ECE 3400 ANALOG ELECTRONICS Spring 2020

INSTRUCTOR: Prof. Gabriel A. Rincón-Mora, Ph.D. (URL: Rincon-Mora.gatech.edu)
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CLASS URL: Rincon-Mora.gatech.edu/classes
SPICE Simulator: Below "Reference Material and downloads"
Syllabus: Linked under "ECE 3400"

COURSE DESCRIPTION: ECE 3400 extends the concepts of semiconductor devices, circuits, and applications begun in ECE 3040 and provides a continuation of concepts, problem-solving techniques, and tools needed for subsequent courses in electronics. The material presents, explains, and shows how to use electrical components to model, analyze, and design filters, clamps, rectifiers, peak detectors, op-amp circuits, transistor amplifiers, and oscillators. The underlying aim is to cultivate and develop insight and intuition for how electronic devices work individually and collectively in analog circuits. The material places emphasis on insight and intuition and presents a perspective on circuits that transcends math and fosters innovation.

PREREQUISITE: ECE 3040 Microelectronic Circuits

TIME FOR QUESTIONS: Schedule one-on-one WebEx appointments with TA.

EDUCATIONAL OUTCOMES: Upon successful completion of this course, students should be able to:
1. Analyze first-, second-, and bi-quadratic passive filters.
2. Analyze clamps, rectifiers, and peak detectors.
3. Analyze negative-feedback circuits.
4. Analyze first-, second-, and higher-order active filters.
5. Analyze amplifiers and oscillators with BJTs and MOSFETs.
6. Use SPICE to simulate circuits.

GRADE COMPOSITION:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Two Midterm Exams</td>
<td>50%</td>
</tr>
<tr>
<td>Assignments</td>
<td>15%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
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<tr>
<td>Professionalism</td>
<td>5%</td>
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</tbody>
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Possible extra credit for distinguishable and extraordinary effort and professionalism.

IMPORTANT DATES:

<table>
<thead>
<tr>
<th>Event</th>
<th>Date/Time</th>
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<tbody>
<tr>
<td>First Day of Class</td>
<td>January 7 (Tuesday)</td>
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<tr>
<td>1st Midterm Exam</td>
<td>February 4 (Tuesday)</td>
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<tr>
<td>2nd Midterm Exam</td>
<td>March 10 (Tuesday)</td>
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<tr>
<td>Last Day to Drop Course</td>
<td>May 2 (Saturday)</td>
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<td>School Recess</td>
<td>March 16–20 (Monday–Friday)</td>
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<tr>
<td>Last Day of Class</td>
<td>April 21 (Tuesday) – Last assignment due on this date.</td>
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<tr>
<td>Final Exam</td>
<td>April 28 at 2:40–3:40 p.m. &amp; 4:10–5:10 p.m. (Tuesday)</td>
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REFERENCES:


ADVICE:

Review material presented after each lecture. Write notes. Ask questions.
Start working on assignments when first announced so questions can be posed early.
COURSE EXPECTATIONS AND GUIDELINES

IN CLASS: No auditors allowed.
   Be seated and ready before class begins.
   Cellular phones, laptops, and tablets must be off and out of sight.
   No smoking or eating in class.
   Students are responsible for all material and information announced in class and over e-mail.

EXAMS: No textbooks or notes allowed.
   Calculators cannot be used in the programmable mode.
   No make-up exams (without prior approval two or more weeks in advance).
   In case of medical emergencies, work with the Office of the Dean of Students.
   Grades become final one week after exams are graded and returned.
   *List problems in numerical order, circle and mark answers clearly, and staple pages together.

ASSIGNMENTS:
   No collaboration allowed (unless otherwise stipulated).
   No e-mail submissions allowed.
   No late submissions without prior approval.
   Allowed late submissions lose 20% for each day they are late (including weekends).
   Grades become final one week after they are available.
   *Attach a cover sheet that includes "ECE 3400", your name, date, and assignment number.
   *List problems in numerical order, circle and mark answers clearly, and staple pages together.

SPICE:
   Only text version of SPICE allowed.
   *Label all nodes, voltages, currents, and component values in schematics.
   *Highlight important information and remove unnecessary details from SPICE-generated results.

PREPARING FOR CLASS: Review previous lecture before each lecture. Read ahead (slides and text).

PREPARING FOR EXAMS: Review lectured slides, notes, examples, and assignments
   (and text for supplementary information).

ASSISTANCE: Provided in direct proportion to demonstrated effort
   in your own attempts to understand and resolve misunderstandings.

ACADEMIC INTEGRITY: All Georgia Tech (GT) students must know and follow GT's Academic Honor Code (www.catalog.gatech.edu/policies/honor-code). In accordance with the Honor Code, I expect your cooperation in reporting suspicious acts relating to academic misconduct. I must and will therefore report all instances of academic dishonesty to the Office of Student Integrity, who will investigate incidents and mandate appropriate penalties for violations. So out of respect for your peers, professors, Georgia Tech, and alumni, please do not engage in dishonest activities in the classroom and anywhere at and outside of Georgia Tech.

STUDENT–FACULTY EXPECTATIONS: At Georgia Tech, we strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and students. See catalog.gatech.edu/rules for basic expectations that you can have of me and I of you. Respect for knowledge, hard work, and cordial interactions will help build the environment we seek, so please remain committed to these ideals in and outside of class.

INSTITUTE ABSENCE POLICY: See Georgia Tech's policies on absences at www.catalog.gatech.edu/rules/4.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES: If you have learning needs that require special accommodations, schedule an appointment with the Office of Disability Services at disabilityservices.gatech.edu to discuss your needs and send me a note afterwards that explains your situation and their recommendations.

TENTATIVE COURSE TOPICS

1. RCL Filters
2. Diode Circuits
3. Op-Amp Circuits
4. Transistor Primitives
5. Transistor Amplifiers
6. Oscillators