SYLLABUS

Course title and number: Electrical Circuit Theory, ECEN 214, sections 518 to 523
Term: Spring 2020

Meeting Times & Locations

Lectures: Tuesdays & Thursdays, 11:10 AM – 12:25 PM, ZACH 241
Lab Sections:
Sections 518 & 519, Fridays, 08:00 AM – 10:50 AM, ZACH 324
Sections 520 & 521, Fridays, 11:30 AM – 02:20 PM, ZACH 324
Sections 522 & 523, Fridays, 03:00 PM – 5:50 PM, ZACH 324

Learning Objectives

1. Understand three basic electrical quantities: charge, current and voltage and the use of sign conventions. Investigate power and energy and demonstrate that these quantities are conserved.
2. Analyze circuits with independent and dependent sources. Define and utilize the fundamental laws of circuit theory: Ohm's and Kirchhoff's laws.
3. Explore series and parallel resistive circuits, delta-wye transformation, voltage and current division principles. Explore the equivalent resistance, voltages, currents, and power in series and parallel connection of resistors. Illustrate how the above laws and techniques can be applied to the design of resistive circuits.
4. Understand two systematic techniques of circuit analysis: nodal and mesh analysis. Introduce methods of simplifying circuits: source transformation, superposition, Thevenin and Norton equivalent circuits. Understand the concept of the equivalent circuit and learn a variety of techniques for finding the Thevenin equivalent circuit. Investigate the maximum power transfer to a resistive load.
5. Understand operational amplifiers, its circuit model and v-i characteristics. Define the ideal op-amp and its terminal voltages and currents. Analyze various circuits containing op-amps. Analyze some popular op-amp circuits: inverting, non-inverting, summing and difference amplifier circuits.
6. Understand capacitors and inductors as two energy storage components. Investigate the properties of capacitors and inductors and their v-i relationships. Introduce parallel and series combinations of capacitors and inductors.
7. Understand the exponential response of first-order RL and RC circuits without and with constant excitation sources present. Derive the exponential solution that characterizes the voltage and current response of RL and RC circuits.
8. Explore the parallel and series RLC circuits. Derive the differential equations and develop a systematic method for finding the voltage and current response in RLC circuits. Define and understand the significance of underdamped, overdamped and critically damped responses.
9. Review the basic arithmetic of complex numbers. Introduce the concept of phasor for representing sinusoidal voltages and currents. Define the concepts of impedance and a generalized ohm's law. Utilize the circuit analysis techniques and the network theorems, to analyze ac circuits by phasor methods.
10. Understand the concept of RMS and an average value of a periodic voltage or current. Define the average power, reactive power, apparent power and complex power and discuss their significance. Introduce the concept of power factor and describe a method and reasons for improving the power factor associated with the load. Derive the maximum power transfer theorem for ac circuits.

Instructors' Information

Ogbonnaya Bassey, email: ogb.bassey@tamu.edu
Dr. Karen Butler-Purry, email: klbutler@tamu.edu

Office hours

Tuesdays 3:00 PM – 5:00 PM, Location: WEB 051
Wednesdays 3:00 PM – 5:00 PM, Location: WEB 051
Or by appointment

Teaching Assistants

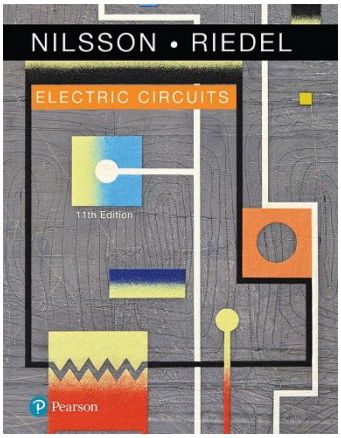
Lab Sections	TA	Email
518	Meltem Apaydin	ma193746@email.tamu.edu
519	Nathan Taylor	ntaylor18@email.tamu.edu
520	Meltem Apaydin	ma193746@email.tamu.edu
521	Yukun Tan	yukuntan@email.tamu.edu
522	Meltem Apaydin	ma193746@email.tamu.edu
523	Nathan Taylor	ntaylor18@email.tamu.edu

Grader

For these course sections, Mandaar Kandarp Padh (mandaar_007@tamu.edu), will assist with some of the grading responsibilities.

