

ECE 105: Introduction to Electrical Engineering Fall 2024

Sections: 30884D

Days/Times: Tuesday, Thursday 2:00–3:50PM

Location: OHE 230

Instructors:

Prof. Yasser Khan

Email: yasser.khan@usc.edu

Offices: MCB 270D

Office hours: Tuesday/Thursday 12-1 PM (and by email appointment)

Prof. Rehan Kapadia

Email: rkapadia@usc.edu

Offices: PHE 626

Office hours: Wednesday 10-12 PM (and by email appointment)

Staff:

Atiyeh Abbasi Jalal (Teaching Assistant)

Email: abbasija@usc.edu

Office hours: Wednesday 4-6 PM PHE 320

Vikas Addepalli (Course Mentor)

Email: daddepal@usc.edu

Office hours: Tuesday/Thursday 4-5 PM EEB

Course Introduction

This introductory course is designed to provide a high-level understanding of electronic systems from both hardware and software perspectives. Students will learn about the building blocks of these systems, including basic circuits and passive and active electronic components such as resistors, capacitors, inductors, diodes, transistors, optoelectronic components, and sensors. The course will culminate in the design, construction, and testing of an optical biosensor, integrating the various concepts covered. Additionally, topics in linear algebra, signals and systems, and neural networks will be introduced to implement an image classification system. Another key aspect of the course focuses on communication systems, particularly free-space optical communication, where students will work with pairs of emitters and detectors. Throughout the course, a custom demonstration board equipped with hardware modules on circuits, devices, systems, and embedded machine learning for image classification will be used to provide hands-on learning experiences. In summary, this course introduces students to electrical engineering, emphasizing practical, hands-on learning of hardware and software systems utilizing AI and ML tools.

Assigned Readings, Materials and Platforms

There is no textbook for the course, however, required readings, viewings, and other course resources are available via web links on this dynamic syllabus, posts on Brightspace, and through email. Brightspace will be used for general announcements, for posting of course documents and information.

Course Requirements, Structure & Grading Policy

Grade Distribution

Homework:	30%
Midterm:	30%
Final:	40%

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the [USC Student Handbook](#). All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage. The impact of academic dishonesty is far-reaching and is considered a serious offense against the university and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the [student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Incompletes

An incomplete (IN) is given when work is not completed because of a documented illness or some other emergency occurring after 80% of the course has been completed. Arrangements for the IN and its removal should be initiated by the student and agreed to by the instructor prior to the final exam. The University policy on IN is detailed in the USC Catalog.

Illnesses and Emergencies

In this course, students are expected to attend class in person. Students who miss class due to illness or other emergencies are expected to make up missing classwork; if medical issues arise that preclude meeting the published deadlines, please contact the instructors as soon as possible.

University Emergencies and Course Continuity

During an emergency, USC will post emergency announcements on this website: <https://emergency.usc.edu>. USC Safety has guidelines for emergency preparedness for fire, earthquake or active shooter situations: <https://safety.usc.edu/emergency-preparedness/>.

ECE 105: WEEKLY COURSE SCHEDULE

Week	Day	Dates	Topic	Deliverables
Week 1	Tuesday	8/27	Introduction to EE, ECE 105	
	Thursday	8/29	Electronic system design	
Week 2	Tuesday	9/3	Circuit analysis	
	Thursday	9/5	Circuit analysis	
Week 3	Tuesday	9/10	Devices: semiconductors	HW1 on circuits released
	Thursday	9/12	Devices: semiconductors	
Week 4	Tuesday	9/17	Devices: semiconductors	HW1 on circuits due
	Thursday	9/19	Devices: optoelectronics	
Week 5	Tuesday	9/24	Sensors	HW2 on devices released
	Thursday	9/26	Sensors	
Week 6	Tuesday	10/1	Biosensing system	HW2 on devices due
	Thursday	10/3	Biosensing system	
Week 7	Tuesday	10/8	Biosensing system	HW3 on system released
	Thursday	10/10	Fall break	
Week 8	Tuesday	10/15	Biosensing system	
	Thursday	10/17	Mid review	HW3 on system due
Week 9	Tuesday	10/22	Midterm	
	Thursday	10/24	Introduction to AI/ML	
Week 10	Thursday	10/31	Linear algebra	
Week 11	Tuesday	11/5	Neural networks	
	Thursday	11/7	Neural networks	
Week 12	Tuesday	11/12	Neural networks	HW4 on linear algebra released HW5 on neural network released
	Thursday	11/14	Imager	
Week 13	Tuesday	11/19	Introduction to communication systems	
	Thursday	11/21	Optical communications	
Week 14	Tuesday	11/26	Optical communications	HW4 and HW5 due HW6 on optical comm released
	Thursday	11/28	Thanksgiving	
Week 15	Tuesday	12/3	Quantum computing	HW6 on optical comm due
	Thursday	12/5	Final review	
	Tuesday	12/12	Final (2pm – 4pm)	

Statement on Academic Conduct and Support Systems

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

<https://sites.usc.edu/counselingandmentalhealth/>

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

988 Suicide and Crisis Lifeline - 988 for both calls and text messages – 24/7 on call

988lifeline.org

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL) – 24/7 on call

<https://sites.usc.edu/clientservices/>

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086

eeotix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplcity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776

osas.usc.edu

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 740-0411

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

ombuds.usc.edu

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-2850 or otfp@med.usc.edu

chan.usc.edu/patient-care/faculty-practice

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.