Instructor: Dr. Aly Sabri Abdalla
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Office: Simrall 310, and WebEx

Office Hours: Monday & Wednesday 4:00 pm to 5:00 pm in Simrall or WebEx or by appointment

Lecture Times: Monday & Wednesday 2 pm to 3:15 pm Central Time, Rula 2080

Distance Section Times: Asynchronous Online – Videos available via Distance Education Website

Prerequisites: Grade of C or better in ECE 3421 and in either ECE 3423 or ECE 3413
Corequisites: N/A

Textbook: (Required) Nilsson, Susan Riedel, Electric Circuits, ISBN-13: 9780137648375

Software: MATLAB Student Version.
NI Multisim – free download at https://www.multisim.com/

Website: canvas.msstate.edu

Course Description and Objectives
(Prerequisite: Grade of C or better in ECE 3421 and either ECE 3423 or ECE 3413). Three hours lecture. Operational amplifiers, frequency responses of RL, RC, and RLC circuits. Laplace transforms, active and passive filters.

After successfully completing this course, the students will be able to:

i. Determine the time-domain and frequency-domain response of circuits containing ideal operational amplifiers.
ii. Demonstrate an understanding of the initial condition and step responses of RC, RL, and RLC circuits
iii. Ability to analyze the sinusoidal steady-state response of RL, RC, and RLC circuits.
iv. Understanding of circuit, filter, or network behavior in both time and frequency domains.
v. Demonstrate an understanding of the basic concepts of Laplace Transform and Circuit Analysis.
vi. Determine the Fourier Series.
vii. Basic knowledge of negative feedback; passive and active filters, and their response.

Methods of Evaluation and Standards of Achievement
Types of graded assignments include:

(a) **Progress Exams** will be administered during the term. Each progress exam is weighted equally. Your average on progress exams forms the bulk of your final grade. **The three highest progress exam grades will be used to calculate your final points.**

(b) The **Final Exam** will be administered during the final examination period. The final is comprehensive and covers all course content. The final exam will have a three-hour time limit. **Distance students** – the final

exam will be available for 72-hours during the university examination period. Timing will depend on the final examination schedule and will be announced on the first day of class.

(c) **Homework** will be assigned with each module/chapter. It is essential you make an honest effort to complete each homework problem because this is the primary way you will practice the skills/concepts learned in class. ***Homework is graded*** and should be submitted through relevant Canvas assignments..

No resources allowed while taking exams. ***All exams are INDIVIDUAL assignments. If you share examination questions, copy another student's work, or allow another student to copy your work, then you are guilty of academic dishonesty****. No outside resources are allowed when taking quizzes. Resources such as Chegg or any other unauthorized resource used during the completion of a quiz is unacceptable.*

You may use a calculator when taking quizzes.

The final exam will be administered according to the University exam schedule.

There will be four progress exams. The lowest progress exam grade will be dropped.

Grading Breakdown	
Assignment Type	**Percentage**
Progress Exams*	60%
Final Exam	30%
Homework	10%

* Three highest progress exams will count. Lowest will be dropped.

Additional Credit Opportunities	
Opportunity	**Credit**
Exam Bonus questions	varies, added to exam

Grading Scale (10 pt)	
Grade	**Average**
A	90.0-100
B	80.0-89.9
C	70.0-79.9
D	60.0-69.9
F	<60.0

LECTURE TOPICS (45 contact hours)

I. Introduction and circuit review (2.5 hours) – Chapters 2, 4
   a. Ohm's and Kirchhoff's Laws
   b. Series and Parallel Components
   c. Voltage and Current Division
   d. Thevenin and Norton
   e. Loop and Nodal Analysis
   f. Superposition

II. Operational amplifiers (3.75 hours) – Chapter 5
   a. The Inverting-Amplifier Circuit
   b. The Summing-Amplifier Circuit
   c. The Noninverting-Amplifier Circuit
   d. The Difference-Amplifier Circuit

III. Initial condition and step responses of RC, RL, and RLC circuits (5 hours) – Chapters 7,8
   a. Natural Response
   b. Step Response
IV. Sinusoidal steady-state response of RL, RC, and RLC circuits (3.75 hours) – Chapters 9,10
   a. Review of complex numbers
   b. Phasors
   c. Solving circuits using loop, nodal, Thevenin, Norton
   d. Using Thevenin and Norton
   e. Power
V. Laplace circuit analysis (10.0 hours) – Chapters 12,13
   a. Laplace Transform
   b. The Step and Impulse Functions
   c. Functional and Operational Transforms
   d. Applying the Laplace Transform
   e. Initial- and Final-Value Theorems
   f. Inverse Transforms and Partial Fraction Expansion
   g. Circuit Elements and analysis
   h. Transfer function
VI. Fourier Analysis (3.75 hours) – Chapters 16, 17
   a. Introduction
   b. Fourier Series
   c. RLC Circuits
VII. Filters (5 hours) – Chapters 14, 15
   a. Amplitude and Phase Response
   b. Filter types
   c. Op-amp filters and component scaling
VIII. Progress Exam 1 (1.25 hours) *
IX. Progress Exam 2 (1.25 hours) *
X. Progress Exam 3 (1.25 hours) *
XI. Progress Exam 4 (1.25 hours) *
XII. Final Exam Review (1.25 hours)
XIII. Final Exam (3 hours)

* Note: Progress exams are throughout the semester. See the class calendar handout for further information.

