University of Arizona
Department of Electrical and Computer Engineering
ECE 351A Electronic Circuits I Spring 2007

Course Information:

Course Instructor:	Dr. Dongsheng Ma Office: 320E, ECE Building Office Phone: (520)621-8733, Secretary: (520)621-2718 Email: ma@ece.arizona.edu
Lecture Time:	MWF 1:00 pm-1:50 pm
Location:	Harvill 204
Office Hours:	MW 2:00 pm-3:30 pm@ECE 320E, or by appointment
Textbook:	***Microelectronic Circuits, (Fifth Edition)***, by Adel S. Sedra & Kenneth C. Smith, Oxford University Press, 2003, ISBN: 0195142519.
Reference:	***Schematic Capture with Cadence PSpice (2nd Edition)***, by Marc E. Herniter, Prentice Hall, 2002, ISBN: 0130484008. This text includes a disk with Orcad Lite version 9.2 of PSpice software.
Prerequisites:	ECE 220; Concurrent registration, ECE 301, ECE 320.
PSpice:	Extensive use is made of PSpice in this course as well as other circuit courses. The faster you can get up to speed on the use of the tool, the better. PC's with PSpice are located in I^2TL (ECE 226). An educational version of PSpice for PC is free and can be obtained from: http://www.cadencepcb.com/products/downloads/PSpiceudent/defaults.asp.

Course Objectives:

ECE 351A introduces the fundamental concepts of semiconductor devices and circuits. It also provides the foundation for the Integrated Circuits (IC) and Very Large Scale Integration (VLSI) design courses that follow in the sequence. In this course, you will learn the basic theory behind non-linear circuit elements, such as diodes, bipolar junction transistors (BJTs) and field effect transistors (FETs). The class will cover how the devices operate, how they are built, and how they are modeled. Ultimately, these concepts will then be used to design basic analog and digital circuits from diode rectifier, regulators and amplifiers to digital logic gates. Intuitive understanding and practical applications will be emphasized throughout the course.

Evaluation:

Grading:	Homework	20%
	Two best midterm exams	40% (20% each)
	Final exam (comprehensive)	35%
	Professionalism	5%

Homework: Homework will be assigned for grading and as study practice. Most of you will recognize the value of the homework as a guide for reinforcing class and text topics. Cheating and copying are not allowed. Penalty will be given if found. Late homework will be accepted with a 20% per day late penalty until the graded assignment is returned in class.

Exams: There will be **three** in-class midterm exams and **one** comprehensive final exam in the whole semester. All exams will be closed book and notes, with the exception of a one-page letter-size formula sheet (**only formulas!**) that will be allowed. Calculators cannot be used in the programmable mode on the tests or the final exam. Here is the **tentative** schedule of the exams:

Midterm exam 1:	In-class, Friday, Feb. 16, 2007
Midterm exam 2:	In-class, Friday, March 23, 2007
Midterm exam 3:	In-class, Friday, April 20, 2007
Final exam:	11:00am-1:00pm, Monday, May 7, 2007

Dropping of lowest grade:
Your lowest scoring of the three in-class exams will be dropped, and will not affect your grade.

Bonus Questions:
Bonus questions will be given in final exam and one midterm exam (which midterm has the bonus question will not be announced in advance,) to encourage your study and think deeply. Two more opportunities to prove your excellence in this course!

Make-ups:
Make-up exams will **not** be available for midterm exams. In the event you miss one exam due to a documented occurrence of serious illness, emergency or military duty, your grade will be assigned as the average of your grades for all the other midterms once official letter or certificate is shown. If there is not such a reason, you will be assigned a zero and this midterm will become the one dropped from your score. Difficulty in booking holiday plane reservations is not an acceptable reason for missing an exam, so book your travel early!

Professionalism: The professionalism portion of your grade will basically depend on your adherence to the course policies outlined in this document. No smoking and phone call are allowed in each class. Attendance is important, since each student is responsible for all assignments, announcements and materials covered in each class. You punctual arrival will be appreciated.

Final Grade: Grades are established as follows. Students with the following scores will be certain of obtaining at least the grades indicated below. However, the instructor may adjust the boundaries so that higher grades result.

100 – 90	A
90 – 75	B
75 – 60	C
60 – 45	D

45 – 0 E

Your lowest Midterm Examination score will be dropped. There is no curve and there are no quotas on any letter grade! From the above, you may determine that (i) the final exam can raise or lower your score roughly two letter grades, (ii) likewise, midterm exams count for about two letter grades, and (iii) homework counts for about one letter grade.

After each exam, we will post the solution online for your reference and announce it in the class. Based on the solution, you have one week to check your grade with the grader. After one week, grade checking will **not** be available.

Code of Academic Integrity:

Violations of this code can lead to sanctions and even expulsion from the University. The guiding principle is that submitted work must be the student's own. However, the complete implications of the code are explained on the University of Arizona web page http://w3.arizona.edu/~studpubs/policies/cacaint.htm

Withdrawals:

If you wish to withdraw, correct procedure must be followed. Simply stopping attendance does not drop you from the course. If you do not withdraw according to procedure, your name will appear on the final grade report with a failing grade.
Feb. 17: Last day to drop the course with a grade of "W"

Incompletes:

A course grade of "incomplete" (I) can be awarded only in cases of documented hardship, such as a medical or family emergency.

Important Dates:

First day of the classes	Wednesday, Jan. 10, 2007
Martin Luther King Jr. Holiday	Monday, Jan. 15, 2007
Last day to drop courses	Tuesday, Feb. 6, 2007
Spring recess	Saturday - Sunday, March 10-18, 2007
Last day of classes	Wednesday, May 2, 2007

Tentative Course Topics:

• Course introduction and organization
• Introduction to microelectronic circuits
System-level study on amplifiers
• Introduction to amplifier • Circuit models for amplifier • Frequency response of amplifiers • Operational amplifiers: the inverting and non-inverting configurations • Difference Amplifier • Effect due to non-ideality

- Large-signal operation
- Offset and Input Bias
- Integrators and Differentiators

Diodes & Diode Circuits

- The ideal diode
- Terminal characteristics
- Rectifier
- Limiting and clamping circuits
- Physical operation
- Brief introduction to diode modeling

MOSFETs & MOSFET Circuits

- Device structure
- Fabrication processes
- Physical operation
- Second order effects
- I-V characteristic
- DC operation
- Using as an Amplifier
- Biasing
- Small-signal operation and models
- Single stage MOS amplifiers
    - CS Amplifier
    - CG Amplifier
    - Source follower
- Frequency response
- CMOS digital logic circuits
- Depletion-type MOSFET

BJTs & BJT Circuits

- Device structures
- Physical operation
- I-V characteristic
- DC operation
- Using as an Amplifier
- Biasing
- Small-signal operation and models
- Single stage BJT amplifiers
    - CE Amplifier
    - CB Amplifier
    - CC Amplifier
- Frequency response
- BJT digital logic circuits