

University of Southern California
Ming Hsieh Department of Electrical Engineering

Course Number & Title:	EE 202L, Linear Circuits	
Units:	4	
Semester:	Spring 2021	
Schedule:	<u>Lectures</u>	Tuesdays & Thursdays 10:00 am – 11:50 am
	<u>Labs</u>	Mondays 4:00 pm – 5:50 pm OR 6:00 pm – 7:50 pm
Location:	Online	
Instructor:	Hossein Hashemi	
Office:	PHE 616	
Office Hours:	Tuesdays & Thursdays 8:45 am – 9:45 am	
Contact Information:	hosseinh@usc.edu , 213-740-3596	
Teaching Assistants:	Aria Samiei (samiei@usc.edu), Office Hours: TBD Masashi Yamagata (myamagat@usc.edu), Office Hours: TBD	

Catalogue Description:

Lumped circuit elements; network equations; zero-input and zero-state responses; sinusoidal steady-state analysis; impedance; resonance; network functions; power concepts; transformers; Laplace transforms.

Course Description:

EE 202L covers the analysis of linear circuits and networks. A laboratory component complements the theoretical lectures.

Learning Objectives:

EE 202L is a fundamental course that covers the analysis of linear lumped circuits. Several important mathematical concepts related to matrices, complex variables, differential equations, and Laplace transform will be covered in the context of linear circuits.

Prerequisite: MATH 245

Main Text Book: R. Thomas, A. Rosa, G. Toussaint, *The Analysis and Design of Linear Circuits*, Wiley, 9th Edition, 2019.

Readings: All lecture notes will be available on Blackboard.

Grading:

Homework	10%
Midterm Exam #1	20%
Midterm Exam #2	20%
Labs & Projects	20%
Final Exam	30%

Tentative Weekly Schedule

Week	Date	Subject	Readings	HW
1	Mon 01/18/2021		Chapters 1 & 2	
	Tue 01/19/2021	Symbols & Units; Circuit Variables		HW 1 Assign
	Thu 01/21/2021	Element Constraints; Connection Constraints		
2	Mon 01/25/2021		Chapter 2	
	Tue 01/26/2021	Combined Constraints; Equivalent Circuits		HW 2 Assign
	Thu 01/28/2021	Voltage & Current Division; Circuit Reduction		HW 1 Due
3	Mon 02/01/2021		Chapter 3	
	Tue 02/02/2021	Review of Matrices		HW 3 Assign
	Thu 02/04/2021	Node-Voltage Analysis; Mesh-Current Analysis		HW 2 Due
4	Mon 02/08/2021		Chapter 3	
	Tue 02/09/2021	Linearity Properties; Thevenin & Norton Equivalent Cir.		HW 4 Assign
	Thu 02/11/2021	Maximum Signal Transfer; Interface Design		HW 3 Due
5	Mon 02/15/2021		Chapter 4	
	Tue 02/16/2021	Midterm Exam #1		HW 5 Assign
	Thu 02/18/2021	Linear Dependent Sources		HW 4 Due
6	Mon 02/22/2021		Chapter 4	
	Tue 02/23/2021	Analysis of Circuits with Dependent Sources		HW 6 Assign
	Thu 02/25/2021	The Operational Amplifier		HW 5 Due
7	Mon 03/01/2021		Chapter 4	
	Tue 02/02/2021	Op-Amp Circuit Analysis		HW 7 Assign
	Thu 03/04/2021	Op-Amp Circuit Design		HW 6 Due
8	Mon 03/08/2021		Chapter 4,5	
	Tue 03/09/2021	Op-Amp Circuit Applications		HW 8 Assign
	Thu 03/11/2021	Signal Waveforms; Step & Exponential Waveforms		HW 7 Due
9	Mon 03/15/2021		Chapters 5, 6	
	Tue 03/16/2021	Sinusoid Waveform; Composite Waveforms		HW 8 Assign
	Thu 03/18/2021	The Capacitor; The Inductor; Dynamic Op-Amp Circuits		HW 7 Due
10	Mon 03/22/2021		Chapters 7	
	Tue 03/23/2021	Wellness Day		HW 8 Assign
	Thu 03/25/2021	Midterm Exam #2		HW 7 Due
11	Mon 03/29/2021		Chapter 7	
	Tue 03/30/2021	RC and RL Circuits		HW 9 Assign
	Thu 04/01/2021	First-Order Circuit Step Response		HW 8 Due
12	Mon 04/05/2021		Chapter 7	
	Tue 04/06/2021	1 st -Order Circuit Response to Exponential & Sinusoid		HW 10 Assign
	Thu 04/08/2021	Series RLC Circuit; Parallel RLC Circuit		HW 9 Due
13	Mon 04/12/2021		Chapter 7	
	Tue 04/13/2021	Laplace Transform; Basic Properties & Pairs		HW 11 Assign
	Thu 04/15/2021	Pole-Zero Diagrams; Inverse Laplace Transform		HW 10 Due
14	Mon 04/19/2021		Chapters 9 & 10	
	Tue 04/20/2021	Circuit Response using Laplace Transform		HW 12 Assign
	Thu 04/22/2021	Wellness Day		HW 11 Due
15	Mon 04/26/2021		Chapter 10	
	Tue 04/27/2021	Transformed Circuits & Circuit Analysis in the s domain		
	Thu 04/29/2021	Node-Voltage & Mesh-Current Analyses in the s domain		HW 12 Due

16	Tue 05/11/2021	Final Exam		
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Homework

Unless otherwise stated, homework assignments are due on Thursdays at the beginning of the class. Solutions will be posted on the class website on the same day.

Late homework will not be accepted. No exceptions except institution-established emergency reasons; credit for such late homework is with the discretion of the professor.

Limited collaboration in solving homework problems is allowed. This includes reviewing and discussing the problems with current EE 202L students and TA prior to writing down your solution. Everybody has to write his/her own solution independently and make sure to fully understand it. Exchanging solutions, consulting with people other than class members, finding solutions on the web or elsewhere, etc. are not allowed. Violations result in losing the credit for the entire homework set in addition to a significant percentage of the overall course grade, all with the discretion of the professor.

All answers should be clearly and fully justified. If we can't figure out your steps from is turned in, points will be deducted, even if your final answer is correct.

One or more of the homework assignments include design problems as well as the typical analysis problems. Simulation and performance verification of the design problems will be in the Cadence environment.

Final Design Project

The final project will consist of a transistor-level design, analysis, and simulation of a complete integrated circuit such as a high-performance Operational Trans-conductance Amplifier (OTA) in the Cadence environment using a state-of-the-art semiconductor foundry process design kit. Design project must be completed individually. Final project grading will be based on design creativity, achieved specifications, completeness of the written report including comparison between analysis and simulation results, and the quality of the oral presentation including answering to the questions posed by the instructor and other classmates. The approximate timeline for the project is as follows:

Late October:	Announcement of the final project description
Last Friday of the class:	Due date for electronic submission of the project schematic
Last Monday of the class:	Oral presentations, and due date for submission of the report

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

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

studenthealth.usc.edu/counseling

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

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298

equity.usc.edu, titleix.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.symplicity.com/care_report

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

The Office of Disability Services and Programs - (213) 740-0776

dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

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

Diversity at USC - (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

dps.usc.edu, 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) 442-120 – 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.