E157 Lecture 1 Day Plan

Welcome

Why are you taking this class?

- Cell phones – Antennas don't work without RF theory.
- The internet – fast signals require specially designed wires to carry them. Important in DRAM, fiber optic back planes, electrical router back planes, etc.

Why do we need this class? What physics are different for fast RF signals

- big L impedance and small C impedance → often low power
- the speed of light affects fast-changing signals.
- You don't have any models for radiation yet

How does this class work?

- Still in beta – Lab 3 will get a fix, power flow and antenna videos will get a fix, maybe others changes, so don't get too far ahead.
- Videos
- Quizzes – solo thinking time, then complete as a team
- Post-quiz during Lecture – Activities, Some office hours
- Labs –
    - practical questions, theory questions, the lab itself
    - Questions do not have their own writeup, append to start of lab
    - Deliverable is a lab notebook
        - Not text heavy
        - Is _results heavy_ and _setup/replication_ heavy
        - Make sure to include mandatory data
        - Nominally chronological, we bend a bit here
        - Can submit multiple files to capture your full set of data & setup (e.g.: folder containing csv & png for each experiment, organized by day, backed by notes)
    - Most important goal is matching model / simulations / theory
    - Due ~ every two weeks, don't fall behind!
    - Partners measure together, write-up separately ← **EMPHASIZE SEPARATE FIGURES**
- Design projects: Like open ended labs, but deliverable is a templated report, same deal w/ separate write-ups for each partner.
- First lab will require you to get RF lab certified, schedule w/ me/Xavier

Logistics time:

- Partners,
- dedicated lab hours,
- office hours,
- grading(?),
- cert appointments
- Study groups

- Discord
- Big warning about extensions, labs due Weds, projects due Fri

Lesson

- This is preparation for certification. Read RF lab rules too.
- Major ways to break instruments: DC biases, Power levels, Mechanical (cables)
- DC biases → AC coupling almost everything, use zero-centered signals.
- Power → dBm is 10*log(P1/1mW). RMS reminder. 2x linear = +3dB. 10x linear = +10dB.
- Look at some crappy cables and some good cables. Mating planes. Construction.
- Mechanical failures: radius of curvature, strain on shield/housing at connector, sharp bend