INSTRUCTOR-SPECIFIC CLASS INFORMATION

Office Hours
I encourage my students to discuss the course or other academic concerns and interests. Email is preferred, and online conferencing meetings are welcome by appointments.

Expectations for the Classroom and Communication
The following policies for course communication apply for **ALL students**:

- You are required to check your MSU email account regularly. This is considered an official means of communication by MSU for distance education students.
- The course materials will be accessed through Canvas.
- All class announcements will be posted on the Canvas website.
- Assignment submissions will utilize Canvas unless otherwise specified by the instructor.
- You are required to have access to a computer that connects to the internet.
- Students should direct correspondence to the instructor directly related to the class via the mail feature in Canvas.
- Students should not discuss specific exam questions.
- Students are encouraged to discuss homework together in a group, but the assignment should be completed individually.

The following policies for course communication apply to **students enrolled in the Distance section**:

- Students can correspond with each other via the general course discussion board.
- Students should expect to log in to Canvas no less than three times per week to access course information, lectures, and updates.

Grading Policies
Instructor-provided class materials are the only resources allowed while taking quizzes. ***All assignments are INDIVIDUAL assignments. If you share exam questions, copy another student's work, or allow another student to copy your work, then you are guilty of academic dishonesty****.*

Students shall not bring or have any computing equipment in the quiz, including programmable calculators, mobile phones, books, dictionaries, electronic organizers, notes or paper, and other materials as shall be authorized by the professor.

Grades are not curved in this course! It is theoretically possible for everyone in the class to get an A (or F). Your performance depends on how well you do, not on how everyone else does. To advance in the curriculum, you must achieve a grade C (70%) or better in this course. Failure to meet these minimal criteria would leave you ill-prepared for the next level of courses.

A programmable calculator is not allowed. The term "programmable" includes any calculator capable of storing a sequence of keystrokes that can be retrieved after the calculator is turned off or powers itself off. Scientific calculators are approved by the National Council of Examiners for Engineering and Surveying (NCEES) for use in taking the Fundamental of Engineering Examination (FE). The list of approved calculators and the ABET policy are available here. https://ncees.org/2017- calculator-list-approved-new-model-added/

- When taking a quiz in this class, students can only use a scientific calculator.

Minimum Technology Requirements
The following minimum technology requirements are necessary **for all students** to complete the course:

- Computer with web browser, Microsoft Office, and Adobe Reader
- Internet access

Quizzes are administered online via Canvas. **Ensure you have adequate internet access and power for your computer BEFORE you begin the quiz.** You will only be able to start the quiz one time. There are no time extensions available.

Distance students will also need:

- Webcam and microphone (computer or smartphone) to participate in virtual meetings / office hours.

Technical Assistance
If you have questions about this course, please contact the instructor via Canvas messaging. For technical support (e.g., computer support, Canvas issues), please contact help@ece.msstate.edu or engr-dist-support@lists.msstated.edu or www.bagley.msstate.edu/distance.

Attendance Policy for face-to-face instruction
Students registered in face-to-face sections are expected to attend all lab meetings. Please refer Academic Operating policy 12.09. (http://www.policies.msstate.edu/policypdfs/1209.pdfLinks to an external site.), regarding attendance expectations and accommodations.

Note that official, university-approved and documented absences are not subjected to attendance penalties. It is the student's responsibility to initiate a request of making up course work in a timely manner. Unless impractical, all communication regarding official, university-approved and documented absences and make-up work should take place prior to the absence. Students are responsible for all material covered during class and any in-class announcements.

Attendance Policy for distance instruction
Distance students are expected to "attend" every class meeting by watching assigned lecture videos and reading assigned material. For distance students, lecture meetings are asynchronous, which means you can "attend" (e.g., watch videos) at a time convenient for your weekly schedule. However, you must attend any scheduled office hour appointments and complete assignments according to the weekly class schedule and assignment due dates.

UNIVERSITY POLICIES

Continuity of Instruction

In the event that face-to-face classes are suspended due to extenuating circumstances, such as weather, the instructor will continue instruction in a manner that best supports the course content and student engagement. In this event, all instructors will notify students of the change via their university email address (the official vehicle for communication with students). At that time, they will provide details about how instruction and communication will continue, how academic integrity will be ensured, and what students may expect during the time that face-to-face classes are suspended. If a student becomes unable to continue class participation due to extenuating circumstances, (e.g., health and safety, loss of power, etc.) the student should contact their instructor and advisor for guidance. For additional guidance, please refer to Academic Operating Policy 12.09.