Textbook & Materials

1. Electric Circuits, 11th Edition (or any recent edition), by James W. Nilsson and Susan A. Riedel, Pearson (Prentice Hall) with Mastering Engineering (required)
Or
Mastering Engineering with eText (possibly more affordable) of Electric Circuits, 11th Edition, by James W. Nilsson and Susan A. Riedel



2. Lab manual (posted on eCampus)

Prerequisites

Upper-division status in ECE plus Physics 208 & Math 308 (can be co-registered in Math 308)

Grading Policies

Homework	10%
Laboratory	20%
Quizzes	20%
Midterm Exams	30% (10% each)
Final Exam	20%

All requests for regrading should be submitted to your instructor within one week that the graded material is returned. Include a note on what you want to be regraded and why you think it should be regraded.

Grading Scale (out of 100)

A: 90-100; B: 80-89; C: 70-79; D: 60-69; F: 59 or lower

Note: Laboratory attendance is mandatory for a passing grade. Students repeating ECEN 214 for a better grade are required to repeat both the lecture and laboratory portions of the course.

Homework & Mastering Engineering

Homework will be assigned through Mastering Engineering. For easier access to Mastering Engineering, it has been integrated into the eCampus/blackboard page for the sections of this class. Homework will be assigned on Thursday at 9 AM of each week and will be due on Wednesday of the following week by 11:59 PM. Late submission receives a 10% reduction in score for each day late up until 50% maximum reduction after which the reduction stays the same. You can complete the late homework anytime until the final day of exam.

Guidelines on how to setup Mastering on the eCampus/blackboard has been posted on the "Start Here" section of the eCampus class page.

Quizzes

There will be an in-class quiz each week on Thursdays in which there is no exam except for the first week. The quizzes are closed book. The quizzes will consist of one of the homework problems that was due the previous night with a small modification in the problem. It is highly advisable that you come with your own calculator for each quiz. The quiz will typically take less than 15 minutes of the usual lecture time. Your quiz grade will be formed from the average of the best 8 out of 9 quizzes.

Exams

All exams (midterms and finals) will be closed book. You are allowed to bring in one sheet of one-sided and two-sided notes on a plain paper (8.5 by 11 inches) for midterm and final exam respectively. Note that while the midterms will cover about a third of the class materials, the final is comprehensive. Calculator is highly recommended for each exam. Make sure to bring a calculator that you are familiar with.

Online Class Discussion

We will use the eCampus for class discussions related to homework, lectures and concept questions. Your instructors will create forums on eCampus under the "Discussion" page. When posting about questions or comments, please choose a forum that is mostly related to it. At the end of the semester, extra credit (up to 1% in cumulative grade) will be awarded to students who were most active and creative towards the use of the Discussion forum.

Getting Help

There are different ways you can get help related to materials in this class: You can post your questions on the eCampus discussion forum and get a response from your peers and instructor. You can ask your instructors for help during their office hours or email them to schedule an appointment. You can ask your TA for help.

Tentative Lecture, Quiz & Exam Schedule

Note that schedule is subject to change

Week	Topic	Textbook Chapters
1. Week of Jan 13	Course overview, circuit variables, power balance, math review (solution to a system of linear equations), sources, ohm's law	Chs. 1 & 2
2. Week of Jan 20	Kirchhoff's law, equivalent resistances, voltage & current divider circuits, the Wheatstone Bridge, Δ-Y equivalent circuits **Quiz 1**	Chs. 2 & 3
3. Week of Jan 27	Nodal analysis, mesh analysis, source transformations **Quiz 2**	Ch. 4

