

EETBD 330 -- COMMUNICATION SYSTEMS - SPRING 2004

- COURSE DESCRIPTION:** Analog communications systems; principles of AM and FM transmitters and receivers, including sideband systems. Transmission lines, antenna theory, and noise calculations.
- PRE-REQUISITES:** EETBD 415 (or concurrent), MTHBD 211 (or concurrent)
- TEXT:** Electronic Communication Systems: Fundamentals through Advanced, 5th edition - by Tomasi
- CONTENT:** Chapters 1-8
- INSTRUCTOR:** Mr. David Loker -- 898-6478, B-180, DRL3@psu.edu
- OFFICE HOURS:** Thur. 12:00 - 1:50, or by appt.
- LECTURE:** Wed. and Fri. -- 9:00 - 9:50 -- N169
- LABORATORY:** Mon. -- 9:00-10:50 -- P105
- GRADING:**
- | | |
|------------------------------|-------|
| Exams (2 @ 20%) | - 40% |
| Research Proj. or Final Exam | - 20% |
| Laboratory | - 30% |
| Homework | - 10% |
-
- | | | | | | |
|----|---------|----|---------|---|--------------|
| A | 93-100 | B | 83-86.9 | C | 70-76.9 |
| A- | 90-92.9 | B- | 80-82.9 | D | 60-69.9 |
| B+ | 87-89.9 | C+ | 77-79.9 | F | less than 60 |
- PROFESSIONALISM:** Students are expected to act professionally at all times. Honesty and integrity are most important. Attendance and participation in all classes and labs are very important.
- HOMEWORK:** Homework will be collected at the beginning of the class period on the due date. When handing in your assignment, place name, date, course number, and title of assignment in the upper right corner of the paper. Use only 8.5" x 11" engineering paper or notebook paper, but not paper torn from a spiral-bound notebook. Also, write on one side of the paper only. Illegible papers will not be collected or graded.
- LAB REPORTS:** Lab reports will be due the week following the completion of the experiment indicated on the tentative lab schedule. **Unless otherwise mentioned, the format for the lab report will follow the procedure indicated at the end of the syllabus.**
- RESEARCH PROJ. or FINAL EXAM:** A student may choose to take a final exam or to complete an individual research project in place of taking the final exam. The project will be to demonstrate and document a working prototype of the design of a communication system. Details about the project will be given during the semester.
- POLICIES:**
- Acts of academic dishonesty will not be tolerated.** It is unacceptable to copy homework, lab work, lab reports, or exams. It is also unacceptable to allow anyone else to copy your work. The affected assignment will be given a failing grade.
 - No make-up exams will be given.**
 - Homework assignments are to be turned in at the beginning of the class period on the due date. **No late homework assignments will be accepted or graded.**
 - Lab reports are due at the beginning of the lab period on the due date. **The overall grade for late lab reports will be reduced by 10% for each day late.** Each lab experiment is to be demonstrated to the instructor before the next lab experiment is scheduled to begin.

General comments about the course:

- **My** primary responsibilities are:
 - To make certain that you understand the material through lecturing and problem solving. *I **can't** make certain that you understand the material without getting adequate feedback from you.*
 - To provide feedback to you through graded homework, quizzes, and exams.
- **Your** primary responsibilities are:
 - To learn (or master) the material. *This is accomplished by **completing and understanding** all assigned work and by **asking** questions during class. Stop me if you don't understand the material.*
 - To provide feedback to the instructor during the lectures on whether you understand the material.
- Many of the labs focus on building real-world systems and will require outside class time to successfully complete. This is done in order to better prepare you to enter the job market and be successful at obtaining the right job. **This course provides the foundation for a successful career in the communications field.** *Plan to spend on average **approximately 6-8 hours of productive outside class time per week** to successfully complete all the course work.*
- Focus on **working hard and on learning the material** rather than on obtaining the proper grade. If you have learned the material, the proper grade will follow.
- **I will do everything I can to help you be successful in this course!**

After completing this course, a student should be able to:

1. Design an IC oscillator.
2. Understand the frequency-domain representation of signals.
3. Design series and parallel LC circuits.
4. Understand RF AM transmission and reception systems.
5. Understand RF FM transmission and reception systems.
6. Understand IR telemetry systems.
7. Understand IR remote control systems.
8. Understand On-off key modulation.

