ECE 345 Syllabus
Spring 2014

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Office Hours: Monday, Wednesday, and Friday from 3:30 to 5:30 and by appointment.

Lecture: M, W, F – 11:00 to 11:50, ENGR. A-220
Labs: Section 001 Thursday – 8:00 to 9:50 ENGR. E-237
        Section 002 Thursday – 11:00 to 12:50 ENGR. E-237

Evaluation:
Test 1, Chaps. 1 – 3, (Friday, Feb. 7) 20%
Test 2, Chaps. 4 – 5, (Friday, Mar. 7) 20%
Test 3, Chaps. 6 – 7, (Friday, Apr. 11) 20%
Final Exam, Chaps. 1 – 8, (Tuesday, May 6, 12:50 - 2:50 PM) 20%
Homework 10%
Lab 10%


Course Topics:
Chapters 1 – 3: Introduction to microelectronics, Basic physics of semiconductors, Diode Models and circuits (Test 1).
Chapters 4 and 5: Physics of bipolar junction transistors and Bipolar amplifiers (Test 2).
Chapters 6 and 7: Physics of MOSFETs and MOSFET amplifiers (Test 3)
Chapter 8: Operational amplifiers, op-amp circuits, and non-ideal characteristics of the op-amp (Final Exam).

Classroom Policies:
1.) Students are responsible for all announcements made in class.
2.) If a test (other than the final exam) is missed for a legitimate reason a grade may be given based on the remaining work.
3.) Late homework is not accepted.
4.) Students are expected to conduct themselves in a professional and ethical manner. Failure to do so could count against the final grade.
5.) Attendance will be taken at random throughout the semester; excessive absences could count against the final grade.
1. **Course number and name:** ECE 345 Electronics
2. **Credits and contact hours:** 4 credits, Three 50-minute sessions per week, Ten 110-minute laboratory experiments
3. **Course Committee:** S. Ahmed, M. Sayeh, H. Wang
4. **Text book:**
5. **Reference and supplemental materials:**
6. **Specific course information**
   b. prerequisites or co-requisites: PHYS 205b, ECE 235
   c. Required for EE and CpE majors
   d. Professional Component {Credit Hours}
      0 | 0 | 0 | 3 | 1

A. **By the time of Exam #1 (after about 15 lectures), the students should be able to do the following:**
   1. Solve circuit problems with ideal diodes. (a, e, k)
   2. Apply the constant voltage drop model and the piece-wise linear diode model to diode problems. (a, e, k)
   3. Apply the small signal diode model to calculate the changes in the diode voltage for changes in the diode current. (a, e, k)
   4. Calculate the carrier concentration in p and n type materials. Calculate the resistivity of doped semiconductors. Calculate the built-in voltage, reverse saturation current, and the junction capacitance of p-n junctions. (a, e, k)
   5. Use diodes to design half wave, full wave and bridge rectifiers. (a, e, k)
   6. In the laboratory obtain diode characteristics and measure and verify currents and voltages in diode circuits. (a, b, e, j, k)

B. **By the time of Exam #2 (after about 26 lectures), the students should be able to do the following:**
   1. Identify the different modes of operation of BJT. (a, e, k)
   2. Identify the differences between large-signal and small-signal models of a BJT and the limits of these models. (a, e, k)
   3. Calculate the gain and input/output resistance of a BJT circuit by replacing the BJT with a proper small signal model. (a, e, k)
   4. Identify the configuration of single BJT circuit (i.e., common emitter, common collector or common base) and the advantages and disadvantages of the configuration with respect to gain and input/output resistance. (a, e, k)
   5. Design, build, and verify BJT biasing circuits. (a, b, e, j, k)
   6. Measure and verify the characteristics of BJT amplifiers. (a, b, e, j, k)
C. By the time of Exam #3 (after about 37 lectures), the students should be able to do the following:
   1. Identify the different modes of operation of MOSFET. (a, e, k)
   2. Identify the differences between large-signal and small-signal models of a MOS and the limits of these models. (a, e, k)
   3. Calculate the gain and input/output resistance of a MOS circuit by replacing the MOS with a proper small signal model. (a, e, k)
   4. Identify the configuration of single MOS circuit (i.e., common source, common drain or common gate) and the advantages and disadvantages of the configuration with respect to gain and input/output resistance. (a, e, k)
   5. Design basic building blocks such as current mirror circuits and inverters. (a, e, k)
   6. Design, build, and verify MOS FET biasing circuits. (a, b, e, j, k)
   7. Measure and verify the characteristics of MOS amplifiers. (b, j, k)

D. By the time of Final Exam (after about 41 lectures), the students should be able to do the following:
   1. Solve circuit problems with ideal operational amplifiers. (a, e, k)
   2. Understand the effect of non-ideal characteristics of operational amplifiers on circuit performance. (a, e, k)
   3. Calculate the voltage and frequency limits set by slew rate and bandwidth. (3, 6, 11)
   4. Design inverting, non-inverting, Miller integrators. (a, e, k)
   5. Measure the offset voltage and current of operational amplifiers. (b, k)

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<tr>
<th>Outcome</th>
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<td>Assessed</td>
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(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
Syllabus Attachment
Spring 2014

“...student achievement and success because achievement and success are essential if we are to shape future leaders and transform lives.”

