

Syllabus for MAE40

Linear Circuits – Winter 2025

January 11, 2025

This is the Syllabus for MAE40 Linear Circuits – Winter 2025. Steady-state and dynamic behavior of linear, lumped-parameter electrical circuits. Kirchoff's laws. RLC circuits. Node and mesh analysis. Operational amplifiers. Signal acquisition and conditioning. Electric motors. Design applications in engineering.

Instructor

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Teaching assistants

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Prerequisites

Grades of C- or better in Math 20D, 20F and Phys 2B.

Text

The Analysis and Design of Linear Circuits, 10th Edition, R. E. Thomas, A. J. Rosa and G. J. Toussaint, Wiley 2023. ISBN: 978-1-119-91344-3

Other editions of the book are also fine to use (however, homework will be assigned from the 10th edition). Various editions are available at the Science and Engineering Library Reserves.

Calendar

Part I

- Introduction (T & R, Chapters 1 & 2)
- Equivalent circuits (T & R, Chapters 2 & 3)
- Systematic circuit analysis (T & R, Chapter 3)
- Active circuits (T & R, Chapter 4)

Part II

- (*Laplace transform*) (T & R, Chapter 6 & 9)
- Circuits in the s-domain (T & R, Chapter 6 & 10)
- s-domain circuit analysis and design (T & R, Chapter 10)
- Frequency response and filter design (T & R, Chapter 12 & 14)

The website contains a list of downloadable PDFs with the slides used during the lectures so that in class you can focus on the discussion and actively understanding the material – including asking plenty of questions!

Exams

The first midterm will be on Tuesday, February 4, 2025, during class.

The second midterm will be on Tuesday, February 25, 2025, during class.

The final will be on Thursday, March 20, 2025, 3:00pm-6:00pm.

Homework

There will be a set of homework problems per week taken from the main text. Homework assignments are due weekly, on Fridays at midnight (specific dates for your reference are included in the webpage). 20% deduction for lateness by one day without reason, else 100%.

We use an all electronic homework submission and grading process through Gradescope (within Canvas). Homework, instructions, and solutions will be posted there. You can handwrite legibly or type, then scan your homework as a PDF file for submission. Please check the quality of your PDF file before submission. If we cannot read it, we cannot grade it! Please turn in a readable and organized homework. This is a big class! Here is a suggestion: include your name and your ID # on top of each and every page, answer questions in logical order, and start answering a question always on the top of the page.

You are encouraged to ask questions about homework problems in the discussion session. You are encouraged to work in groups on homework problems but each student must turn in homework separately. To address questions related to homework, we use Piazza at https://piazza.com/ucsd/winter2025/mae40_wi25_a00. Answers to questions will be posted regularly, but do not expect immediate turnarounds!

Grading policy

The overall grade will be calculated as the maximum between the following two scales

Scale1: Homework: 20%, Midterm1: 25%, Midterm2: 25%, Final exam: 30%

Scale2: Homework: 20%, Midterm1: 20%, Midterm2: 20%, Final exam: 40%

Having two midterms lowers the stakes/importance of any given exam in the final grade, allowing you to make up for an isolated bad performance.

Even though the hwk is only 1/5 of the total grade, past experience reveals that **it is nearly impossible to get a good grade without having worked on and spent time with the homework consistently throughout the course.**

Official solutions to the midterms and final exams will be posted online.

Canvas

Your scores will be available via Canvas. Check out <https://canvas.ucsd.edu/courses/63062> for instructions on how to register and log in. Please **check it regularly** to make sure your homework scores are being transcribed correctly.

Academic honesty

No form of academic dishonesty will be tolerated. We take this very seriously. For the definition of academic dishonesty and its consequences, refer to the UCSD General Catalog 2024-2025 at <http://www.ucsd.edu/catalog/>

Prior to starting the course, you should visit <https://academicintegrity.ucsd.edu/forms/form-pledge.html> and take the UCSD Academic Integrity Pledge.

Lectures and hours

Lectures and discussion sessions will be in person.

Lectures take place on Tuesdays and Thursdays, from 2:00pm to 3:20pm, at Center Hall, room 212.

Discussion sessions take place on Wednesdays, from 9:00am to 9:50am, at Center Hall, room 212.

Lectures and discussion sessions will be recorded. All recordings will be available on Canvas. Use them judiciously: e.g., you were sick and had to miss a class, or you want to re-check something you saw in lecture. Don't take recordings as a substitute for regularly attending class in person—**I cannot stress this enough based on past experience**. Recordings will not work as a substitute for the type of active understanding that it is only possible in class when you follow the lecture, ask/answer questions, or listen to other people's questions/answers.

Office hours

Jorge: Tuesdays, from 3:30pm to 4:30pm, at EBU1, room 1603

Brooklyn: Fridays, from 2:00pm to 3:00pm, at EBU1, room 1603

Course webpage

<http://terrano.ucsd.edu/jorge/teaching/mae40/w25>

The webpage contains this syllabus and the list of homework due. Please check it periodically for updates and other announcements related to the course.

MAE Math Open House

The MAE Math Open House is open to all students enrolled in the MAE Department, regardless of grade. You bring questions, we help you understand the concepts! We are a few engineering students and faculty who want to help you build your mathematical foundation for your engineering courses.

Discord link: <https://discord.gg/uWw9gvX9NM>

Times and dates:

- Wednesdays 4-5pm in EBU2 270
- Thursdays 5-6pm in EBU2 270

Please contact Nate Linden at nlinden@ucsd.edu with any questions.

IDEA Engineering Student Center

The IDEA Engineering Student Center is a hub for student engagement, academic enrichment, personal/professional development, leadership, community involvement, and a respectful learning environment for all. The IDEA Center is currently working remotely and invites undergraduate and graduate students to connect through its Facebook page (<https://www.facebook.com/ucsdidea>) or Instagram page (<https://www.instagram.com/ucsdidea>)

Food Support for Students

If you are skipping and stretching meals, or having difficulties affording or accessing food, you may be eligible for CalFresh, California's Supplemental Nutrition Assistance Program, that can provide up to \$292 a month in free money on a debit card to buy food. Students can apply at <http://benefitscal.com/r/ucsandiegocalfresh>

The Hub Basic Needs Center empowers all students by connecting them to resources for food, stable housing and financial literacy. Visit their site at <http://basicneeds.ucsd.edu>