E151 Syllabus

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Welcome to E151! I am very excited about this analog design, and I am very excited to have you in the class. This course teaches design and analysis of linear, analog systems, particularly multi-stage amplifiers with an emphasis on laboratory realization as a teaching tool for debugging practical analog systems.

At the end of this course you will be able to design and build an operational amplifier. To do this, you will need to use several skills. You will be able to:
- Find design parameters of single stage amplifiers
- Analyze multi-stage amplifiers by reducing stages to two-port representations
- Apply small signal models, open circuit time constants and half circuit analysis
- Use analog building blocks like references, current mirrors and output stages
- Reason about stability and compensation of amplifiers in feedback
- Take a systematic and rational approach to debugging analog circuits in a lab

Schedule
The most up to date class schedule, including descriptions of lectures, is on the website

Optional Reference Texts
Analysis and Design of Analog Integrated Circuits. Grey, Hurst, Lewis and Meyer (called Grey and Meyer)
Microelectronic Circuits, Sedra/Smith

Supplies
All physical supplies will be provided in lab. You will need to install the ltSpice simulator:
https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html

Lab Access
The projects for this class will require the use of power supplies, function generators and oscilloscopes. These tools are available in many labs at Mudd, but we will mostly use the Analog Lab. This lab will be in heavy use this semester, and we only have top billing during our 3 hour lab meeting. If you must use the lab at a different time, do so when there are no other classes in session. Never disturb equipment for other labs. You will be given the code to the lab during the first lecture.

Late Work
I am very flexible about extensions, so please request them when you need them. I will approve an extension so long as (1) I know about it in advance, (2) it doesn't interfere with my graders, and (3) I don't perceive it as causing you to fall too far behind. If an extension extends past the reveal of answers in class or online, I trust you not to refer to the published answers. All work needs to be completed by the last day of classes.

Artificial Intelligence
The use of large language models (LLMs) is not permitted to generate text in your lab notebooks. You may use large language models to help generate spreadsheets or software, but you should manually express the core understanding being demonstrated by such spreadsheets or software. For instance, if you were making a graph of transistor properties, the formula describing a transistor should be manually entered, but the surrounding code that makes the visualization may be generated by a LLM.

Assignments and Grading

Videos & Quizzes
- Videos will be released shortly after each lecture period, watching them will prepare you for the next lecture. Watch them actively, completing activities and taking notes.
- Each lecture period will begin with a quiz on the videos assigned for the lecture
- The quiz will first be completed individually then as a small group.
- Your score on the quiz is the average of your score and your group's score.

Labs:
- Labs are assigned each week on Monday, they are due next Monday at 11:59AM.
- The deliverable for each lab is a completed lab notebook. These are less formal than reports, and we will discuss them more in class. Export as PDF and upload to Canvas.
- Labs will be completed in self-selected pairs. You will be in the same pair all semester.
- You may not collaborate with other pairs other than by discussing your work. You may not share designs and your circuit must be the work of your own hands.

Design Projects:
- You have two design projects, which are like larger, less structured labs
- Design projects are also completed with your lab partner.
- Instead of the lab notebook entry documenting the design and testing process, design projects are documented by submitting a filled-in design project template. The template is available on the website. This template approximates a brief report on the design, so write carefully and discuss your process thoughtfully when the template prompts you.

Skill Mastery Problems
- In class, you may request to take exam-style questions on individual skills in the class in keeping with the skill mastery schedule on the website. A "last call" schedule on the website suggests times by which you should attempt mastery questions.
- You may request more questions on the same skill in future classes or office hours.
- Masteries that are incomplete at the end of the semester will count against your mastery grade. You can also lose mastery points by having three or more masteries "open" (unattempted prior to last call or attempted and unfinished) at once, indicating that you are far behind schedule.

Assessments:
- A pre-assessment will be assigned during the first week. You are expected to put forth a good faith effort in completing the questions in a maximum of 1.5 hours, but don't feel obligated to take the whole time. You will not have learned the material in the assessment yet, so don't worry if you don't answer much, and leave questions you don't know blank. This assessment will be graded on thoughtful completion.
- A post assessment will be assigned during the last week of class. You are expected to complete the assessment in 1.5 hours. This assessment will be graded on correctness.

Grading:
- Assessment   3%   Pre and post assessments
- Quizzes   5%   Half credit assigned to individual quiz, half to group quiz
- Labs   40%   4% per lab for 10 labs
- Design Projects   14%   7% per design project
- Midterm   14%
- Final   14%
- Mastery   10%

Policies

Title IX
If I learn of any potential violation of our gender-based misconduct policy (rape, sexual assault, dating violence, domestic violence or stalking), I am required to notify the HMC Title IX Coordinator. Students can request confidentiality from the institution, which I will communicate to the Title IX Coordinator. If students want to speak to someone confidentially, they can contact the EmPOWER Center at (909) 607-2689, Monsour Couseling Center at (909) 621-8202 or the McAlister Chaplains at (909) 621-8685. Speaking with a confidential resource does not preclude students from making a formal report to the Title IX Coordinator at a later time.

Harassment
I am committed to making this class a safe space for people of all genders, sexual orientations, races, cultures, religions, disabilities, political affiliations and socioeconomic classes. Please be kind to one another and try to form an inclusive community. Please report any instances of harassment which might undermine or harm our community to me.

Academic Accommodations
If you would like to request academic accommodations due to temporary or permanent disability, contact the Office of Disability Resources at (909)-607-3148 or ability@hmc.edu . Appropriate accommodations are considered after you have conferred with the Office of Student Disability Resources and presented the required documentation of your disability.

Help Seeking
College students often experience issues that may interfere with academic success, including stress, sleep issues, juggling responsibilities, life events, relationship concerns, anxiety or depression. If you or a friend is struggling, I encourage you to seek support! Definitely take advantage of Academic Accommodations and my Late Work policy, but please also seek support in the following ways;

- Chat with me in office hours
- Talk to the academic deans (academicdeans@g.hmc.edu)
- Talk to the Office of Health and Wellness (wellness@hmc.edu)
- Visit the Monsour Counseling Center, which is open 24/7/365 and at (909)-621-8202

Academic Honesty
It goes without saying that I expect the honor code to be followed carefully during this class. Any instances of academic dishonesty will be handled through the HMC honor board.

Specific academic honesty pitfalls for this class:
- Copying another student's design during lab
- Allowing students other than your partner to build or measure your circuits
- Unattributed schematics or reference designs (eg: from data sheets) in lab notebooks
- Any sharing or posting of mastery problems, quizzes or previous exams.