IMPORTANT DATES
Semester Exam Dates: .................................................. 01/13/2014
Last day to add a class (without instructor permission): ........... 01/24/2014
Last day to withdraw completely and receive a 100% refund ......... 02/26/2014
Last day to drop a course using SakiNet: ........................................ 03/23/2014
Last day to file diploma application for same to appear in Commencement programs: ........................................ 03/28/2014
Final Examinations: .................................................. 5/5 – 5/9/2014

*Note: For outreach, online, and short course drop/add, please visit Registrar’s Academic website at registrar.siu.edu

SPRING SEMESTER HOLIDAYS
Martin Luther King, Jr.’s Birthday 01/20/2014
Spring Vacation 03/06 – 03/10/2014

WITHDRAWAL POLICY – Undergraduate only
Students who officially register for a session may not withdraw merely by the stopping of attendance. An official withdrawal form needs to be initiated by the student and processed by the University. For the proper procedures to follow when dropping courses and when withdrawing from the University, please visit http://registrars.siu.edu/pdf/ugradcatalog1114.pdf

INCOMPLETE POLICY – Undergraduate only
An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. An INC must be changed to a completed grade within one semester following the term in which the course was taken, or graduation, whichever occurs first. Should the student fail to complete the course within the time period designated, that is, by no later than the end of the semester following the term in which the course was taken, or graduation, whichever occurs first, the incomplete will be converted to a grade of F and the grade will be computed in the student’s grade point average. For more information please visit: http://registrars.siu.edu/grad/INC incomplete.html

REPEAT POLICY
An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit no more than two times (two total enrollments) unless otherwise noted in the course description. For students receiving a letter grade of A,B,C,D, or F, the course repetition must occur at Southern Illinois University Carbondale. Only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned. See full policy at http://registrars.siu.edu/pdf/ugradcatalog1114.pdf

GRADUATE POLICIES
Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please visit http://gradschool.siu.edu/about-us/grad-catalog/index.html

DISABILITY POLICY
Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must come to the DSS to open cases. The process involves interviews, reviews of student-supplied documentation, and completion of Disability Accommodation Agreements. http://disabilityservices.siu.edu

STUDENT CONDUCT CODE
http://policies.siu.edu/other_policies/code/Chapter3Conduct.html

SAUKI CARES
The purpose of SAUKI Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For information on SAUKI Cares: (618) 453-5714, or insanet@siu.edu, http://sauki.areas.siu.edu/index.html

EMERGENCY PROCEDURES
Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. We ask that you become familiar with the SIU Emergency Response Plan and Building Emergency Response Team (BERT) programs. Emergency response information is available on posters in buildings on campus, available on BERT’s website at www.bert.siu.edu, Department of Safety’s website at www.dps.siu.edu (disaster drop down) and the Emergency Response Guidelines pamphlet. Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during evacuation or sheltering emergency.

INCLUSIVE EXCELLENCE
SIU contains people from all walks of life, from many different cultures and subcultures, and representing all strata of society, nationalities, ethnicities, lifestyles, and affiliations. Learning from and working with people who differ is an important part of education as well as an essential preparation for any career. For more information please visit: http://www.siuc.university/Science.siu.edu/

MORRIS LIBRARY HOURS
http://www.lib.siu.edu/about

LEARNING AND SUPPORT SERVICES
Help is within reach. Learning support services offers free tutoring on campus and math labs. To find more information please visit the Center for Learning and Support Services website: Tutoring: http://tutoring.siu.edu/ Math Labs: http://tutoring.siu.edu/math tutoring/index.html

WRITING CENTER
The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit http://write.siu.edu

AFFIRMATIVE ACTION & EQUAL OPPORTUNITY
Our office’s main focus is to ensure that the university complies with federal and state equity policies and handles reporting and investigating of discrimination cases. For more information visit: http://diversity.siu.edu/

Additional Resources Available:

SAUKINET: http://sauki-net.siu.edu/co/home/displaylogin
ADVISMENT: http://advisment.siu.edu/
PROVOST & VICE CHANCELLOR: http://provost.siu.edu/
SIU ONLINE: http://onlines.siu.edu/

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