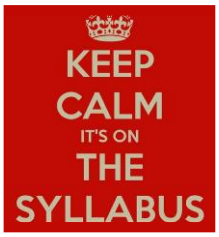
Jeff Stribling
Electrical Engineering

EE 101A - Circuits I (4 units)



Course Goals: have a good understanding of circuit theory, circuit elements (capacitors, resistors, diodes, transistors, inductors), DC and AC analysis of amplifiers. Be prepared for EE 101B, 114, 116, 153, and other courses. Build some cool & useful things. Have fun along the way!

Instructor Jeff Stribling; e-mail: stribs@stanford.edu
Office Hours (OH): Tuesday/Thursday 1−2:30 PM Packard 106.

Course Assistant James Skelly, e-mail skello@stanford.edu, OH Monday 3−5 PM Packard 106.

Lab Manager Aria Rashidi (all EE instructional labs), ariar@stanford.edu

Websites
Canvas: https://canvas.stanford.edu/courses/193323
Gradescope: https://www.gradescope.com/courses/761637
Ed Discussion: https://edstem.org/us/courses/57906
If you are not automatically added to these websites, please contact either James or me.

Lectures **Tuesday/Thursday, 10:30AM−1:00PM**, from Jun 25 to Aug 15, 2024
In-person: Hewlett 101

Reviews An optional review session will be held Fridays from 5-6:30ish in Packard 202.

Labs (Jun 26-)
1. Wednesday 10 AM−1 PM
2. Wednesday 2 PM−5 PM
1. Thursday 4 PM−7 PM

All Labs are in Packard Room 004.

Note: **On Tue Jun 25, Lab Session sign-up will be open.** There are limited spaces in each section, first come first served. Please contact me (stribs@stanford.edu) if you can only make it to one or no sessions. Students should try to form lab groups (of 2 people), others will be assigned**.**

Books No "required" text. However, readings will be recommended from:

- Hambley, "EE Principles and Applications" 7th ed.
- Sedra & Smith, "Microelectronic Circuits" 8th ed.
- Scherz and Monk, "Practical Electronics for Inventors" 4th ed. (FREE online: https://learning.oreilly.com/library/view/practical-electronics-for/9781259587559/)

Also see Prof. David Miller's math refresher (posted on Canvas)

Grading

Homeworks	30%
Labs	25%
Midterm 1 (July 23th, 10:30 AM, Hewlett 101)	20%
Midterm 2 (Aug 17th, 9:30 AM, Hewlett 101)	20%
Participation	5%

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Homeworks are assigned Monday, and due Sunday at 11:59pm PDT on Gradescope (if you are not automatically added upon enrollment, please email James or me). No late homework is accepted, but we will drop your lowest score. You may collaborate on homeworks, but you must turn in your own. **Labs are due Tuesdays at 11:59pm PDT the week <u>after</u> each lab is performed**, over Gradescope. (Unless otherwise noted.)

Midterms will be closed book & notes, but with calculator and one page of equations (two pages for Midterm 2). Midterm 1 will be in-class, during class time. Midterm 2 will be during finals. (But stay tuned for any possible changes.) We will have midterm review sessions and you will receive more information (including practice exams) closer to the date. **Please always observe the Honor Code.**

Review sessions will be recorded on Zoom/Canvas, office hours and labs are not.

Honor Code https://communitystandards.stanford.edu/policies-and-guidance/honor-code

Advice for homeworks and exams:

- Explain your thinking so we can follow it, give partial credit, etc.
- Write clearly; if we can't read it, we can't give credit!
- If the final answer is numerical, please state the units
- Do a unit check (*e.g.*, V/A = Ω, F×V = C, etc.)
- Use units consistent with those in class (*e.g.*, mA, kΩ, etc.)
- Avoid computer notation like 1e15, use 10^{15} instead
- Significant figures are determined by least precise input. Ex: 12.5 + 1.3295 = 13.8
- You may seek advice on homeworks, but must turn in your own work

Don't Drink and Derive

$$E = mc^3 \quad R = C\frac{di}{dt}$$

$$F = 4\pi\epsilon\frac{q}{r^3} \quad F = \sqrt{ma}$$

$$I = k(V_{DS} - V_T)$$

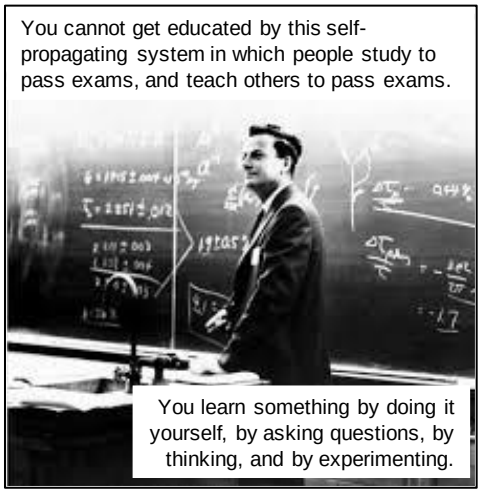
$$V = I - R$$

Other Advice:

