

The University of Maine
Department of Electrical and Computer Engineering
ECE 210 – Electric Circuits I

Spring 2024

Electric Circuits I

Course Number: ECE 210.

Prerequisites: MAT 127 – Calculus II, and PHY 122 – Physics for Engineers II.

Credits: 3.

Lectures: 10:00 - 10:50 pm, Monday, Wednesday and Friday, 119 Barrows Hall.

Recitation: 5:00 - 6:50 pm, Tuesday, 228 Barrows (Prof. John Allen).

Web Site: Brightspace (<https://courses.maine.edu>).

Instructor

Dr. David E. Kotecki

Office: 277 Barrows Hall.

Virtual Office: <https://maine.zoom.us/my/davidkotecki> (Password: circuits24).

e-mail: kotecki@maine.edu

Phone: 207.581.2248

Office Hours

9:00 - 10:00 am, Monday, Wednesday, and Friday.

2:00 - 4:50 pm, Monday, Tuesday, and Thursday (221 Barrows Lab).

You are encouraged to drop by my office, either in-person or virtual, to ask questions and discuss homework problems related to this course. If you are unable to meet during these times, e-mail me to set up an appointment.

Text Book

Title: [Electric Circuits \(12th edition\)](#).

Authors: James W. Nilsson and Susan A. Riedel.

Publisher: Prentice Hall (2023).

ISBN-13: 9780137648160

Available as an e-text: <https://www.vitalsource.com/products/electric-circuits-subscription-james-w-nilsson-susan-riedel-v9780137648368>.

Text book is also used in ECE 214 - Electric Circuits II.

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, TI Nspire CX CAS, and the TI Nspire II CX CAS.

Goals

This is a foundation course in circuit analysis. You will acquire the fundamental tools to analyze and solve for the voltage, current, and power in linear circuits containing basic circuit elements such as wires, resistors, capacitors, inductors, transformers, switches, independent and dependent voltage and current sources, and operational amplifiers. Time-independent (DC), transient, and sinusoidal steady-state (AC) circuit analysis are presented. This course will prepare you for more advanced courses in circuit analysis, electronics, and signals and systems.

Homework

The homework problems are located at the end of each chapter of the textbook. The assigned problems are listed on **Page 5** of this syllabus. Once the homework is completed, photograph or scan your work and upload your solutions to the Assignment section of Brightspace. Homework must be submitted no later than midnight on the due date. Late homework submissions are not generally accepted.

Only a few problems from each homework set will be graded 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.**

You may work on the homework problems individually or 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

Sarah Glatter
e-mail: sarah.glatter@maine.edu

Exams

There are four exams. The first three exams will be held from 5:00 - 6:50 pm during the regularly scheduled recitation sessions; the fourth exam will be held during the final exam week. The exams are closed book and closed notes. You may bring an 8.5" x 11" sheet of paper with notes and a calculator to the exams. 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 and messy, 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:	6 February 2024
Exam #2:	5 March 2024
Exam #3:	2 April 2024
Final Exam:	1 May 2024 (10:30 am - 12:30 pm)

Anyone who is unable to attend 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.

If you have an accommodation letter from Student Accessibility Services, please send me a copy as soon as possible.

Grading

Exam 1	100 points
Exam 2	100 points
Exam 3	100 points
Final Exam	100 points
Homework	100 points
Total	<u>500 points</u>

Letter Grade Assignment Floor

$90\% \leq \text{Average} \leq 100\%$	A
$88\% \leq \text{Average} < 90\%$	B+
$80\% \leq \text{Average} < 88\%$	B
$78\% \leq \text{Average} < 80\%$	C+
$70\% \leq \text{Average} < 78\%$	C
$68\% \leq \text{Average} < 70\%$	D+
$60\% \leq \text{Average} < 68\%$	D
Average < 60%	F

