

SAN JOSE STATE UNIVERSITY
Department of Aviation & Technology

Tech 163
Fall 2013
Lecture: T 6:00 – 8:45 pm
E-mail: tom.brown@sjsu.edu

Tom Brown, Jr.
Office: IS 101
Phone: (408) 924-3211
Office Hrs:
T: 4:50 PM– 5:50 PM

TELECOMMUNICATIONS SYSTEMS

Course Description

Communications systems. Types of modulation. Transmitters and receivers. Digital communications. Data transmission. Digital modulation and modems. Multiplexing and multiple-access techniques. Wireless communication. Microwave devices. Satellite communications. Fiber-optic systems.

Prerequisite: Tech 62, Tech 63.

Student Learning Outcomes

Upon successful completion of this course, you will be able to:

- a. Describe telecommunications theory and application.
- b. Explain the difference between analog communication and digital communication.
- c. Identify the devices needed for wire communication, wireless communication, satellite communication, and fiber-optic communication.
- d. Describe how multiplexing allows many signals to be sent through a single channel.

Textbook

Blake, R. (2002). Electronic Communications Systems, 2nd Ed. Albany, NY: Delmar/Thomson Learning.

References

Floyd, T. (2012). Electronic Devices. 9th Ed. Upper Saddle River, NJ: Prentice Hall.

Young, P. (2004). Electronic communication techniques. 5th Ed. Upper Saddle River, NJ: Prentice Hall.

Evaluation

The final grade for the course will be based on the following items:

Homework		10%	100 pts
Midterm #1	Sept 24	10%	100
Midterm #2	Oct 27	10%	100
Quiz #1	Sept 10	05%	050
Quiz #2	Oct 08	05%	050
Quiz #3	Nov 12	05%	050
Project Rev	Nov 26	30%	300
Final Exam	Tue, Dec 17(5:15 -7:30 pm)	25%	250

The final grade will be determined according to the following scale:

A+	97 - 100	B+	85 – 88	C+	73 – 76	D+	61 - 64
A	93 – 96	B	81 – 84	C	69 - 72	D	57 - 60
A-	89 – 92	B-	77 – 80	C-	65 - 68	F	00- 56

Project

We will spend the entire semester studying Electronic Communication Systems. So it is only fair to request each student to design and build a system to show his/her understanding of a communication system of choice. Obviously, your system must include some of the technologies that will be discussed. Such items as a class A, B, AB and C amplifiers as well as Time Division Multiplexing and Frequency Division Multiplexing are to be included? You can also be the designer of an amplitude modulated system or a frequency modulated system. These modulation systems are among the most popular ones to use, but there are others. Please integrate your system with software if the opportunity is there to do so. Submit your topic of interest to me no later than September 24, 2013.

A complete write-up of your project is required. You must explain in detail how your system works. The project write-up and a demonstration of your project performance will be due November 26, 2013.

Suggested Projects

1. Design and build a class A, B, AB or C amplifier to achieve nearly maximum efficiency.
2. Use discrete components to design an AM system with the ability to select either the upper sideband or lower side band.
3. Design a FM system using discrete components to show how FM modulation is achieved.
4. Use discrete components to design a FM system with the ability to establish only two sidebands and to select.
5. Propose a project to demonstrate how time division multiplexing works.
6. Propose a project to demonstrate how frequency division multiplexing works.
7. Design an analog to digital converter system.
8. Design and build a three pole filter of your choice to an agreed upon cut-off frequencies.
9. Design an 8 bit digital to analog converter system.
10. Design and build an AGC circuit.

University, College, or Department Policy Information

a) Academic integrity statement (from the Office of Student Conduct and Ethical Development):

“Your own commitment to learning, as evidenced by your enrollment at San Jose State University, and the university’s Academic Integrity Policy requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The policy on academic integrity can be found at http://sa.sjsu.edu/student_conduct .

b) Campus policy in compliance with the Americans with Disabilities Act:

“If you need course adaptations or accommodations because of a disability, or if you need special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with DRC to establish a record of their disability.”

Week Of	Lecture Topics	Problems
8/27	1.1 Introduction 1.2 Elements of a communication System 1.3 Time and Frequency Domains 1.4 Noise and Communications	21 23,27 31,35
9/03	1.5 Spectrum Analysis 2.1 Introduction-radio frequency circuits 2.2 High –Frequency Effects 2.3 Radio-Frequency Amplifiers	37 27,29,31,33,35
9/10	2.4 Radio-Frequency Oscillators 2.5 Mixers 3.1 Introduction-Amplitude Modulation 3.5 Suppressed-Carrier AM	 25,27,31,33,35,37,39,41
9/17	4.2 Frequency Modulation 4.3 Phase Modulation	21,23,25,27,29,31 33,35,36,37
9/24	Midterm #1	
10/01	4.5 FM and Noise 4.7 FM Measurements	
10/08	5.1 Introduction-Transmitters 5.2 Transmitter Requirements 5.3 Transmitter Topologies 5.4 Full-Carrier AM Transmitters	29,33,35,39,41 43,45,53,55,57,59
10/15	5.5 Single-Sideband AM Transmitters 5.6 FM Transmitters 5.7 Transmitter Power Measurements	
10/22	6.1 Introduction-Receivers 6.2 Receiver Topologies 6.3 Receiver Characteristics 6.4 Demodulator s	29,31,33,35,37,39,41,43
10/27	Midterm #2	
11/05	6.5 Receiver Variations 6.6 Communications Receivers 6.7 Transceivers 6.8 Receiver Measurements	
11/12	7.1 Introduction-Digital Communication 7.2 Pulse Modulation 7.3 Pulse-Code Modulation	17,19,21,23,25,27,29
11/19	7.4 Delta Modulation 7.6 Time-Division Multiplexing 13.1Introduction-Multiplexing/Multiple-Access	
11/26	13.2 Frequency-Division (FDM/TDMA) 13.4 Spread- Spectrum Systems 24.1 Introduction-Fiber Optics 24.2 Optical Fiber	13,15,17,19
12/03	24.3 Fiber-Optic Cables 24.6 Optical Emitters/Detectors 25.1 Introduction- Fiber-Optic Systems 25.2 Basic Fiber-Optic Systems 25.3 Repeaters and Optical Amplifiers	25,27,28,29,31,33,35,37,39
12/17/2013, Tuesday	Final, Rm. IS 117 Time: 5:15PM-7:30PM	