbalanced lines, wave guides, fiber-optic guides)
 2. Theory (characteristic impedance, reflection, impedance matching, SWR)

Weekly Schedule

Weeks	Assignment	Questions	Problems
1 & 2	Chapter 1: Introduction to Electronic Communications 1-1 The Significance of Human Communications 1-2 Communications Systems 1-3 Types of Electronic Communications 1-4 Modulation and Multiplexing 1-5 The Electromagnetic Spectrum 1-6 Bandwidth	1-30	1, 3
3 - 7	Chapter 2: Review of Electronic Fundamentals 2-1 Gain, Attenuation, and Decibels 2-2 Tuned Circuits 2-3 Filters 2-4 Transformers and Inductively Coupled Circuits 2-5 Fourier Theory	1-16	1-25
8 -10	Chapter 3: Amplitude Modulation Fundamentals 3-1 AM Concepts 3-2 Modulation Index and Percentage of Modulation 3-3 Sidebands and the Frequency Domain 3-4 AM Power		1-13
11	Chapter 4: Amplitude Modulator and Demodulator Circuits 4-1 Basic Principles of Amplitude Modulation 4-2 Amplitude Modulators 4-3 Amplitude Demodulators		
12	Chapter 5: Fundamentals of Frequency Modulation 5-1 Basic Principles of Frequency Modulation 5-2 Principles of Phase Modulation 5-3 Modulation Index and Sidebands 5-4 Noise-Suppression Effects of FM 5-5 Frequency Modulation versus Amplitude Modulation		1-5
13	Chapter 6: FM Circuits 6-1 Frequency Modulators 6-2 Phase Modulators 6-3 Frequency Demodulators	1, 2	1, 2
14	Chapter 7: Radio Transmitters 7-1 Transmitter Fundamentals 7-2 Carrier Generators 7-3 Power Amplifiers 7-4 Impedance-Matching Networks 7-5 Speech Processing 7-6 Typical Transmitter Circuit		1-5
15	Chapter 8: Communications Receivers 8-1 Basic Principles of Signal Reproduction 8-2 Super-heterodyne Receivers 8-3 Frequency Conversion 8-4 Intermediate Frequency and Images 8-5 Noise 8-6 Typical Receiver Circuits 8-7 Receivers and Transceivers		1-4