ECE 209
Fundamentals of Electric Circuits
Department of Electrical and Computer Engineering
The University of Maine
Fall Semester 2017

Fundamentals of Electric Circuits

Course Number: ECE 209
Credits: 3
Lecture: 9:30 - 10:45 pm, Tuesday and Thursday; 210 Boardman Hall
Prerequisites: MAT 127 – Calculus II and PHY 122 – Physics for Engineers II
Course Website: http://web.eece.maine.edu/kotecki/ECE209

Instructor

Dr. David E. Kotecki
Office: 277 Barrows / ESRB
Tel: 207 581-2248
e-mail: kotecki@maine.edu

Office Hours

You are encouraged to drop by my office to ask questions and discuss homework problems. My office hours are:
10:00 - 11:00 am Monday and Wednesday
1:00 - 2:00 pm Tuesday and Thursday

Text Book

Title: Electric Circuits (10th edition)
Authors: James W. Nilsson and Susan A. Riedel
Publisher: Prentice Hall
Year: 2015
ISBN: 13:978-0-13-376003-3

Calculators

It is strongly recommended that you have a calculator capable of solving simultaneous linear equations with complex variables. Calculators may be used when solving homework problems and taking exams. The most popular calculators are the TI-89, TI-89 Titanium, and the TI Nspire CX CAS. If you do not own one of these calculators, try to borrow one for use during the examinations.

Goals

This is a foundation course in circuit analysis. You will acquire the fundamental tools to analyze linear circuits. You will learn how to analyze and solve circuit problems containing basic circuit elements including: wires, resistors, capacitors, inductors, independent and dependent voltage and current sources, and operational amplifiers. Both time–independent (DC), transient, and steady–state analysis will be introduced. This course will prepare you for more advanced courses in circuit analysis, signals and systems, and electronics. This course should help you pass the PE exam.

Homework

The homework problems are located at the end of each chapter. All of the assigned problems are listed Page 5 of this syllabus. You may submit your solutions to the homework problems in class or give them directly to the Homework Grader. Homework must be submitted no later than 5:00 pm on the due date. Late homework is not normally accepted.

Not all homework problems will be graded; a selected number of problems from each assignment will be corrected and used to determine your homework grade. The homework score will be based on the correct method and the correct answer. Circle your final answers! Presentation will not be separately graded, but poor presentation of your work will lower your grade – be neat!

You may work on the homework problems individually on with others in the class. You are encouraged to work together and discuss your solution to the problem with other students in the class. Each student is required to submit their own homework solutions.

Homework Grader

Thomas Leighton (TJ)
e-mail: thomas.leighton@maine.edu
Homework drop-off: 299 Barrows Hall (combination #299111)

Exams

There are three Preliminary Exams and one Final Exam. You may bring an 8.5" x 11" sheet of paper with notes along with any information stored in your calculator to the exams. Only hand held calculators (no tablets, phones, or laptops) may be used. The exam grade will be based on both the method used to solve the problem and the answer. Answers to problems not supported by a correct method will not earn credit. Presentation will not be separately graded and I will do my best to figure out what you meant to do on a problem, but if the work is poorly laid out or just a mess, your grade will suffer.

The exams are designed to test your knowledge of fundamental concepts and your ability to apply those concepts to solve problems. It is important to learn and master the key concepts rather than memorize how to do individual problems. Problems on the exams will be similar to but different from the problems in the homework. However all exam problems can be solved using the same concepts and techniques used to solve the homework problems.

Examination Dates

Exam #1:	28 September 2017
Exam #2:	24 October 2017
Exam #3:	21 November 2017
Final Exam:	12 December 2017 (9:30-11:30)

Anyone who is unable to attend class during one of the scheduled examination dates must notify the instructor prior to the exam. If you are excused from the exam for cause, a make-up exam will be offered during the last week of classes.

