ENGR 6

Electric Circuit Analysis with Lab

Spring 2021

Section #54099

Class:
On-Campus Lab: T 1:00-3:50 pm PHY-7, plus online

Instructor:
Dr. John Heathcote
Office:
FEM-1B (in the math study center)
Phone:
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Virtual Office Hours:

M	11:00 am-12:50 pm
W	9:00-9:50 am
ThF	11:00-11:50 am

These are my official office hours, but you can find me at many other times!
Send me an email or a Canvas message to set up a Zoom meeting!

During virtual office hours, I will be monitoring my Canvas messages closely. Send me a message and I will quickly answer your question or we can set up an instant Zoom meeting.

Course Communication Policy:
My instructions to you each week will be posted in a weekly module. Be sure to read through all instructions posted in the module so that you fully understand what you need to complete each week. (Do not simply look at assignments posted in your course calendar. You will miss some important instructions if you do that.)

I will send Canvas messages regularly to keep you updated on the progression of the class and any important announcements. You will need to read these to stay informed about the class.
I will be available for virtual office hours as shown above. During these times, you can expect a quick response from a Canvas message or we can set up a Zoom meeting.

Another important method of communication will be the feedback that I provide when I grade your assignments. Whenever you have a new grade posted, read any comments that I have posted regarding your work. This feedback will be very important for you to know what you have done well and what needs improvement.

Please contact me with any questions or concerns you have about this class. Contact me through a Canvas message. I will reply within 24 hours on weekdays. I may be able to respond on weekends as well, but it is not guaranteed. (If I do not respond within 24 hours, please resend your message.)

Required Text: Fundamentals of Electric Circuits, 6th Edition, Alexander and Sadiku, McGraw Hill

Welcome to Electric Circuit Analysis!

I would like to welcome you to ENGR 6, in which you will learn to analyze electric circuits. You will learn techniques that will allow you to take a rather complicated electric circuit diagram and determine the amount of current, voltage, or power at different points in a circuit. You will also develop laboratory skills in building circuits and using measurement tools. This is a challenging, but fun, course in electrical engineering!

Catalog Description: An introductory course in the analysis of DC and AC linear circuits containing resistors, inductors, capacitors, independent and dependent voltage and current sources, and operational amplifiers. Lecture topics include Ohm's Law, Kirchhoff's Laws, loop and mesh analysis, Thevenin's and Norton's Theorems, superposition, natural and forced response in first and second order circuits, phasor analysis, resonance, AC steady-state power calculations, power transfer, and energy concepts. Lab component includes construction, testing, and analysis of linear electrical circuits

Prerequisite: Physics 4B
Corequisite: Math 7 or Math 17
Advisories: English 1A

Grading:

60%	Tests
15%	Final Exam
15%	Homework, Classwork and Quizzes
10%	Laboratory Performance and Reports

Grading Scale:
A: 90-100%
B: 80-89%
C: 70-79%
D: 60-69%
F: <60%

Tests: There will be four tests given during the term. These tests will be traditional written tests taken during the scheduled lab period. Each test will typically cover the chapters that were immediately presented during that unit. The rules for allowed notes will be declared ahead of time. If a student cannot take a test during a scheduled time (for whatever reason), he/she must contact the instructor (by email, phone, or in person) by the start of the test.

Tentative Test Dates: 2/9, 3/9, 4/13, 5/11, 5/18 (Final)

Final Exam: A cumulative final exam will be given during exam week. It will cover all of the topics presented during the semester.

Assignments:
Written assignments will include end-of-chapter problems from the textbook or other problems set up for you to practice the material. To receive full credit, the assignments should be performed neatly and submitted on time. Draw the circuit diagram and show your work for each problem.

You will work these problems out by hand and then scan and submit your work on Canvas. A good app to use to scan your work and create a pdf file is GeniusScan. This app will create very clear pictures of your work and will compile them together as one pdf file.

Class Work:
In-class work problems may be assigned and completed during some on-campus lab periods. These will be problems related to assignment problems to further students' understanding and practice problem-solving skills.

Laboratory Performance and Reports: This course includes a laboratory section during which we will perform experiments to complement the coursework for the class. The laboratory grade will be based on performance during the lab experiment and some required written reports. Grades for laboratory reports may be based on the quality of your experimental work, the analysis of the experiment, the accuracy of your experimental calculations, and your ability to set up circuit equipment. Occasional lab quizzes will be given to test students' ability to use the laboratory equipment.

Due to the Covid-19 situation, we will have a specific protocol for you to follow during lab days. It is very important that you follow these procedures to keep everyone in the class safe.

If you cannot attend a lab, you will be able to make up the grade with an alternate assignment or make up the lab, as long as you contact me before the lab period. (If you are feeling sick or if you have been recently exposed to someone with Covid-19, you should not attend the lab.) **Contact me via Canvas message before class if you are going to miss a lab period.**

Late Work and Make-up Tests: Homework and laboratory reports should be submitted on time. If there is a valid reason that the work must be turned in late, please inform the instructor ahead of time. Otherwise, late work will not receive full credit. Canvas will automatically deduct points for assignments submitted late.

