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ETEC 250.01: Solid State Electronics I

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ETEC 250 Solid State Electronics I

Credits: 4

Prerequisite: ETEC 105 DC Circuit Analysis

Term: Spring 2015

Meetings

Lectures: MWF 2:10PM to 3:00PM in HB 05
Labs: Tuesday 2:40PM to 4:30PM in HB 05

Final Exam

Monday, May 11, 2015 from 3:20PM to 5:20PM

Faculty Contact

Steve Shen, Instructor – steve.shen@umontana.edu

Phone: 406-243-7914

Office Hours: Monday 12:00PM to 2:00PM, Tuesday 1:00PM to 2:30PM,
Wednesday 1:00PM to 2:00PM, Friday 1:00PM to 2:00PM

Office: Griz House 8

Course Description

ETEC 250 Solid State Electronics I 4 cr. Offered Spring. Prereq. ETEC 105. An introduction to semiconductor technologies used in solid state electronics with an emphasis on diodes and transistors. Classroom concepts are reinforced through lab-based experiments.

Course Overview

This course introduces the fundamentals of electronic devices and discrete circuits with applications and troubleshooting coverage. Special applications of electronics to renewable energy are also included in the first half of the course.

Please note the course requires the purchase and downloading to your personal pc of the Multisim Software to perform the assigned lab experiments from the lab manual accompanying the Floyd text. This software is a onetime purchase and will be used with the other electronics courses as well. Instructions for this purchase requirement will be provided and assistance with starting it up on your pc will be available as well.

Course Objectives

Upon completion of this course students will:

- Describe semiconductors and how current is produced in a semiconductor
- Describe n-type and p-type semiconductors and a pn junction
- Explain and analyze diode circuits with applications
- Describe the characteristics of special-purpose diodes and analyze their operation with applications
- Describe the characteristics of bipolar junction transistors and analyze their operation with applications
- Discuss and determine the dc operating point of a linear amplifier
- Analyze transistor bias circuits
- Describe amplifier operation
- Describe and analyze the operation of different types of amplifiers
- Explain and analyze the operation of power amplifiers (classes A, B, AB, and C)
- Describe the characteristics of JFET and analyze its operation and applications
- Explain the operation of MOSFETs and analyze MOSFET circuits
- Explain and analyze the operation of FET amplifiers

- Describe and analyze MOSFET switching circuits

Required Materials

Electronic Devices, conventional current version, Ninth edition, Thomas Floyd, Prentice Hall 2012.

Laboratory Exercises for Electronic Devices, Ninth Edition, by Dave Buchla and Steve Wetterling.

Scientific Calculator (recommend TI 84-Titanium, TI 86, or TI 89)

Multisim circuit simulation software: Here is a link for its purchase and download.

<http://www.ni.com/multisim/try/>

Evaluation Procedures

Grades will be assessed as follows

Assessment Area:

Attendance	5%
Homework Assignments	20%
Midterm Exam	20%
Final Exam	30%
Lab Exercises	25%

Grading Scale:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
Below 60%	F

General Requirements for the Course

1. All the assigned lab experiments and projects are to be done **with physical components**, unless otherwise indicated by the instructor.
2. All the lab experiments and projects are to be completed individually. Team discussions are highly recommended.
3. Multisim simulations are required for some of the lab experiments.
4. Please **demonstrate every lab experiment and project** to the instructor as soon as you complete them.
5. Turn in the lab report on or before the due date.
6. Late work may be accepted at most one week after the due date and can receive a maximum of **80%** of the full credit.
7. No work will be accepted **one week after the due date**, or after the solutions have been gone through.
8. No work will be accepted after the final week of the semester, Friday May 9, 2014.

Academic Integrity:

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at:

http://life.umt.edu/vpsa/student_conduct.php

Using the Web to research materials and concepts is an integral part of learning in the twenty-first century. Studying with other students is a productive method of

learning. A certain amount of collaborating on concepts with other students and using resources found on the Internet in an assignment is recommended. Copy and paste is not acceptable. It is expected that each student will input his/her assignment into the computer, and each student must be able to explain any assignment turned in. Collaboration on exams is strictly forbidden.

Dropping and Adding Courses or Changing Sections, Grading or Credit Status

University Policy for dropping courses or requesting grading/credit status changes can be found in the catalog:

<http://www.umt.edu/withdrawal/Withdrawal%20Policies.aspx>

Students should become familiar with all academic policies.

For Complete Academic Policies Please View the Um Catalog at:

<http://www.umt.edu/catalog/academics/academic-policy-procedure.php>

Disability Accommodations:

Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please contact me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator. For more information, visit the Disability Services website at <http://www.umt.edu/dss> . Or call 406.243.2243 (voice/text).

Changes to Syllabi:

NOTE: Instructor reserve the right to modify syllabi and assignments as needed based on faculty, student, and/or environmental circumstances. If changes are made to the syllabus, amended copies will be dated and made available to the class.

Cell Phone and other Electronic Communication Devices Policy:

All electronic communication devices must be tuned off and stowed away prior to the start of class.

Attendance Policy:

Regular classroom attendance is expected.

Exam, Project, and Assignment Policy:

All exams are to be taken on the assigned date and time. Projects and assignments are due at the start of class on the assigned date and time. Late assignments will be accepted at the instructor's discretion. Rescheduling of an exam will be approved at the discretion of the instructor and only in extraordinary situations.

Learning Management System:

It is the responsibility of the student to access and familiarize herself/himself with the Learning Management System (LMS) for the course (Moodle). Access & training is available through UOnline <http://umonline.umt.edu>

Topic Outline for ETEC 250 Solid State Electronics I

1. Introduction to Electronics
2. Diodes and Applications
3. Special-Purpose Diodes
4. Bipolar Junction Transistors
5. Transistor Bias Circuits
6. BJT Amplifiers
7. Power Amplifiers
8. Field Effect Transistors (FETs)
9. FET Amplifiers and Switching Circuits