ESE 271: Electrical circuit analysis

Fall 2020

The course is designed to provide the necessary theoretical background for electronic lecture and lab courses like ESE 211, 218, 311, 314, 324, 372, etc. The course covers the following topics: passive circuit elements: resistors, capacitors, inductors. Elements of circuit topology. Kirchhoff's and Ohm's law. Nodal and mesh analysis. Equivalent circuits. Steady-state AC circuits. Phasors. Transient analysis. Fourier and Laplace transforms. Fundamentals of AC power, coupled inductors (transformers). Two-port networks.

Course Designation: Required Course

Text Books: Main: Charles K. Alexander and Matthew N.O. Sadiku "Fundamentals of Electric Circuits", McGraw Hill, ISBN 978-0-007-352955-4

Additional: R.E. Thomas, R.J. Rosa, G.J. Toussaint "The analysis and design of linear circuits", 7 th Edition, Willey, ISBN 978-1-119-06558-47

Prerequisites: MAT 127 or 132 or 142 or 171 or AMS 161; PHY 127 or 132/134 or 142.

Credit Hours: 3

Instructor: **S.Suchalkin,** sergey.suchalkin@stonybrook.edu

Goals: The goal of the course is to develop skills of theoretical circuit analysis and circuit design.

Lectures are given remotely (Zoom) on Mondays and Wednesdays 8:30 a.m. – 9:50 a.m.

Office hours are offered remotely (Zoom) on Thursdays 11:00 a.m. – 1:00 p.m.

Exams: there are 2 midterm and 1 noncumulative final exams.

Grading: Homework 10%; Midterm 1 – 25%; Midterm 3 – 30%; Final – 35%.

Topics Covered:

Week 1	Mon Aug. 24	Lecture 1. Basic concepts: current, voltage, power.	
	Wed Aug. 26	Lecture 2. Resistor. Ohm's law. Kirchoff's laws.	
Week 2	Mon Aug. 30	Lecture 3. Circuit theorems.	
	Wed Sept. 2	Lecture 4. Dependent sources and operational amplifiers.	HW1 is due
Week 3	Mon Sept. 7	Labor day	
	Wed Sept. 9	Lecture 5. Nodal and Mesh analysis.	
Week 4	Mon Sept. 14	Lecture 6. Circuits with operational amplifiers.	
	Wed Sept. 16	Lecture 7. Material review.	HW2 is due
Week 5	Mon Sept. 21	Midterm exam 1.	
	Wed Sept. 23	Lecture 8. Capacitors.	
Week 6	Mon Sept. 28	Lecture 9. Inductors.	
	Wed Sept. 30	Lecture 10. RC and RL circuits. Time constants.	
Week 7	Mon Oct. 5	Lecture 11. Phasors. Impedance. RLC circuits.	HW3 is due
	Wed Oct. 7	Lecture 12. AC steady state. Nodal analysis.	
Week 8	Mon Oct. 12	Lecture 13. AC steady state. Mesh analysis.	
	Wed Oct. 14	Lecture 14. First order circuit. Transfer functions. Bode plots.	
Week 9	Mon Oct. 19	Lecture 15. Complex power. RMS.	HW4 is due
	Wed Oct. 21	Lecture 16. Magnetically coupled circuits. Transformers.	
Week 10	Mon Oct. 26	Lecture 17. Material review.	
	Wed Oct. 28	Midterm exam 2.	
Week 11	Mon Nov. 2	Lecture 18. Laplace transform.	
	Wed Nov. 4	Lecture 19. Laplace transform.	
Week 12	Mon Nov. 9	Lecture 20. Laplace transform.	
	Wed Nov. 11	Lecture 21. Circuits in s-domain. Transfer functions.	HW5 is due
Week 13	Mon Nov. 16	Lecture 22. Step and impulse response. Poles. Stable circuits.	
	Wed Nov. 18	Lecture 23. Frequency response function. Bode plots.	
Week 14	Mon Nov. 23	Thanksgiving break	
	Wed Nov. 25	Thanksgiving break	
Week 15	Mon Nov. 30	Lecture 24. Resonant filters.	
	Wed Dec. 2	Lecture 25. Two port networks	HW6 is due
Week 15	Mon Dec. 7	Lecture 26. Material review	
Finals	Dec. 9-17	Final exam (non cumulative).	

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact the Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631)632-6748.