Grading

Exams 1 – 3	20% each
Homework	20%
Final Exam	20%
Total	100%

Letter Grade Assignment Floor

$\geq 90\%$	A
88% – 90%	B +
80% – 88%	B
78% – 80%	C +
70% – 78%	C
68% – 70%	D +
60% – 67%	D
$< 60\%$	F

Tentative Class Schedule

Class	Date	Topics	Sections
1	29 Aug. 2017	Course Overview; Systems of Units; Power & Energy	Chapter 1 – all sections
2	31 Aug. 2017	Voltage, Current, and Resistance	Chapter 2, Sections 1–3
3	5 Sept. 2017	Kirchhoff's Laws	Chapter 2, Sections 4 and 5
4	7 Sept. 2017	Series and Parallel Resistance; Measuring Current and Voltage	Chapter 3, Sections 1–7
5	12 Sept. 3017	Nodal Analysis	Chapter 4, Sections 1 and 2
6	14 Sept. 2017	Nodes and Dependent Sources	Chapter 4, Sections 3 and 4
7	19 Sept. 2017	Mesh Analysis	Chapter 4, Section 5
8	21 Sept. 2017	Loops and Dependent Sources	Chapter 4, Sections 6 – 8
9	26 Sept. 2017	Source Transformations, Thévenin and Norton Equivalents	Chapter 4, Sections 9 – 11
10	28 Sept. 2017	Exam #1	—
11	3 Oct. 2017	Superposition	Chapter 4, Sections 12 and 13
12	5 Oct. 2017	Operational Amplifiers	Chapter 5, Sections 1–4
13	12 Oct. 2017	Op Amp Circuits	Chapter 5, Sections 5–6
14	17 Oct. 2017	The Inductor and Capacitor	Chapter 6, Sections 1 – 3
15	19 Oct. 2017	Mutual Inductance	Chapter 6, Sections 4 and 5
16	24 Oct. 2017	Exam #2	—
17	26 Oct. 2017	Natural Response RL and RC Circuits	Chapter 7, Sections 1 and 2
18	31 Oct. 2017	Step Response and General Solutions	Chapter 7, Sections 3 and 4
19	2 Nov. 2017	Sequential Switching	Chapter 7, Section 5
20	7 Nov. 2017	The Sinusoid	Chapter 9, Sections 1 and 2
21	9 Nov. 2017	The Phasor and Passive Elements	Chapter 9, Sections 3 and 4
22	14 Nov. 2017	Kirchhoff's Law	Chapter 9, Sections 4 and 6
23	16 Nov. 2017	Thévenin and Norton Equivalents; Nodal and Mesh Analysis	Chapter 9, Sections 7 – 9
24	21 Nov. 2017	Exam #3	—
25	28 Nov. 2017	Transformer	Chapter 9, Sections 10 and 11
26	30 Nov. 2017	Instantaneous, Average and Reactive Power	Chapter 10, Sections 1 – 3
27	5 Dec. 2017	Complex Power and Power Transfer	Chapter 10, Sections 4 – 6
28	7 Dec. 2017	Review of Entire Course	—
29	12 Dec. 2017	Final Exam	—