4. Week of Feb 3	Thevenin & Norton equivalents, maximum power transfer, superposition, introduction to op-amps **Quiz 3**	Chs. 4 & 5
5. Week of Feb 10	Op-amps configurations **Exam 1 (Chs. 1 – 4)**	Ch. 5
6. Week of Feb 17	Inductance, Capacitance & Mutual Inductance, math review (first-order differential equations) **Quiz 4**	Ch. 6
7. Week of Feb 24	First-order RL and RC circuits **Quiz 5**	Ch. 7
8. Week of Mar 2	Math Review (second-order differential equation) **Exam 2 (Chs. 5-7)**	
9. Week of Mar 9	Spring Break	
10. Week of Mar 16	Natural & Step response of RLC circuits **Quiz 6**	Ch. 8
11. Week of Mar 23	Second-order op-amp circuits, finding initial and final conditions, math review (complex numbers) **Quiz 7**	Chs. 8
12. Week of Mar 30	Introduction to phasors, AC circuit analysis **Quiz 8**	Ch. 9
13. Week of Apr 6	Sinusoidal steady-state power calculations **Exam 3 (Chs 8 – 9)**	Ch. 10
14. Week of Apr 13	Maximum power transfer in AC circuits **Quiz 9**	Ch. 10
15. Week of Apr 20	TBD	
	Final Exam, Comprehensive, Time: 3:00 PM – 5:00 PM, Thursday, April 30	

Weekly Lab Activities

For most weeks of the semester (see schedule above), you will be turning in a prelab assignment for the current lab, a lab report for the previous week's lab, performing the specified measurements for the current week's lab, and attending a 15 minute meeting with your lab TA. The specific due dates and times for all these items will vary depending on your section/TA. Your TA will provide you with more details during the first two weeks of class. There is no lab work for the first two weeks of class, but your TA may schedule a meeting during your regularly scheduled lab time to go over some details on how things will work throughout the semester.

Analog Discovery

In the lab, you will be using the Analog Discovery 2. With this device, you can emulate the functionalities of an oscilloscope, waveform generator, voltmeter, adjustable power supply, etc. on your PC. You can order the Analog Discovery 2 here: http://www.ni.com/en-us/shop/select/analog-discovery-2. Software for the device is freely available online for Windows, Mac OS X, and Linux operating systems at the following page: https://reference.digilentinc.com/reference/software/waveforms/waveforms-3/start. The labs will be performed by groups of two students, so you may share a device with your lab partner to decrease the cost. Further instructions will be provided by the TAs.

Tentative Lab Schedule

Date	Lab
Week of Jan. 13	No Labs
Week of Jan. 20	Go to the lab meeting time, meet with TA (Monday = MLK Day)
Week of Jan. 27	Lab #1 – Introduction to Electrical Measurements
Week of Feb. 3	Lab #2 – Non-Ideal Sources **Lab Report #1 Due**
Week of Feb. 10	LAB PRACTICUM #1

Week of Feb. 17	Lab #3 – Equivalent Networks and Superposition **Lab Report #2 Due**
Week of Feb. 24	Lab #4 - OpAmps/Security System Part 1 **Lab Report #3 Due**
Week of Mar. 2	Lab #5 - OpAmps/Security System Part 2 **Lab Report #4 Due**
Week of Mar. 9	**Spring Break – No Lab Meetings**
Week of Mar. 16	LAB PRACTICUM #2
Week of Mar. 23	Lab #6 - Transient Response of a 1st Order Circuit **Lab Report #5 Due**
Week of Mar. 30	Lab #7 - Transient Response of a 2nd Order Circuit **Lab Report #6 Due**
Week of Apr. 6	LAB PRACTICUM #3 (TA office hours)**
Week of Apr. 13	Lab #8 - AC Steady-State Response of 2nd Order Circuit ** **Lab Report #7 Due** **
Week of Apr. 20	Lab #9 – Power Transfer in AC Circuits **Lab Report #8 Due**
Week of Apr. 27	**Lab Report # 9 Due**

Note **: Because Friday, April 10 is reading day, which is part of the week of April 6, Lab 8 schedule and Lab 7 report due dates have been moved to the week of April 13. Your TA will decide on how best lab practicum #3 will be conducted (may be done through TA office hours before Friday, April 10). Some of the other instructors may switch the order of the lab assignments for these two weeks.

Academic Integrity Statement

"*An Aggie does not lie, cheat or steal, or tolerate those who do*."
The Honor Council Rules and Procedures can be found here: http://aggiehonor.tamu.edu

American with Disabilities Act (ADA) Policy Statement

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit http://disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Excused Absences

Refer to http://student-rules.tamu.edu/rule07 for all policies regarding excused absences. Please read thoroughly.