GEORGIA INSTITUTE OF TECHNOLOGY  
School of Electrical and Computer Engineering  

ECE 6412  ANALOG INTEGRATED-CIRCUIT DESIGN  Spring 2018

INSTRUCTOR: Prof. Gabriel A. Rincón-Mora, Ph.D. (Rincon-Mora.gatech.edu)  
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Administrative Assistant: Desta Davidson  
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TIMES AND LOCATION: Mondays and Wednesdays at 4:30–5:45 p.m. in Van Leer 240

TIME FOR QUESTIONS: Over e-mail and after class as described in class.


SPICE or PSPICE Reference Manual (available from class URL).

PREREQUISITE: ECE 4430 Analog Integrated Circuits (or equivalent)

CLASS URL: Rincon-Mora.gatech.edu/classes and sub-link titled "ECE 6412".

SYLLABUS: Posted under "ECE 6412" link on class URL.

SPICE SIMULATOR: Software accessible from class URL.

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 is to cultivate and develop insight and intuition for how semiconductor devices work individually and collectively in microelectronic circuits. For this, the presentation seeks to furnish a physical and intuitive view of devices and circuits that transcends mathematical and algebraic formulations to empower engineers with the tools necessary to design ICs that perform practical and complex analog functions.

Course Grade:  
Midterm = 30%  
Assignments and Design Projects = 30%  
Final Examination = 35%  
Professionalism: Adherence to syllabus and ECE policies. = 5%  
Possible extra credit for distinguishable and extraordinary effort and professionalism.

Important Dates:  
First Day of Class January 8 (Monday)  
School Holiday January 15 (Monday)  
Midterm February 26 (Monday)  
Last Day to Drop Course March 14 (Wednesday)  
School Recess March 19–23 (Monday–Friday)  
Last Day of Class April 23 (Monday) – Last assignment due on this date.  
Final April 27 at 2:50–5:40 p.m. (Friday)

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

In Class: No auditors allowed.
Be seated in class 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.
E-mail concise questions and direct them to both the instructor and TA(s) for the course.

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.
List problems in numerical order, circle and mark answers clearly, and staple pages together.
Grades become final one week after exams are graded and returned.

Assignments: No electronic "e-mail" submissions allowed.
Collaboration between students is allowed and encouraged, unless otherwise stipulated.
But submitted assignments must be unique – identical assignments split grade.
Late submissions lose 20% of the grade for each day they are late, including weekends.
Include a cover sheet that includes "ECE 6412", your name, date, and assignment number.
Ensure methods used to obtain solutions are clear.
List problems in numerical order, circle and mark answers clearly, and staple pages together.
Grades become final one week after they are available.

SPICE: Use only text version of SPICE and include net list and control text used to generate all results.
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 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: TA(s) (if available) and I will provide assistance in direct proportion to the effort demonstrated in your own attempts to understand and resolve misunderstandings and problems.

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 (linked 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 also includes me, please do not engage in dishonest activities in the classroom or anywhere at Georgia Tech.

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

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.

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