Homework Assignments

Homework	Due Date	Problems
#1	8 Sept. 2017	1.4, 1.7, 1.8, 1.10, 1.11, 1.18, 1.25, 2.5, 2.7, 2.9, 2.12, 2.15, 2.17, 2.23. 2.32, 2.33
#2	15 Sept. 2017	3.3, 3.5, 3.9, 3.11, 3.16, 3.18, 3.20, 3.24, 3.31, 3.39, 3.52, 3.57. 3.60
#3	22 Sept. 2017	4.3, 4.6, 4.7, 4.8, 4.12, 4.15, 4.17, 4.18, 4.23, 4.25, 4.29, 4.30, 4.39
#4	6 Oct. 2017	4.45, 4.51, 4.55, 4.57, 4.58, 4.60, 4.64, 4.68, 4.74, 4.78, 4.82, 4.87, 4.97
#5	13 Oct. 2017	5.1, 5.3, 5.5, 5.6, 5.8, 5.10, 5.16, 5.21
#6	20 Oct. 2017	5.27, 5.31, 5.36, 5.38, 5.44, 6.5, 6.6, 6.10, 6.12, 6.17, 6.19, 6.20, 6.23, 6.28, 6.35
#7	3 Nov. 2017	6.39, 6.45, 7.4, 7.6, 7.10, 7.20, 7.25, 7.29, 7.31, 7.36, 7.37, 7.41, 7.46, 7.57
#8	10 Nov. 2017	7.68, 7.70, 7.73, 7.75, 7.78, 7.79, 7.82
#9	17 Nov. 2017	9.2, 9.4, 9.7, 9.11. 9.18, 9.22, 9.23, 9.24, 9.25, 9.30, 9.33, 9.36, 9.37, 9.39
#10	8 Dec. 2017	9.43, 9.49, 9.53, 9.58, 9.67, 9.74, 9.76, 9.80, 10.1, 10.3, 10.8, 10.22, 10.28, 10.41

Academic Honesty Statement

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

Students with Disabilities Statement

If you have a disability for which you may be requesting an accommodation, contact Student Accessibility Services, 121 East Annex, 581.2319, as early as possible. Students who have already been approved for accommodations by SAS and have a current accommodation letter should provide a copy of the letter to me as soon as possible.

Course Schedule Disclaimer (Disruption Clause)

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

Sexual Violence Policy: Sexual Discrimination Reporting

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination involving members of the campus, your teacher is required to report this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

For confidential resources on campus: Counseling Center: 207-581-1392 or Cutler Health Center: at 207-581-4000.

For confidential resources off campus: Rape Response Services: 1-800-310-0000 or Spruce Run: 1-800-863-9909.

Other resources: The resources listed below can offer support but may have to report the incident to others who can help: For support services on campus: Office of Sexual Assault & Violence Prevention: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911. Or see the OSAVP website for a complete list of services at http://www.umaine.edu/osavp/

An electronic circuit is composed of individual electronic components, such as resistors, transistors, capacitors, inductors and diodes, connected by conductive wires or traces through which electric current can flow. To be referred to as electronic, rather than electrical, generally at least one active component must be present. The combination of components and wires allows various simple and complex operations to be performed: signals can be amplified, computations can be performed, and data can be Electrical circuits are all about energy. Energy is put into a circuit by the battery or the commercial electricity supplier. The elements of the circuit (lights, heaters, motors, refrigerators, and even wires) convert this electric potential energy into other forms of energy such as light energy, sound energy, thermal energy and mechanical energy. Power refers to the rate at which energy is supplied or converted by the appliance or circuit. It is the rate at which energy is lost or gained at any given location within the circuit.

Electric circuit, path for transmitting electric current. An electric circuit includes a device that gives energy to the charged particles constituting the current, such as a battery or a generator; devices that use current, such as lamps, electric motors, or computers; and the connecting wires or transmission lines.Â Encyclopaedia Britannica's editors oversee subject areas in which they have extensive knowledge, whether from years of experience gained by working on that content or via study for an advanced degree. Electric circuits consist of closed loops of electric current. These devices underpin all modern electronics. Use Wolfram|Alpha to compute properties of different circuit elements and their combinations, including diodes, filters and other circuits. Get information on resistors, inductors and capacitors. Examine the relationship between resistance and current with Ohm's law. + Expand. Circuits. An electrical circuit is a path or line through which an electrical current flows. The path may be closed (joined at both ends), making it a loop. A closed circuit makes electrical current flow possible. It may also be an open circuit where the electron flow is cut short because the path is broken.Â It is very important to know the basic parts of a simple circuit and the symbols that relate to them. A simple circuit has conductors, a switch, a load and a power source. Here are the functions of each part