ECE-2020-400 **Electric Circuits I** **Summer I-2025**

Class Time:	Mon.-Fri.	TBA	Online
Instructor:	Dr. William R. Harrell wharrel@clemson.edu	Office: 205 Riggs Hall	656-5918

Office Hours: Phone – Technical Questions – By Appointment
E-mail – Administrative Questions Only (Normally)
Zoom: – Make appointment using email

TA: TBD Phone: TBD
E-mail: TBD
Will Handle Technical Questions via e-mail, Phone, or Zoom

Course Modality: Fully Online

Textbook: J. W. Nilsson, S. A. Riedel, *Electric Circuits*, 12th Edition (Required). Additional lecture notes and videos are available on Canvas.

Attendance Policy: This is an Online course, so attendance is not applicable; however, it is expected that you will view each of the Online Lecture videos and study the Lecture Notes on Canvas. You will be responsible for all of the material covered in this class, both from the notes and the textbook!

Prerequisites: MTHSC-1080 with a grade of C or better.

Preq or Concurrent: PHYS-2210, with a grade of C or better.

Class e-mail: We will set up a class e-mail list which will be used often to communicate with the class. **You should check your e-mail daily**, since we will send out important information and reminders this way! *The default on the listserv will be your clemson.edu address.* Note that any messages you send to the class list will go to every student in the class. You can also easily contact us using the e-mail address/es listed above.

Course Description: Study of DC resistive circuits, Kirchhoff's Laws, Nodal and Mesh analysis, sources, Thevenin's and Norton's theorems, RL, RC, RLC circuit solutions with initial conditions using homogeneous or nonhomogeneous ordinary differential equations having constant coefficients. Introduction to Operational Amplifiers (Op-Amps).

Goals/Outcomes: The goals for this course are to provide the student with an understanding of, and a proficiency in the analysis of, electrical circuits containing both active and passive components under both steady state and dynamic (time varying) conditions. These goals will be accomplished by pursuing the following student learning outcomes of electrical circuit analysis, understanding circuit operation, and creative problem solving:

* Active component models (sources), both independent and dependent.
* Passive component models: Resistors, Capacitors, Inductors, Switches.
* Power and Energy relationships.
* Network Laws: Ohm's law, Kirchhoff's voltage and current laws.
* Nodal and Mesh analysis techniques.
* Thevenin's and Norton's theorems. Superposition.
* Transient response of RL, RC, and RLC circuits.
* Introduction to Operational Amplifiers (Op-Amps).

ECE-2020 is a "core" (fundamental, essential) course for all electrical and computer engineering majors. It is the first of two courses on basic electrical circuit analysis, the second course being ECE–2620–Electric Circuits II. These two courses are among the most fundamental and important courses you will take in the ECE curriculum, in that many future courses, both lecture and laboratory, build on this material. Mastering the material will require study of the text and class notes, and diligent practice of the homework problems. Anyone who has completed the prerequisites for this class can excel in it. It's primarily up to you!

Homework: Homework will be assigned Online and due probably a couple of times per week. Each homework assignment must be scanned into a single PDF file and then uploaded to Canvas by the mandated time and date (See Modules/Homework Assignments/Homework Due Dates and Procedures, on Canvas). Solutions to homework problems will be placed on Canvas. Working the homework problems is essential to the learning of the material in this course; in fact, most of your learning will come from doing the homework. It is expected that your homework will represent your own work, although working in groups is allowed, and even encouraged. *Late homework will normally not be accepted!*

Exams: There will be 3 regular closed book exams and a final exam. Most questions will be circuit analysis problems, including numerical as well as symbolic answers; however, there may be a few conceptual questions as well on each exam. Exams are multiple choice. All exams will be taken online. Online exams will be run and controlled by Respondus LockDown Browser and use Respondus Monitor, which will use a webcam and AI to authenticate each student and record their exam. The student is required to have a laptop computer, internet connectivity capable of transmitting and receiving video, a webcam, a microphone, and a cell phone. All students will take the exams at the same time.

Exam Attendance: If you cannot take an exam at the scheduled time, I should be notified ahead of time if possible, otherwise at least on the day of the exam. Except under very unusual circumstances, no makeup exam will be given without appropriate notification, and even then, only for a very good reason as determined by the instructor.