Tentative Class Schedule

Class	Date	Topics	Sections
1	17 Jan. 2024	Course Overview and Objectives	—
2	19 Jan. 2024	Systems of Units; Power & Energy	Chapter 1, all sections
3	22 Jan. 2024	Voltage, Current, and Resistance	Chapter 2, Sections 1 – 3
4	24 Jan. 2024	Kirchhoff's Laws	Chapter 2, Sections 4 and 5
5	26 Jan. 2024	Series & Parallel Resistance; Y and Δ Configurations	Chapter 3, Sections 1, 2, and 7
6	29 Jan. 2024	Voltage & Current Division; Measurements	Chapter 3, Sections 3 – 6
7	31 Jan. 2024	Nodal Analysis	Chapter 4, Sections 1 and 2
8	2 Feb. 2024	Super Nodes and Dependent Sources	Chapter 4, Sections 3 and 4
9	5 Feb. 2024	Review for Exam #1	
10	7 Feb. 2024	Mesh Analysis	Chapter 4, Section 5
11	9 Feb. 2024	Super Meshes and Dependent Sources	Chapter 4, Sections 6 and 7
12	12 Feb. 2024	Examples of Nodal and Mesh Analysis; Source Transformations	Chapter 4, Sections 8 and 9
13	14 Feb. 2024	Thévenin and Norton Equivalent Circuits	Chapter 4, Sections 10 – 12
14	16 Feb. 2024	Superposition	Chapter 4, Section 13
15	21 Feb. 2024	Operational Amplifiers	Chapter 5, Sections 1 – 3
16	23 Feb. 2024	Basic Op Amp Circuits	Chapter 5, Sections 4 – 6
17	26 Feb. 2024	Examples of Op Amp Circuits	Chapter 5, all sections
18	28 Feb. 2024	The Inductor	Chapter 6, Section 1
19	1 Mar. 2024	The Capacitor	Chapter 6, Sections 2 and 3
20	4 Mar. 2024	Review for Exam #2	
21	6 Mar. 2024	Mutual Inductance	Chapter 6, Sections 4 and 5
22	8 Mar. 2024	Natural Response RL Circuits	Chapter 7, Section 1
23	18 Mar. 2024	Natural Response RC Circuits	Chapter 7, Section 2
24	20 Mar. 2024	Step Response and General Solutions	Chapter 7, Sections 3 and 4
25	22 Mar. 2024	Unbounded Response; Integrating Amplifier	Chapter 7, Sections 6 and 7
26	25 Mar. 2024	Examples of RL and RC Circuits	Chapter 7, all sections
27	27 Mar. 2024	The Sinusoid	Chapter 9, Sections 1 and 2
28	29 Mar. 2024	The Phasor	Chapter 9, Section 3
29	1 Apr. 2024	Review for Exam #3	
30	3 Apr. 2024	Passive Elements	Chapter 9, Section 4
31	5 Apr. 2024	Kirchhoff's Law	Chapter 9, Sections 5 and 6
32	8 Apr. 2024	Thévenin and Norton Equivalents	Chapter 9, Section 7
33	10 Apr. 2024	Nodal and Mesh Analysis	Chapter 9, Sections 8 and 9
34	12 Apr. 2024	Transformer	Chapter 9, Sections 10 and 11
35	15 Apr. 2024	Phasor Diagrams	Chapter 9, Section 12
36	17 Apr. 2024	Instantaneous, Average and Reactive Power	Chapter 10, Sections 1 – 3
37	19 Apr. 2024	Complex Power	Chapter 10, Sections 4 and 5
38	22 Apr. 2024	Maximum Power Transfer	Chapter 10, Sections 6
39	24 Apr. 2024	Review for Final Exam	
40	26 Apr. 2024	Review for Final Exam	

Homework Assignments

Homework	Due Date	Problems
#1	24 Jan. 2024	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	31 Jan. 2024	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	14 Feb. 2024	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	21 Feb. 2024	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	28 Feb. 2024	5.1, 5.3, 5.5, 5.6, 5.8, 5.10, 5.16, 5.21, 5.23, 5.27, 5.36, 5.38
#6	20 Mar. 2024	6.5, 6.6, 6.10, 6.12, 6.17, 6.19, 6.20, 6.23, 6.28, 6.35, 6.39
#7	27 Mar. 2024	7.4, 7.6, 7.10, 7.20, 7.25, 7.28, 7.29, 7.31, 7.36, 7.37, 7.46, 7.68, 7.69, 7.70
#8	10 Apr. 2024	9.2, 9.4, 9.7, 9.11, 9.18, 9.22, 9.23, 9.24, 9.25, 9.30, 9.33
#9	17 Apr. 2024	9.36, 9.37, 9.39, 9.43, 9.49, 9.53, 9.58, 9.67, 9.74, 9.80
#10	26 Apr. 2024	10.1, 10.3, 10.8, 10.9, 10.15, 10.16, 10.17, 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/>

