ET315
Electronic Communications Systems II
[Onsite]

Course Description:

A continuation of Electronic Communications Systems I, this course emphasizes digital techniques and the transmission and recovery of information.

Prerequisite(s) and/or Corequisite(s):

Prerequisites: ET275 Electronic Communications Systems I, ET285 Digital Electronics II

Credit hours: 4

Contact hours: 50 (30 Theory Hours, 20 Lab Hours)

STUDENT SYLLABUS: ELECTRONIC COMMUNICATIONS SYSTEMS II

Instructor: _____

Office hours: _____

Class hours: _____

Major Instructional Areas

1. Digital Communications: Coding Techniques
2. Wired Digital Communications
3. Wireless Digital Communication
4. Network Communications
5. Transmission Lines
6. Wave Propagation
7. Microwaves and Lasers
8. Antennas
9. Fiber Optics
10. Waveguides and Radar
11. Review and Final

Course Objectives

Upon successful completion of this course, the student should be able to:

1. Explain and demonstrate the operation of various digital modulation and multiplexing techniques.

2. Describe series and parallel computer communications protocols.

3. Define various parameters used for measuring performance of digital communications systems and demonstrate techniques for measuring them.

4. Explain techniques used to minimize errors in digital communications systems.

5. Describe and analyze characteristics of standard transmission lines.

6. Describe essential characteristics and parameters of electromagnetic wave propagation.

7. Identify physical and electrical characteristics of antennas and waveguides.

8. Demonstrate a familiarity with radar and microwave systems and associated special components.

9. Explain and demonstrate the principles of operation of fiber optic systems, including the transport of signals through the fiber and associated system components.

Teaching Strategies

This curriculum is designed to promote a variety of teaching strategies that support the outcomes described in the course objectives and that foster higher cognitive skills. The course delivery makes use of various media and delivery tools in the classrooms.

Student Textbook and Materials

Text: Miller, Gary M. and Beasley, Jeffrey S. *Modern Electronic Communications, 8th Edition. Pearson Custom Publishing, 2006.*

Lab Manual: Beasley, Jeffrey S. and Fairbanks, Michael. *Supplemental Text to Accompany Modern Electronics Communication Including System Projects. Pearson Custom Publishing, 2006.*

CD: Snyder, Gary A. *Multisim Circuit Files to accompany Modern Electronic Communications, 2011.*

CD: Snyder, Gary A. *Multisim Circuit Files for Supplemental Text to Accompany Modern Electronic Communications, 2011.*

Course Outline

Unit	Topic (Lecture Period)	Chapters	Laboratory Assignments
1	Digital Communications: Coding Techniques	8-1 through 8-6	PAM and TDM: Lab Manual, Experiment 18
2	Wired Digital Communications	9-1 through 9-7	Tone Decoder: Lab Manual, Experiment 24
3	Wireless Digital Communications	10-1 through 10-5	FSK Modulation and Demodulation: Lab Manual, System Project 1
4	Network Communications **UNIT EXAM 1**	11-1, 11-2 and 11-4	Delta Modulation using CODECs: Lab Manual, Experiment 21, Steps 1-8
5	Transmission Lines	12-1 through 12-9	Delta Modulation using CODECs: Lab Manual, Experiment 21, Steps 9-19
6	Wave Propagation	13-1 through 13-7	BPSK Digital Communication System: Lab Manual, System Project 6
7	Microwaves and Lasers	16-1 through 16-6	PCM and TDM: Lab Manual, Experiment 20
8	Antennas **UNIT EXAM 2**	14-1, 14-2, 14-5 through 14-8	Microwave Communications: LRL Model 550B-SS Experiment Manual
9	Fiber Optics	18-1 through 18-7 and 18-11	Fiber Optic Link: RSR Projects 08SPK1 and OK-120
10	Waveguides and Radar	15-1 through 15-5 and 15-9	A Fiber Optic System: RSR Project OK-726
11	Review and **FINAL EXAMINATION**	The final examination and laboratory final will be based on the content covered in Chapters 8-16 and 18.	

Evaluation Criteria and Grade Weights

- Quizzes and Participation 10%
- Homework 15%
- Unit Exams 20%
- Lab Production 25%
- Theory Final Exam 15%
- Lab Final 15%

Final grades will be calculated from the percentages earned in class as follows:

A	90 - 100%	4.0
B+	85 - 89%	3.5
B	80 - 84%	3.0
C+	75 - 79%	2.5
C	70 - 74%	2.0
D+	65 - 69%	1.5
D	60 - 64%	1.0
F	<60%	0.0

Student Note

Some of the projects require the use of radio frequency. Whenever signals of frequencies of 1 MHz or above are used in a project, in addition to the general rules, special measures should be considered in order to successfully implement the project:

- Identify the components that are sensitive to the high-frequency effects and pay special attention to the layout, connectors, leads and soldering of these components.
- Run short wires to interconnect the components.
- Lay out the circuitry in a linear manner, from the input towards the output, avoiding the crossover or overlapping of wires, leads, connectors etc.
- The leads of the high-frequency components should be as short as possible in order to avoid parasitic inductors.
- When soldering the terminals, use the minimum amount of solder in order to avoid parasitic capacitors.
- Provide filter capacitors, especially ceramic capacitors (or of other type with low impedance for high frequency) between the DC power line and the ground on the protoboard close to the high-frequency components.
- Place a conductor ground plane parallel and close to the board with the high-frequency circuit.
- Apply other special measures as indicated by your instructor.

NOTE: The following changes should be implemented because of an error mistake in the lab manual:

> When completing Step 14 of Lab #21, make sure the students leave the connection from pin 15 of the receive codec connected to ground as it was in the previous circuit (Fig 21-2). Granted, nothing in the procedure says to disconnect it, but Step 14 tells the student to build the circuit of Figure 21-3 (which does not show a connection to pin 15 of the

receive codec) so the students will most likely assume the connection isn't supposed to be there. With no connection to pin 15, the scope display of the TP6 monitor will flat line.

