Welcome to E157! This class teaches design and analysis of high-speed communication circuits, with an emphasis on microwave design, measurement techniques, and communication links. I am very excited about this material and very excited to have you in the class!

At the end of this class, you should be able to complete a clinic project involving high speed board designs or antenna characterization. You’ll learn these skills on the way to that goal:

• Identify when RF theory and techniques are important
• Understand the use common RF equipment, simulations and graphical tools
• Make a link budget for a communication system
• Design a printed circuit board with fast signals on it

Schedule

• The most up-to-date schedule is on the class website
• There is class the Monday before Thanksgiving
• There is no final exam for the class, but design project 2 is due during finals week

Electronic Communication

Mailing List: eng-157-1-2023-fa@g.hmc.edu ↞ We won’t use this much
Discord Server: https://discord.gg/7R3Tz5F5P4 ↞ We use this for almost all comms
Class Site: http://pages.hmc.edu/mspencer/fa20/e157
YouTube Playlist: Is Linked Here
Canvas: Sign up as normal, per email instructions.
Gradescope: Access through Canvas

Optional Reference Texts

Planar Microwave Engineering, Lee. RF Integrated Circuit Design, Razavi

Supplies

Physical supplies will be provided in the RF lab (PB159). You will need the ltSpice simulator: https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html

Assignments and Grading

Quizzes:

• There will be an in-class quiz every lecture.
• The quiz will be carried out first individually and second as a team picked by me.

Labs:

• Labs are due about every two weeks. See the schedule for details.
• Each lab has two deliverables: a problem write-up (see warm-up problems, below) and a completed digital lab notebook. Lab notebooks are less formal than reports, as will be
discussed in class. I suggest trying Evernote for keeping a notebook. Submit your completed notebook, including appropriate spreadsheets and other files, to Canvas.

- Lab work will be carried out in pairs, but lab notebooks will be submitted individually. Discussion on Discord is encouraged.

**Warm-Up Problems:**
- Each lab comes with a set of warm-up problems that are due at the same time as the lab. Submission instructions will be discussed in class.
- Warm-up problems are self-graded. Grading instructions will be discussed in class.
- Warm-up problems will be carried out individually, but discussion on Discord is encouraged.

**Design Projects:**
- Two projects will be presented to you, these are less structured than labs and offer you considerable design freedom.
- The deliverable for design projects is a brief report. This report must introduce the design process, explain the final design, describe the testing process for the circuits, compare calculated, simulated and measured performance of the design, and explain any discrepancies between these quantities. A template will be provided.
- Design reports should be no longer than five pages, fewer is acceptable. Use IEEE citation format and ensure that every figure has a caption.
- The audience for the design report is another student of the class: you may use sophisticated technical language, and you don’t need to introduce basic calculations.
- Lab work for design projects will be completed in pairs. Write ups for the design projects should be your own, individual work.

**Grading:**
- Quizzes 5% Half credit assigned to individual quiz, half to group quiz
- Warmups 18% 6 assignments at 3% each
- Labs 42% 6 labs at 7% each
- Design Projects 24% 2 projects at 12% each
- Midterm 11%

**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. The third requirement in the previous sentence is important in this class: we have a small number of big assignments, and missing a deadline on even one can hurt your ability to do the rest. 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 except for DP2, which must be finished by the end of finals week.

**Lab Access**
We will request swipe access to the RF lab (PB159) for students in the class. You should only use swipe access the lab after being certified, which we will discuss in class. The RF lab is small and we have limited equipment, so each pair of partners for the lab will have a designated “priority slot” where they have top priority to use the RF lab.
**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 ability@hmc.edu: the coordinator for student disability resources. Appropriate accommodations are considered after you have conferred with the Office of Student Disability Resources and presented the required documentation of your disability.

**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 honor board.

Specific academic honesty pitfalls for this class:
- Copying text from your lab partner’s notebook. Sharing data is expected, but you should make your own submission.
- Unattributed schematics or reference designs (from data sheets or the internet) in lab notebooks, warmup assignments or project reports.

**Title IX**
If I learn of any potential violation of our gender-based misconduct policy (rape, sexual assault, dating violence, domestic violence or stalking) by any means, I am required to notify the HMC Title IX Coordinator, Deborah Kahn. Students can request confidentiality from the institution, which I will communicate to the Title IX Coordinator if I am reporting to her. If students want to speak to someone confidentially, the resources listed below are available. Speaking with a confidential resource does not preclude students from making a formal report to the Title IX Coordinator at a later time.

- EmPOWER Center (909) 607-2689
- Monsour Counseling Center (909) 621-8202
- McAlister Chaplains (909) 621-8685