COVID-19 Statement

COVID-19 is an infectious disease caused by the coronavirus SARS-CoV-2. The virus is transmitted person-to-person through respiratory droplets that are expelled when breathing, talking, eating, coughing, or sneez-

ing. Additionally, the virus is stable on surfaces and can be transmitted when someone touches a contaminated surface and transfers the virus to their nose or mouth. When someone becomes infected with COVID-19 they may either have no symptoms or symptoms that range from mild to severe and can even be fatal. During this global pandemic, it is imperative that all students, faculty, and staff abide by the safety protocols and guidelines set forth by the University to ensure the safety of our campus. All students are encouraged to make the Black Bear Cares Pact to protect the health of themselves, the health of others, and the College of Our Hearts Always.

Black Bears Care Pact: <https://umaine.edu/return/black-bears-care/>

Symptom checking: The symptoms of COVID-19 can range from mild to severe, and even people with mild symptoms may transmit the virus to others. Students are encouraged to use the symptom checking app each day before attending class or moving about campus and follow the recommendation prompted within the app. Students should monitor for the following symptoms daily: fever (temperature >100.4F/38.0C) or chills, new cough, loss of taste or smell, shortness of breath/difficult breathing, sore throat, diarrhea, nausea, or vomiting, or the onset of new, otherwise unexplained symptoms such as headache, muscle or body aches, fatigue, or congestion/runny nose.

Physical distancing: Students need to make every effort to maintain physical distancing (6 feet or more) indoors and outdoors including within classrooms. The University classrooms and physical spaces have been arranged to maximize physical distancing. Follow the traffic patterns outlined in each building and outdoor space to avoid crowding. If students are in an academic setting (i.e. clinical or lab class) that requires them to reduce physical distancing, they should follow the instructor's guidelines.

Face coverings: Students must wear appropriate face coverings in the classroom. Face coverings must be worn in indoor and outdoor spaces on campus unless people are alone in a room with a door closed or when they are properly physically distanced and do not expect someone to approach them. When face coverings are removed people are placing themselves and those surrounding them at increased risk for COVID-19.

Eating and drinking in classrooms: Students may not eat or drink in the classrooms and are encouraged to take their food or drink into areas designated for these purposes where they can maintain 6 feet physical distance from others.

Hand hygiene: Proper hand hygiene is an effective measure to prevent the spread of COVID-19. Students should wash their hands often with soap and water or use a hand sanitizer with at least 60

Contingency plans: Classes will be held in various formats to offer flexibility, compassion, and empathy during these unprecedented times. Under certain circumstances, students or instructors may need to miss classes or in-person classes may be disrupted. Students are expected to notify their instructor if they are unable to attend an in-person or online class but will not be penalized for missing class due to illness or the need to care for a family member affected by COVID-19. If a disruption occurs, your instructor will provide communication and contingency plans.

What to do if you have or suspect you have COVID-19: If you have symptoms of COVID-19 or have been possibly exposed to someone with COVID-19, you should stay home, not interact with others, and contact your health care provider immediately to be tested for COVID-19. You may not attend in-person classes and should suspend interactions with others until you are tested. Prior to receiving test results you should quarantine in your living area according to the Maine CDC guidelines below. Please follow the guidance of your health care professional regarding testing, quarantine, and isolation during the testing process and potential illness period.

What to do if someone you know has or may have COVID-19: If someone you know or that you have had close contact with (defined by the ME CDC as 15 mins or more within 6 feet or less) has tested positive

for COVID-19, you should stay home and quarantine according to the guidance of the ME CDC, contact your health care provider, and continue to monitor for symptoms. You may be required to quarantine and/or be tested for COVID-19 under these circumstances. You may also have been exposed to COVID-19 by someone you do not know, and it is possible that you could be contacted through contact tracing to determine if you were exposed. Everyone should respond to these confidential questions to ensure the safety of themselves and those around them.

Maine CDC guidelines: <https://www.maine.gov/dhhs/mecdc/infectious-disease/epi/airborne/coronavirus/general-information.shtml>

If you have questions or would like additional information related to the University of Maine COVID-19-specific policies or procedures please use the following sources:

University Webpages: umaine.edu/return and together.maine.edu

COVID-19 Information line: 207.581.2681

Emergency Operations Center Email Contact: umaine.alerts@maine.edu