

Broward Community College

Course Outline

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STATUS: A

COMMON COURSE NUMBER: EET2358C

COURSE TITLE: Advanced Communication Technology

CREDIT HOURS: 3

CONTACT HOURS BREAKDOWN:

Lecture/Discussion 32

Lab 32

Other 0

Contact Hours/Week 4

CATALOG COURSE DESCRIPTION:

Prerequisite: EET 2142C, EET 2355C

Corequisite: EET 2326C

This is an advanced course in telecommunication technology, with topics covering analog and digital communication, switching systems, Digital Modulation, Wireless communication systems, Personal Communication Systems, and Paging and Wireless Data Networking. Extensive laboratory practice is included in the course.

General Education Requirements - Associate of Arts Degree, meets Area(s):

General Education Requirements - Associate in Science Degree, meets Area(s):

UNIT TITLES:

1. Introduction to Advanced Communication Systems
2. Analog Modulation Schemes
3. Digital Communication
4. Digital Modulation
5. Wired and Wireless Communication Systems
6. Transmission Lines and Waveguides
7. Transmitter and Receiver Circuitry
8. Cellular Radio
9. Personal Communication Systems
10. Satellite-Based Wireless Systems
11. Emerging Communications Technologies

I. Course Overview:

Upon successful completion of this course, the students should be able to demonstrate knowledge of today's communications systems and an in dept knowledge of wireless Communication and understanding of wireless communications devices.

II. Units:

Unit 1.0 Introduction to Advanced Communication Systems

General Outcome:

- 1.0 The students should be able to describe the overall principles of wireless communications systems.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to understand and describe:

- 1.1 Elements of wireless communications systems.
- 1.2 The necessity of modulation in a wireless communication.
- 1.3 The concept of signal to noise ration and its importance to communication systems.
- 1.4 The need for wireless networks
- 1.5 Filtering of signals
- 1.6 The radio-frequency spectrum
- 1.7 Bandwidth and frequency reuse

Unit 2.0 Analog Modulation Schemes

General Outcome:

2.0 The students should be able explain principles of Analog Modulation.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to understand and describe:

- 2.1** The concept of modulation.
- 2.2** Theories and details of modulation schemes.
- 2.3** Amplitude-modulated signals in time and frequency domains.
- 2.4** Frequency and phase modulation
- 2.5** The angle modulation spectrum
- 2.6** Narrowband and wideband frequency modulation
- 2.7** Frequency modulation and noise

Unit 3.0 Digital Communication

General Outcome:

3.0 The students should be able explain principles of digital communication systems.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to understand and describe:

- 3.1** Compare analog and digital communication techniques.
- 3.2** Importance of sampling rate and calculation of sampling rate and theories behind it.
- 3.3** The concepts of aliasing.
- 3.4** Common types of analog modulation.
- 3.5** Pulse-code modulation.
- 3.6** Differential pulse-code modulation.
- 3.7** Delta modulation.
- 3.8** Operation of common types of vocoders.

Unit 4.0 Digital Modulation

General Outcome:

4.0 The students should be able explain principles of digital modulation techniques.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 4.1 The basics types of digital modulation.
- 4.2 Explain the difference between bit rate and baud rate and calculate them for digital modulation systems.
- 4.3 Understand FSK, PSK and QAM.
- 4.4 Describe the concept of multiplexing and multiple access using frequency and time division.
- 4.5 Understand frequency-hopping.
- 4.6 Explain TDMA and FDMA.
- 4.7 Understand code-division multiple access and compare with TDMA and FDMA.

Unit 5.0 Wired and Wireless Communication Systems

General Outcome:

5.0 The students should be able explain principles of communication networks.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 5.1** Understand the principles of switched telephone network.
- 5.2** Explain the public switched telephone system.
- 5.3** Explain the local-loop telephone line signals and their functions.
- 5.4** Explain signaling system seven and its use in communication.
- 5.5** Explain time-division multiplexing in telephony and perform various calculations with TDM signals.

Unit 6.0 Transmission Lines and Waveguides

General Outcome:

6.0 The students should be able understand the theory of transmission lines.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 6.1** Understand the principles of transmission lines and frequency relations.
- 6.2** Understand the concept of characteristic impedance and calculation of impedance of a coaxial or open-wire transmission line.
- 6.3** Explain reflection coefficient and standing-wave ratio.
- 6.4** Understand and calculate losses on transmission lines.
- 6.5** Calculate the cutoff frequency, phase and group velocity, guide wavelength and characteristic impedance for specific modes.
- 6.6** Explain the importance of impedance matching with respect to transmission lines.

Unit 7.0 Transmitter and Receiver Circuitry

General Outcome:

7.0 The students should be able understand the concepts of transmitters and receivers in a communication system.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 7.1 Understand the different types of transmitters and their applications.
- 7.2 Understand the basic concept of a transmitter.
- 7.3 Explain the basic operation of frequency synthesizers and mixers.
- 7.4 Explain the basic characteristics of Class A, B and C amplifiers and their applications.
- 7.5 Differentiate FM and AM transmitters and receivers.
- 7.6 Explain the theory behind the superheterodyne system and its applications in receivers.
- 7.7 Understand receivers and their applications.

Unit 8.0 Cellular Radio

General Outcome:

8.0 The students should be able understand the concepts of cellular radio communication system.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 8.1** Understand the concepts of CB radio and cordless telephones.
- 8.2** Understand advanced mobile phone system.
- 8.3** Explain the security and privacy in a mobile communication environment.
- 8.4** Understand and explain the cell-site equipment and operation.
- 8.5** Explain fax and data communication using cellular phones.
- 8.6** Understand digital cellular systems.
- 8.7** Understand the advantages of digital cellular radio.
- 8.8** Explain TDMA communication.

Unit 9.0 Personal Communication Systems

General Outcome:

9.0 The students should be able understand the different frequencies used in a wireless communication system.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 9.1** Understand GSM, PCS and DCS bands.
- 9.2** Describe the operation of each of the personal communication systems used in North America.
- 9.3** Explain IS-136 (TDMA) PCS.
- 9.4** Understand Global System for Mobile Communication.
- 9.5** Explain IS-95 CDMA PCS.
- 9.6** Testing System of cellular phones.

Unit 10.0 Satellite-Based Wireless Systems

General Outcome:

10.0 The students should be able understand the concepts of satellite-based wireless communication system.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 10.1** Calculate velocity and period for artificial satellites in circular orbits.
- 10.2** Understand the usage of satellites for communication.
- 10.3** Describe signal and noise in satellite-based communication systems.
- 10.4** Understand systems using geostationary satellites.
- 10.5** Describe mobile telephone network using geostationary satellites.
- 10.6** Understand systems using low-earth-orbit satellites.
- 10.7** Understand systems using medium-earth-orbit satellites.

Unit 11.0 Emerging Communications Technologies

General Outcome:

11.0 The students should be able understand the concepts of the latest emerging communications technologies, both those currently in development, and those recently in production.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

11.1 Understand, describe, and explain the latest emerging communications technologies in development.

11.2 Understand, describe, and explain the latest emerging communications technologies recently in production.