Calculators: You will need a scientific calculator for this class. In particular, it should be **capable of solving simultaneous equations and inverting matrices for both real and complex numbers and symbolic quantities.** Calculators such as the TI-89 or TI-Nspire, as well as some others, will meet this requirement. Some problems, however, may not involve numbers. You will need to know how to analyze circuits without calculators; i.e., using algebraic methods. Storing of equations, or of any course material, in calculators will be considered cheating if used on an exam or quiz! *It is your responsibility to learn how to use your calculator*. However, there will be some tutorials on calculator usage posted online.

On Line Procedures: ECE-2020 is an Online course this summer. All materials, except the textbook, will be provided on Canvas. Homework due dates and procedures for submission are posted on Canvas. Further details of procedures for online exams will be provided during the first week of class. You will need a Webcam for all exams. In this online course, you will interact with the content, instructor, and classmates on at least a weekly basis through assignments and discussions as indicated in the syllabus. All students are expected to access and use the Canvas online course site on a daily basis; this access is recorded.

I will only answer e-mails related to administrative issues (*& maybe very simple technical questions*). It is too difficult and time consuming to answer complicated technical questions via e-mail. Technical questions can be answered/discussed via a Zoom meeting. Technical questions can also be handled by making an appointment to call me. In either case, just send me an email and we can set up an appointment.

I have a Topical Outline and Schedule listed below with suggested coverage each day, leading up to each of the three exams. This will hopefully help you manage your time, which is crucial in a summer class.

Academic Integrity: As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. All infractions of academic dishonesty by undergraduates must be reported to Undergraduate Learning for resolution through that office. In cases of plagiarism instructors may use the Plagiarism Resolution Form. *Additionally, for undergraduate classes:* Plagiarism, which includes the intentional or unintentional copying of language, structure, or ideas of another and attributing the work to one's own efforts. Graded works generated by artificial intelligence or ghostwritten (either paid or free) are expressly forbidden. . See the Undergraduate Academic Integrity Policy website for additional information and the current catalog ("Academic Regulations" section) for the policy. Send questions to UGSintegrity@clemson.edu.

Accessibility: Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the instructor know and are encouraged to request accommodations through SAS (Student Accessibility Services) as soon as possible. To request accommodations through SAS, please see this link: www.clemson.edu/academics/student-accessibility-services/how-to-register/requesting-accommodations. You can also reach out to SAS with questions by calling 864-656-6848, email CUSAS@clemson.edu, or visiting SAS at the ASC Suite 239. Contact the office for the most updated drop-in schedule if you would prefer not to schedule an appointment.

Students who have accommodations are strongly encouraged to request, obtain, and send these to instructors through their AIM portal as early in the semester as possible so accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester.

Title IX Statement: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy or related conditions (including pregnancy, childbirth, termination of pregnancy, lactation, recovery from the foregoing, or medical conditions related to the foregoing), national origin, age, disability, veteran's status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sex discrimination (including sex-based harassment and sexual violence) as mandated by Title IX of the Education Amendments of 1972. This Title IX policy is located on the Access Compliance and Education website. Ms. Alesia Smith is the Clemson University Title IX Coordinator, and the Assistant Vice President of Equity Compliance. Her office is located at 223 Brackett Hall, 864-656-3181 and her email address is alesias@clemson.edu. Remember, email is not a fully secured method of communication and should not be used to discuss Title IX issues.

Emergency Prep: Emergency procedures have been posted in all buildings and on all elevators. Students should be reminded to review these procedures for their own safety. All students and employees should be familiar with guidelines from Clemson University Public Safety.

Clemson University is committed to providing a safe campus environment for students, faculty, staff, and visitors. As members of the community, we encourage you to take the following actions to be better prepared in case of an emergency:

1. Ensure you are signed up for emergency alerts. Alerts are only sent when there is a potential threat to safety, a major disruption to campus services, and once-monthly tests.
2. Familiarize yourself with all possible exits, safer locations, and other key information on the emergency evacuation maps in this building, and those that you visit regularly.
3. Make a plan for how you would Run, Hide, and Fight in case of an active threat in this building, and those that you visit regularly. For example:

- Run – what are all the possible exits in this building, and the routes to them?
- Hide – what are the potential hiding locations in this room and building that are out of sight of doors and windows, how do you lock the door(s), how would you barricade the door(s) and windows, where do you turn off the lights?
- Fight – What tools are available in this room and building, should you have to fight?