Make-up tests will only be arranged upon prior approval. If you will know that you will miss a test, you MUST let the instructor know beforehand. If you are sick on the day of a test, you must contact the instructor on that day.

Attendance: Attendance at the lab sessions is mandatory. Class attendance will be recorded. If you miss more than two sessions without contacting me about your situation, you may be dropped.

Add Date:	Friday, January 29	Last day to add a course
Drop Date:	Friday, March 12	Last day to drop this course
Holidays:	Monday, January 18	Martin Luther King Jr. Day
	Friday, February 12-Monday, February 15	Presidents' Day Holidays
	Monday-Friday, March 29 – April 2	Spring Break

Accommodations for Students with Disabilities:

If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact me as soon as possible.

Canvas Course Site:

A Canvas course website is set up for this course. You can look here for class notes, assignments, schedules, or posted solutions. It can be accessed via the Canvas link on the Reedley College home page. Your user name is your seven digit student number.

Academic Dishonesty:

Students at Reedley College are entitled to the best education that the college can make available to them, and they, their instructors, and their fellow students share the responsibility to ensure that this education is honestly attained. Because cheating, plagiarism, and collusion in dishonest activities erode the integrity of the college, each student is expected to exert an entirely honest effort in all academic endeavors. Academic dishonesty in any form is a very serious offense and will incur serious consequences.

Cheating is the act or attempted act of taking an examination or performing an assigned, evaluated task in a fraudulent or deceptive manner, such as having improper access to answers, in an attempt to gain an unearned academic advantage. Cheating may include, but is not limited to, copying from another's work, supplying one's work to another, giving or receiving copies of examinations without an instructor's permission, using or displaying notes or devices inappropriate to the conditions of the examination, allowing someone other than the officially enrolled student to represent the student, or failing to disclose research results completely.

Plagiarism is a specific form of cheating: the use of another's words or ideas without identifying them as such or giving credit to the source. Plagiarism may include, but is not limited to, failing to provide complete citations and references for all work that draws on the ideas, words, or work of others, failing to identify the contributors to work done in collaboration, submitting duplicate work to be evaluated in different courses without the knowledge and consent of the instructors involved, or failing to observe computer security systems and software copyrights. Incidents of cheating and plagiarism may result in any of a variety of sanctions and penalties, which may range from a failing grade on a particular examination, paper, project, or assignment in question to a failing grade in the course, at the discretion of the instructor and depending on the severity and frequency of the incidents.

Lecture/Lab Schedule (subject to change):

Week 1	Chapter 1	Introductory Lab
Week 2	Chapter 2	Unknown Resistance Lab
Week 3	Chapter 3A	Kirchhoff's Law Lab
Week 4	Chapter 3B	Voltage Divider Lab
Week 5	Chapter 4A	Test #1
Week 6	Chapter 4B	Linearity and Superposition Lab
Week 7	Chapter 5	Thevenin Equivalent Lab
Week 8	Chapter 6	Op Amp Lab
Week 9	Chapter 7	Test #2
Week 10	Chapter 8A	First Order Circuit Lab
Week 11	Chapter 8B	1st and 2nd Order Circuits Lab
	Spring Break	
Week 12	Chapter 9A	Oscilloscopes
Week 13	Chapter 9B	Test #3
Week 14	Chapter 10	Frequency Response Lab
Week 15	Chapter 11A	Black Box Lab
Week 16	Chapter 11B	Power Factor Correction Lab
Week 17	Final Exam Review	Test #4
Week 18	Finals Week	Final Exam

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

A. Determine unknown electrical quantities using the basic v-i characteristic equations of electrical components.

B. Solve DC circuit problems using a variety of analytical techniques.

C. Solve AC circuit problems using phasor methods.

D. Solve steady-state AC power problems.

E. Use basic electrical test and analysis equipment in a laboratory setting.

F. Plan, execute, and write reports for laboratory experiments.

COURSE OBJECTIVES:

In the process of completing this course, students will:

A. Derive and use the v-i (voltage-current) characteristic equations for resistors, operational amplifiers, and independent and dependant power sources.

B. Solve DC electrical circuit analysis problems using Kirchhoff's voltage and current laws.

C. Apply series and parallel resistor theorems.

D. Apply current and voltage division theorems.

E. Solve DC electrical circuit analysis problems using the analysis techniques of mesh current and node voltage.

F. Solve DC electrical circuit analysis problems using the analysis techniques of superposition, Thevenin's Theorem, and Norton's Theorem.

G. Derive and use the v-i characteristic equations for energy storage devices (capacitors and inductors).

H. Solve first order circuit problems involving energy storage devices (both natural and forced response problems).

I. Solve second order circuit problems involving energy storage devices (both natural and forced response problems).

J. Learn and use phasor analysis techniques for solving AC steady-state circuit problems.

K. Apply KVL, KCL, node voltage, mesh current, Thevenin's Theorem, Norton's Theorem, and superposition analysis techniques to solve AC steady-state circuit problems.

L. Calculate power quantities in AC steady-state circuit problems using the appropriate equations and the power triangle.

M. Calculate electrical quantities in three-phase AC electrical circuits.

N. Learn to competently use electrical laboratory test and analysis equipment.