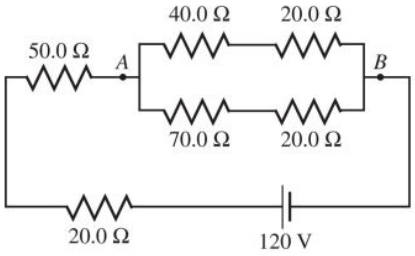
Electric Circuit Analysis with Lab

Spring 2019

Engineering 6 – *Section #57109*

Electric Circuit Analysis with Lab



Instructor: Dr. John Heathcote **Class Times:** Lecture/Lab: M 1:30-4:20 pm PHY-70
Lecture/Lab: W 1:30-4:20 pm BUS-49

Office: FEM-1B, in the Math Study Center

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Office Hours:

TTh 12:00-1:50 pm
F 10:00-10:50 am

These are my official office hours, but you can find me at many other times! You can also find me in my office most days between 10 and noon. If you see me there, I am available to answer your questions or discuss any topic. Please come by!

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 125 and 126

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. 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: 2/11, 3/11, 4/3, 5/13, 5/20 (Final)

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

Homework: Homework will be assigned in order to practice the problem-solving skills taught in class. 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.

Class Work and Quizzes: In-class work problems may be assigned and completed during some class periods. These will be problems related to homework problems to further students' understanding and practice problem-solving skills. Quizzes may also be given to test students' understanding and problem-solving ability.

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.

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. 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 call the instructor on that day.

Attendance: Attendance in class and at the lab sessions is mandatory. Class attendance will be recorded. If you miss more than four (4) class sessions, you may be dropped.

Make-Up Labs: If you must miss a lab session and want to make up the points, you will need to make up the laboratory work at another time. You will have to work around the instructor's schedule in order to find a time when he can supervise the laboratory work.

Add Date:	Friday, February 1	Last day to add a course
Drop Date:	Friday, March 8	Last day to drop this course
Holidays:	Monday, January 21	Martin Luther King Jr. Day
	Friday-Monday, Feb. 15-18	Presidents' Day Holidays
	Monday-Friday, April 15-19	Spring Recess Holidays
Final:	Monday, May 20, 1:00-2:50 pm	

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	Chapters 1 and 2	Introductory Lab
Week 2	Chapters 2	No Lab *(MLK, Jr. Day)*
Week 3	Chapter 3	Unknown Resistance Lab
Week 4	Chapter 4	Voltage Divider Lab
Week 5	Chapter 4	**Test #1**
Week 6	Chapter 4	No Lab *(Presidents' Day)*
Week 7	Chapters 5 and 6	Op Amp Lab
Week 8	Chapters 6 and 7	Linearity and Superposition Lab
Week 9	Chapter 7	**Test #2**
Week 10	Chapter 8	First Order Circuit Lab
Week 11	Chapter 8	1^{st} and 2^{nd} Order Circuits Lab
Week 12	**Test #3**	Test Review
Week 13	Chapter 9	Phasor Lab
	Spring Break	
Week 14	Chapters 9 and 10	Frequency Response Lab
Week 15	Chapter 11	Black Box Lab
Week 16	Chapter 11	AC Circuits
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.