4. Learn what you can do to prepare yourself for the hazards that affect our locations (http://www.clemson.edu/cusafety/EmergencyManagement/)
5. Download the Rave Guardian app to your phone (https://www.clemson.edu/cusafety/cupd/rave-guardian/)

Copyright: Materials in courses are copyrighted, including instructor's materials. They are intended for use only by students registered and enrolled in a particular course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Teach Act. Students must seek permission from instructors to record any class activity, including lectures, discussions, and presentations. Students should refer to the Office of General Counsel site for Copyrighted Materials for additional information.

Original works of authorship including but not limited to books, textbooks, novels, poetry, articles, works of art, photos, images, videos, movies, music, architectural designs etc. are protected under copyright law unless otherwise indicated or the copyright term has expired. Depending on the date of publication, determining the copyright term can be complicated. When copyright protected materials or portions of such materials are made available to you by an instructor for a course (including materials created by the instructor), they are intended to be used only by students enrolled in a particular course and only for instructional/educational activities associated with the course. They should not be retained in another medium or disseminated to others outside of the course. Any further use of this material by a student should only be done with appropriate written permission from the copyright owner (which in most cases is not the course instructor). Violations of federal copyright law could result in civil lawsuits and significant financial and other penalties."

Grading: Final grades will be determined by averaging the homework, exams, and the final exam based on the scale below.

Homework	**10%**
3 Exams	**60% (20% each)**
Final Exam	**30%**
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Course Grade	**100%**

Grading Scale:		
	90 - 100	A
	80 - 89	B
	70 - 79	C
	60 - 69	D
	0 - 59	F

* I reserve the right to adjust the grading scale depending on overall class performance, but only in your favor.

Note-1: *The Canvas Grade Book is for your information and convenience. Official grades are kept in my office, and these are the true grades. It is the student's responsibility to verify the accuracy of their Canvas grades.*

Note-2: *The instructor reserves the right to modify any aspect of this syllabus at any time during the summer semester for reasons including, but not limited to, COVID-related situations. The class will be notified of any modifications.*

Version #1 Date: 4/28/2025

TOPICAL OUTLINE and SCHEDULE

Day	Date	Text Coverage	Material
Tu	5/13	Chap. 1, pp. 2-19	Voltage, Current, Power, Energy
W	5/14	Chap. 2, pp. 26-38	Sources, Ohm's Law, Circuit Models
Th	5/15	Chap. 2, pp. 39-44	Kirchhoff's Laws
F	5/16	Chap. 2, pp. 45-50	Kirchhoff's Laws, Dependent Sources
M	5/19	Chap. 3, pp. 58-68	Series & Parallel Resistors, Dividers
Tu	5/20	Chap. 3, pp. 68-73	Dividers, Voltage & Current Meters
W	5/21	Chap. 3, pp. 73-80	Wheatstone Bridge, Δ-Y Circuits
Th	5/22	Chap. 4, pp. 92-100	Node-Voltage Analysis
F	5/23	**Exam #1**	**Chapters 1, 2, and 3**
M	**5/26**		**Memorial Day Holiday - No Class**
Tu	5/27	Chap. 4, pp. 100-108	Supernodes, Mesh-Current Analysis
W	5/28	Chap. 4, pp. 108-115	Mesh-Current Analysis, Comparison
Th	5/29	Chap. 4, pp. 115-123	Source Transformations, Thevenin & Norton Equivalents
F	5/30	Chap. 4, pp. 123-135	Max Power Transfer, Superposition
M	6/2	Chap. 6, pp. 182-193	Inductors, Capacitors
Tu	6/3	Chap. 6, pp. 194-199 pp. 211	Series and Parallel L's and C's Summary & Review
W	6/4	**Exam #2**	**Chapter 4**
Th	6/5	Chap. 7, pp. 220-232	RL & RC Circuits, Natural Response
F	6/6	Chap. 7, pp. 233-240	RL and RC Step Response
M	6/9	Chap. 7, pp. 241-250 pp. 255-256	General Solution Sequential Switching, Summary & Review
Tu	6/10	Chap. 8, pp. 272-289	Parallel RLC Natural Response
W	6/11	Chap. 8, pp. 289-303 pp. 308-310	Step Response, Series RLC Response Summary & Review
Th	6/12	Chap. 8, and Notes	Further study of RLC Circuits
F	6/13	**Exam #3**	**Chapters 6, 7, and 8**
M	6/16	Chap. 5, and Notes	Intro to Operational Amplifiers
Tu	6/17	Chap. 5, and Notes	Intro to Operational Amplifiers
W	6/18	Class Notes	Study Day at Clemson

Thursday **6/19** **Final Exam** **Time: TBA**

Note: *Actual schedule may vary slightly depending on class progress.*

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