ECE 3050  ANALOG ELECTRONICS  Fall 2010

INSTRUCTOR:  Dr. Gabriel A. Rincón-Mora (www.Rincon-Mora.com)
E-mail: Rincon-Mora@gatech.edu, Office: VL 482
Administrative Assistant: Angel Greenwood
E-mail: Angel.Greenwood@ece.gatech.edu, Office: VL 484

TIME & LOCATION:  Tuesdays and Thursdays: 1:35 – 2:55 p.m., VL 341
OFFICE HOURS:  Tuesdays and Thursdays: 2:55 – 3:30 p.m., VL 341 and 482


PREREQUISITE:  ECE 3040 – Microelectronic Circuits


COURSE OBJECTIVES

ECE 3050 extends the concepts of semiconductor devices, circuits, and applications begun in ECE 3040 and provides a continuation of important concepts, problem-solving techniques, and tools needed for subsequent electives and a career in microelectronics. Accordingly, the course discusses and illustrates how to bias amplifier circuits and devices and how they respond to sinusoidal signals of varying frequencies. It goes on to show how to model and calculate the responses of circuits containing BJTs and FETs to these signals. The class then presents linear feedback concepts associated with both single- and multi-stage transistor circuits so the student can learn to analyze and, to some extent, design electronic circuits employing feedback to produce prescribed gains, frequency response, and impedance levels, applying stability conditions to determine the effectiveness and robustness of the feedback loop. In summary, the course aims to inculcate the analysis and design capabilities necessary to understand and utilize electronic components in analog circuits and systems, placing emphasis on basic understanding and critical thinking, in other words, on basic and intuitive grasp of technical concepts.

IMPORTANT:  PLEASE STOP ME AND ASK QUESTIONS AS NEEDED DURING LECTURE.

EVALUATION

Course-Grade Composition:

Two 1-h and 20-m exams during the semester  ≈ 50%
Homework problems  ≈ 15%
Final Examination  ≈ 30%
Professionalism  ≈ 5%

The professionalism portion of the grade depends on the student's adherence to the course policies outlined in this document, the ethical standards of the School of Electrical and Computer Engineering and Georgia Tech at large, and instructions given in class and via e-mail correspondence. Scores will be evaluated based on the student's performance relative to the rest of the class.
Important Dates:

First day of class: August 24, 2010 (Tuesday)
Last day to drop a class: October 15, 2010 (Tuesday)
Fall Recess: October 19, 2010 (Tuesday)
Thanksgiving: November 25, 2010 (Thursday)
Last day of class: December 9, 2010 (Thursday)

Exam Dates:

Exam 1: October 7, 2010 (Thursday: 1 week prior to drop date)
Exam 2: November 23, 2010 (Tuesday)
Final: December 14 (Tuesday at 2:50 – 5:40 p.m.)

Please note these dates and plan accordingly (and let me know if typographical errors exist as soon as possible). All tests are closed textbook and notes. The bell (or alarm) will mark both the beginning and end of the exams. Everybody must remain seated with pencils and pens down when the time-period ends, until otherwise instructed. All work must stop by the onset of the closing bell. "Make-up" exams are discouraged, and in no case will a "make-up" exam be administered unless the student obtained the instructor's approval prior to the announced time of the exam. Test grades become final one week after they are returned. If you have a question about the exam, place a note on the front of the exam explaining your concern and/or question and submit it within one week of having the exam returned. I will then review the entire exam, for the issue in question and other possible grading errors –good or bad– and return it within one week. Calculators cannot be used in the programmable mode during the exams.

Reading Assignments: Review the sections in the book and references that correspond to the topics outlined in the Syllabus, depending on which topic is being covered at the time. Additional handouts and reading assignments may be assigned in class. Reviewing lecture notes, examples included in the textbook, and homework problems assigned is an excellent way of preparing for exams, as is browsing and reviewing the material linked by the URL supplement for the course.

