ITT Technical Institute

ET456T

Digital Communication Systems II

Onsite Course

SYLLABUS

Credit hours: 4

Contact/Instructional hours: 60 (36 Theory Hours, 24 Lab Hours)

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

Prerequisites: ET455T Digital Communication Systems I

Course Description:

A continuation of Digital Communication Systems I, emphasizing more advanced concepts such as multiple access, spread spectrum and synchronization methods.

STUDENT SYLLABUS

Instructor:	0000000000000
Office hours:	
Class hours:	

Course Overview

The course covers the various techniques of microwave radio, signal synchronization, and spread spectrums in digital communication systems. The course also covers methods of providing multiple access. In addition, the course explains the subsystems of a satellite earth station transmitter and receiver and defines parameter values for a satellite communications system design. Finally, the course covers the system performance measurements for evaluating satellite communication systems.

Major Instructional Areas

- Microwave Radio System Operation
- Satellite Communication Design Calculations
- Multiple Access Techniques
- Synchronization Techniques for Digital Communication
- Spread Spectrum Techniques

Course Objectives

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

- 1. Describe microwave radio frequency and different system configurations and its characterizations.
- 2. Describe the various subsystems of a satellite earth station transmitter and receiver.
- 3. Define and compute various parameter values for a satellite communications system design. [antenna gain, up-link losses, power at the input of the LNA (low noise amplifier) on board the satellite, carrier-to-noise ratio, figure of merit, receiver noise figure]
- 4. Describe methods of providing multiple access. [FDMA, TDMA, CDMA, SDMA, and Global Positioning Systems]
- 5. Explain techniques of signal synchronization in a digital communication system.
- 6. Classify various spread spectrum techniques and describe performance
- 7. Perform laboratory exercises using system simulation software [VisSim/Comm (Commsim)] as well as

bench-top test equipment such as signal generators, digital storage scopes, and spectrum analyzers.

Teaching Strategies

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. Delivery makes use of various media and delivery tools in the classrooms.

Student Textbook and Materials

Text: Tomasi, Wayne. <u>Advanced Electronic Communications Systems</u>. 6th ed., Englewood Cliffs, N.J.: Prentice-Hall, 2004. (used in previous course: ET455)

Text: Digital Communication Systems, Custom 1st ed., Boston: MA, Pearson Custom, 2005.

Lab Manual: Tavaholi, Mohamad. <u>Revised Digital Communication II Laboratory Manual</u>, Custom 2nd ed., Boston: MA, Pearson Custom, 2010.

Course Outline

Unit	Topic (Lecture Period)	Chapters	Lab and Other Coverage		
1	Microwave Radio Communications I	Tomasi, 13	Lab Exercise 1 Homework Exercises		
2	Microwave Radio Communications II	Tomasi, 13	Lab Exercise 2 Homework Exercises		
3	Microwave Radio System Gain Exam 1 (Units 1-3)	Tomasi, 13	Lab Exercise 3 Homework Exercises		
4	Satellite Communications I	Tomasi, 14	Lab Exercises 4, 5 Homework Exercises		
5	Satellite Communications II	Tomasi, 14	Lab Exercise 6 Homework Exercises		
6	Multiple Access Techniques Exam 2 (Units 4-6)	Tomasi, 15	Lab Exercises 7, 8, 9 Homework Exercises		
7	Synchronization Techniques I	DCS, 1	Lab Exercises 10, 11 Homework Exercises		
8	Synchronization Techniques II Exam 3 (Units 7-8)	DCS, 2	Lab Exercise 12 Homework Exercises		
9	Spread Spectrum Techniques I	DCS, 3	Lab Exercises 13, 14, 15, 16 Homework Exercises		
10	Spread Spectrum Techniques II	DCS, 4	Lab Exercises 17, 18 Homework Exercises		
11	Review and Final Examination	The final examination will be based on the content covered in Units 1 - 10.			
NOTE: DCS = Digital Communication Systems text.					

Evaluation Criteria and Grade Weights

- Homework 25%
- Unit Exams (3) 30%
- Lab exercises 30%
- Final exam 15%

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

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