EETBD 330 - COMMUNICATIONS SYSTEMS
Tentative Course Outline

| WEEK | DATE | PAGES | TOPICS |
|-------------|--------------|-------------------------------|--|
| 1 | 1/14 1/16 | 12-19 82-87 | Introduction, Oscillators |
| 2 | 1/21 1/23 | 82-87 Handout | Oscillators |
| 3 | 1/28 1/30 | 39-56 | Frequency-domain representation of signals |
| 4 | 2/04 2/06 | Handout | LC circuits |
| 5 | 2/11 2/13 | 119-136 Handout | RF/IR AM transmission |
| 6 | 2/18 2/20 | 161-181 Handout | RF/IR AM reception EXAM 1 |
| 7 | 2/25 2/27 | Handout | Analog signal encoding/decoding |
| 8 | 3/03 3/05 | Handout | Digital signal encoding/decoding |
| 9 | *** | *** | SPRING VACATION ON 3/08 TO 3/12 |
| 10 | 3/17 3/19 | Handout | A/D and D/A converters |
| 11 | 3/24 3/26 | 213-222 229-242 | RF SSB transmission and reception |
| 12 | 3/31 4/02 | 253-277 279-282 290-293 | RF FM transmission |
| 13 | 4/07 4/09 | 307-322 328-335 88-102 | RF FM reception EXAM 2 |
| 14 | 4/14 4/16 | Handout | RF On-off key (OOK) modulation |
| 15 | 4/21 4/23 | Handout | RF OOK devices |
| 16 | 4/28 4/30 | *** | REVIEW |
| 17 | 5/06 | *** | FINAL EXAM – COMPREHENSIVE (8:00 – 9:50) Or Completion of Research Project by 5:00 pm |

EETBD 330 -- COMMUNICATIONS SYSTEMS
Tentative Lab Schedule

| WEEK | DATE | LAB EXPERIMENT |
|-------------|---------------|---|
| 1 | 1/12 | Lab 1: Research on telemetry systems |
| 2-3 | 1/19- 1/26 | Lab 2: Voltage-controlled oscillator |
| 4-5 | 2/02- 2/09 | Lab 3: 555 timer |
| 6 | 2/16 | Lab 4: IR transmitter and receiver |
| 7-8 | 2/23- 3/01 | Lab 5: Sensor voltage transmission and reception in telemetry systems |
| 9 | *** | SPRING VACATION ON 3/08 TO 3/12 |
| 10 | 3/15 | Lab 6: Encoding and decoding in remote control systems |
| 11-12 | 3/22- 3/29 | Lab 7: A/D and D/A converters |
| 13-14 | 4/05- 4/12 | Lab 8: DC motor remote control |
| 15-16 | 4/19- 4/26 | Lab 9: RF remote control |

LAB REPORTS

General Comments:

- Each lab group will consist of at most 2 students.
- 1 lab report will be submitted per group.
- Each lab report will be typed using a word processor.
- The lab report should be formal with no reference to the first person.
- The lab report will be weighted by a factor equal to the number of weeks to complete the lab experiment covered within the lab report.

Report Format:

- Pages 1-2: Course number, lab number and title, names of students reporting, date, a brief summary of the **Purpose** of the lab experiment, a detailed summary of the **Theory and Design** information pertinent to the lab experiment, a brief summary of the **Testing Procedure**, and a detailed summary of the **Results**.
- Attachments: Theoretical formulas and calculations, simulation results, circuit diagrams, etc.

Grading Criteria:

| Items for consideration | Grade % |
|--|---------|
| Lab experiment completed with technically accurate results | 65 |
| Content of lab report | 30 |
| Spelling, grammar, writing style | 5 |