Homework Assignments: Homework assignments are graded and provided to reinforce material presented in class. Collaboration between students is allowed and encouraged. However, the completed assignment to be submitted must be unique. If two solutions are identical, one score will be assigned and the grade will be shared/distributed between the students with identical solutions (e.g., if two identical solutions earned 100 out of 100 possible points, both students will earn a total of 100 points, 50 each). Please avoid submitting assignments late – late assignments will be accepted with a 20% penalty per day late (including weekends) until the solutions are provided or the graded assignment is available for pick up. Please note electronic submissions (e.g., via e-mail attachments) are not allowed and the TA (if there is one available for the class) and I will provide assistance concerning the solution to these and other problems in direct proportion to the written efforts demonstrated by your own attempts.

Attendance: Attendance is strongly encouraged, but not mandatory. Each student is responsible for all assignments, announcements, and handouts given and material covered in class. If the student misses a lecture, he/she should contact a fellow student for assignments, announcements, handouts, and notes given in class. The instructor will start and end each class as close to the official class time as possible so please be in your seats by that time out of courtesy to the rest of the class and your instructor (this is part of the professionalism grade).

Smoking, eating, and drinking: Prohibited in the classroom by ECE rules.

ACADEMIC HONESTY

Cheating and other forms of academic dishonesty are on the rise nationally. Georgia Tech has specific rules regarding academic misconduct as well as an Academic Honor Code, which are described on the web at http://www.deanofstudents.gatech.edu. Your role as a Georgia Tech student requires you to know and follow these rules. My role as your instructor requires that I evaluate each student individually and as fairly as humanly possible. I will not tolerate academic dishonesty in this class. I expect your cooperation in reporting any suspicious act relating to academic misconduct. As such, I will follow the guidelines, which states that I should “report (all) instances of
academic dishonesty to the Office of the Dean of Students.” Out of respect for your fellow students, Georgia Tech, and alumni, which includes me, please do not engage in dishonest activities in the classroom.

**SPECIAL CIRCUMSTANCES**

If a student has a disability that may require special accommodations, please schedule an appointment with the ADAPTS office (http://www.adapts.gatech.edu/) to discuss any special needs and inform me after class.

**HOMEWORK/PROJECT GUIDELINES**

The following guidelines should be followed so that written assignments can be evaluated accurately, fairly, and promptly – please note that points will be lost if a submitted assignment does not adhere to these guidelines.

- Use a cover sheet and print (clearly) your full name, date, course number, and assignment number.
- Label each section and subsection at a position on the page where it is not covered by a staple.
- Clearly label all circuit diagrams with all pertinent nodes, voltages, and currents and the names and values of the components used.
- The methods used to obtain the solutions and/or numerical values must be clear from the submitted paperwork. Numerical answers must contain proper dimensional units wherever appropriate.
- Submit homework solutions in numerical order (i.e., avoid out-of-order work) – grading is difficult otherwise, and part of the solution may be inadvertently overlooked.
- Clearly mark all answers by putting a box around them – also do this for exams.

The following extra items are required on homework problems that require SPICE simulations:

- A circuit diagram with SPICE nodes labeled, numbered, and/or named.
- The input control file(s) used to generate SPICE results – use only the text version of Spice (do not use schematic capture).
- Edit and highlight SPICE results that support numerical results. SPICE results that are unedited or not annotated will not be graded.

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<thead>
<tr>
<th>TENTATIVE COURSE TOPICS</th>
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<tbody>
<tr>
<td><strong>Course Policies</strong></td>
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<tr>
<td>Devices &amp; Basic Diode &amp; Bias Circuits: Diodes, BJT's, &amp; FETs</td>
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<td>Analog Systems: Gains, two-port networks, Bode plots, filters.</td>
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<td>Operational Amplifiers: Inverting &amp; non-inverting, differential amps, active filters.</td>
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<td>Single-Stage Amplifiers: DC bias, ac gains, impedance levels, graphical analysis, modeling, design examples (CE, CS, CB, CG, CC, and CD configurations).</td>
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<td>Multistage Amplifiers: DC and ac coupled amps, differential amps, CMRR.</td>
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<td>Frequency Response: Low- and high-frequency analysis techniques (Miller’s theorem, time-constant analyses).</td>
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<td>Feedback Amplifiers: Voltage, current, transconductance, transresistance.</td>
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<td>Sinusoidal Oscillators: Wein-bridge and phase-shift oscillators.</td>
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