Course Objective: ECE 6412 extends the concepts of semiconductor devices, integrated circuits (ICs), and applications begun in ECE 3040, ECE 3400, and ECE 4430. The material presents, explains, and shows how to understand, develop, and use semiconductor devices to model, analyze, and design transistor-level analog ICs with and without negative feedback using bipolar and CMOS technologies. The underlying aim of this course is to develop insight and intuition for how semiconductor devices work individually and collectively in microelectronic circuits. Ultimately, the material seeks to furnish a physical and intuitive view of integrated circuits that transcends mathematical and algebraic formulations to empower practicing engineers with the tools necessary to design ICs that perform practical and complex analog functions.

Course-Grade

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Midterm</td>
<td>30%</td>
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<tr>
<td>Assignments and Design Projects</td>
<td>30%</td>
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<tr>
<td>Final Examination</td>
<td>35%</td>
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<tr>
<td>Professionalism: Adherence to syllabus and ECE policies.</td>
<td>5%</td>
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</tbody>
</table>

Possible extra credit for distinguishable and extraordinary effort and professionalism.

Important Dates:

- First Day of Class: January 10 (Tuesday)
- School Holiday: January 16 (Monday)
- Midterm: February 28 (Tuesday)
- Last Day to Drop Course: March 15 (Wednesday)
- School Recess: March 20–24 (Monday–Friday)
- Last Day of Class: April 25 (Tuesday) (Last assignment due)
- Final: April 27 at 2:50–5:40 p.m. (Thursday)

Important: WHEN IN DOUBT, PLEASE STOP ME DURING LECTURE AND ASK QUESTIONS, but refrain from asking questions about material missed because of class absences.
COURSE EXPECTATIONS AND GUIDELINES

In Class: No auditors allowed.
All students must be in their seats before class begins.
Cellular phones, laptops, and tablets must be off and out of sight.
No smoking, eating, or drinking in class.
All 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.
* Work with the Office of the Dean of Students in case of medical emergencies.
Grades become final one week after tests are returned.
Pages must be stapled and problems in numerical order (bring a stapler if necessary).
All answers must be unambiguous and circled and marked clearly.

HW: No electronic "e-mail" submissions allowed.
Collaboration between students is allowed and encouraged, unless otherwise stipulated.
Submitted assignments must be unique – identical assignments split grade.
Late submissions lose 20% of the grade for each day they are late, including weekends.
Grades become final one week after they are available.
Staple and include a cover sheet with ECE 6412, your name, date, and assignment number.
Use only text version of SPICE and include netlist and control text used to generate all SPICE results.
Label all nodes, voltages, currents, and component values in schematics.
Circle and mark unambiguous answers clearly and list problems in numerical order.
Ensure methods used to obtain solutions are clear.
Highlight important information and remove unnecessary details from SPICE-generated results.

Preparing for Class: Review the sections in the book and references that correspond to the topics outlined in this syllabus and discussed in class. Review lecture slides, examples, and assignments when preparing for exams.

Assistance: The TA (if one is available for the class) and I will provide assistance in direct proportion to the written efforts demonstrated in your own attempts to understand the concepts and solve the problems in question.

Missed Lectures: Contact one of your peers for missed assignments, announcements, and material covered in class.

Academic Integrity: All Georgia Tech students must know and follow Georgia Tech's Academic Honor Code (described at 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, which includes me, please do not engage in dishonest activities in the classroom and at Georgia Tech.

Accommodations for Individuals with Disabilities: If you have learning needs that require special accommodations, please send me a note and schedule an appointment with the Office of Disability Services at disabilityservices.gatech.edu to discuss any special needs.

Student–Faculty Expectations: At Georgia Tech, we strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and students. See www.catalog.gatech.edu/rules/22.php 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.

TENTATIVE COURSE TOPICS

1. Introduction
2. Overview of Microelectronic Devices
3. Overview of Single-Transistor Primitives
4. Analog Building Blocks
5. Negative Feedback
6. Operational Amplifiers
7. Comparators
8. Reference Circuits