- Be comfortable with exponentials and logarithms
- Be comfortable drawing and reading data from linear and log axes
- Have basic knowledge of Matlab, Excel, or equivalent for plotting

Approximate list of topics:

1. Course Introductions and Overview
2. Circuit Abstraction
3. Resistive Networks
4. Diode Circuits
5. Energy Storage Elements
6. Network Theorems
7. MOSFETs
8. DC and AC Analysis of MOSFET Amplifier
9. Single Stage MOSFET Amplifiers
10. Sinusoidal Circuit Analysis



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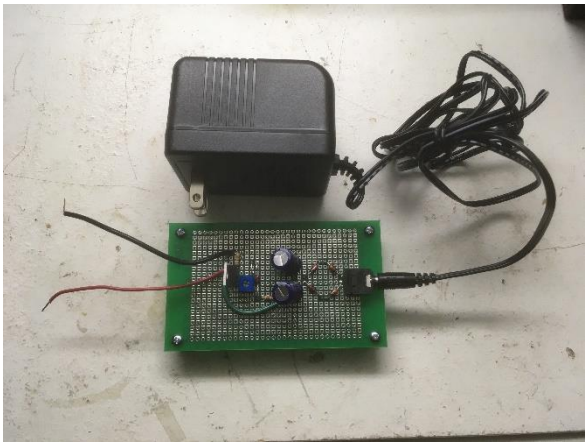
Labs:

0. Introduction: Understanding the test equipment and practice soldering
1. Diode Characterization
2. AC-DC Converter: Rectifier
3. AC-DC Converter: Capacitor, Zener Diode
4. AC-DC Converter: Potentiometer
5. AC-DC Converter: Source Follower (two weeks)
6. Switching Voltage Regulator (optional)

Some Lab Notes (for more please read Lab 0!)**:**

- **Safety:** Do not leave a hot soldering iron unattended, or any electronics connected to a power source. Whenever you make a change to your circuit, turn the power supply off. **Always wear safety glasses**. Pay attention to the maximum power rating of your resistors and watch the polarity of your capacitors.
- **Attendance:** You must attend at least one lab session for each lab, because your labs need to be checked-off by CAs. This is in addition to turning in the (short) lab write-ups.
- **Lab Sessions:** These are dedicated to debugging and checking off work. To make sure you make the most out of these, please work with your partner to accomplish as much as possible in advance.
- **Partners:** You will work in groups of 2. You can form a partnership on your own, or we will assign you a partner. Partners should be enrolled in the same lab time slot. If you are assigned a partner, we will try to pair students who took E40M with those who did not. Each student must turn in their own work individually through Gradescope.
- **What are we building?** Image on the left is our AC-DC converter in EE 101A. Image on the right is our AC-DC converter powering the audio amplifier (boom box) in EE 101B.



Access and Accommodations

We are committed to providing equal educational opportunities for students with disabilities. If you experience disability, please register with the Office of Accessible Education (OAE). Professional staff will evaluate your needs, support appropriate and reasonable accommodations, and prepare an Academic Accommodation Letter for faculty. **Please share such a letter with the instructor as soon as possible**, so we can work with you and OAE to identify any barriers that might be encountered in your experience of this course.

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Diversity and Inclusion
In an ideal world, engineering and science would be objective. However, much of human knowledge can be subjective and has been historically built on a small subset of voices, including the books & readings for this course. Thus, we acknowledge it is possible that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of an engineering and scientific nature. Please contact the instructors if you have any suggestions to improve the quality of the course materials.

Furthermore, we would like to create a learning environment that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, etc.) To help accomplish this:

- If you feel like your performance in the class is being impacted by your experiences outside of class, please do not hesitate to come and talk with us. We want to be a resource for you. If we believe your experience impacts multiple students, we may make a general announcement to the class, with your permission.
- We (like many people) are still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to us about it.

Gender-Inclusive Language
This is an inclusive classroom. Everybody has a name and a pronoun. The instructors are committed to referring to you with the correct pronoun and will always do their best to pronounce your name correctly. Please feel free to correct us if we make a mistake!

English as a Foreign Language
Stanford welcomes students from around the world, and their perspectives enrich our community. To support students whose primary language is not English, services are available on campus, including workshops and individual appointments. For more information, please see:

- English for Foreign Students (EFS) Program
- Bechtel English classes for international students

Wellness
Mental health concerns or stressful events (e.g., a global pandemic) may lead to diminished academic performance or reduce your ability to participate in daily activities. Free, easily accessible, confidential mental health services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of services available on campus at Counseling & Psychological Services (CAPS) and through this list of Mental Health Resources at Stanford.