

# E157 Syllabus

Fall 2023

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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](mailto: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/m Spencer/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 ItSpice 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 Theory and Practice Problems, below) and a completed digital lab notebook. The problem writeup should be pre-

pendent to the lab notebook in one big PDF file. 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 supporting files, to Canvas.

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

#### *Theory and Practice Problems:*

- Each lab comes with a set of theory and practice problems that are due at the same time as the lab. Submission instructions will be discussed in class.
- Problems will be carried out individually, but discussion is encouraged consistent with standard Mudd collaboration policies.

#### *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 |
| • Theory/Practice Qs | 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](mailto: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, theory/practice questions 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

## 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 or Discord
- Talk to the academic deans ( [academicdeans@g.hmc.edu](mailto:academicdeans@g.hmc.edu) )
- Talk to the Office of Health and Wellness ( [wellness@hmc.edu](mailto:wellness@hmc.edu) )
- Visit the Monsour Counseling Center, which is open 24/7/365 and at (909)-621-8202