Mississippi State University Honor Code https://honorcode.msstate.edu/policy

"As a Mississippi State University student I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do"

Upon accepting admission to Mississippi State University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor Code. These rules make clear that a student must not receive unauthorized assistance with their work. This principle includes the content created by generative artificial intelligence (AI) tools without authorization from the instructor. Students will be required to state their commitment to the honor code on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the MSU community from the requirements or the processes of the Honor Code. For additional information, please visit: https://honorcode.msstate.edu/policy.

If found cheating on any assignment, the instructor will recommend the student receive an "F" in the course.

Title IX http://students.msstate.edu/sexualmisconduct/

MSU is committed to complying with Title IX, a federal law that prohibits discrimination, including violence and harassment, based on sex. This means that MSU's educational programs and activities must be free from sex discrimination, sexual harassment, and other forms of sexual misconduct. If you or someone you know has experienced sex discrimination, sexual violence and/or harassment by any member of the University community, you are encouraged to report the conduct to MSU's Office of Civil Rights compliance at 325-5839 or by e-mail to titleix@msstate.edu. Additional resources are available at https://www.civilrights.msstate.edu/title-ix-sexual-misconduct.

HEALTH AND ABSENCES

Attending class is very important to your academic performance. University excused absences are listed below. With an excused absence you are allowed to make-up all missed work including tests. University policy states that you cannot be forced to use a class drop grade for an excused absence. However, it is your responsibility to communicate with your professor about your absence and completion of any missed work.
A professor may define class attendance, particularly as it pertains to in-class responsibilities, that go beyond just being present in the classroom. The class policy may include statements about the importance of learning and attendance, the extent of credit or penalty for an unexcused absence, and how excused and unexcused absences are measured. It is your responsibility to be aware of any specific class policies in addition to the general university policy.

For online courses, you will be considered in attendance when you; a) participate in a course activity (e.g., discussion board); and b) communicate with the course instructor regarding a course topic within a specified time frame. Logging into an online course without active participation does not constitute attendance. When students who are enrolled in an online course are aware of necessary absences, they should inform the instructor as soon as is possible so that other arrangements can be made.

Excused Absences per AOP 12.09 Class Attendance and Reporting Absences (https://www.policies.msstate.edu/policy/1209)

These approved excused absences are not subject to instructor discretion in course attendance penalties:

- Participation in an official university activity with authorization from an appropriate administrator sponsoring the activity (e.g., Department Head or higher). If the validity of the activity is questionable, the matter should be referred to the Office of the Provost and Executive Vice President for final resolution.
- Death in a student's immediate family to include a student's parent, legal guardian, sibling, grandparent, grandchild, spouse or partner, as well as natural, adopted and/or in-law children.
- Participation in legal proceedings or administrative procedures that require a student's presence.
- Religious holy day.
- Illness that is too severe or contagious for the student to attend class.
- Required participation in military duties.
- Mandatory admission interviews for professional or graduate school that cannot be rescheduled.

An illness or injury of a student's immediate family (to include parent, legal guardian, sibling, grandparent, grandchild, spouse or partner, as well as natural, adopted and/or in- law children) is eligible for excused absences, but is subject to the instructor's discretion.

University or other organized events intended to provide personal enrichment or entertainment will not be considered university authorized activities as it pertains to course attendance and will not qualify as an excused absence.

University Safety Statement

Mississippi State University values the safety of all campus community members. Students are enrolled in Maroon Alert, which will notify campus of ongoing or imminent threats. If you receive an alert:

1. Notify those around you.
2. Get to safety.
3. Follow alerts at www.emergency.msstate.edu or @MaroonAlert on X.

Fire Emergencies: In case of a fire emergency, evacuate the building and move away. Do not attempt to re-enter until responders deem it safe to do so.

Severe Weather: If a tornado warning is issued, move to an interior room on the lower level of your building. Several buildings have identified Severe Weather Refuge Areas, which may be used. Do not attempt to drive in severe weather. Visit www.emergency.msstate.edu for more information.

Active Attacker / Gunshots Reported: Use the Avoid, Deny, Defend model to respond to an active attacker situation.

1. **Avoid** the area and get to safety.
2. If you can't Avoid, **Deny** anyone access to your location by locking or blocking yourself in a room. Turn off your cellphone ringer and wait for help.
3. If you can't Avoid or Deny, **Defend** yourself. Coordinate with others and commit to taking down the attacker. Use anything at your disposal as a weapon.

Bomb Threats: Report any suspicious devices or substances to the University Police at 662-325-2121. Follow instructions for evacuating the area.

Additional emergency guidelines and helpful videos are available at www.emergency.msstate.edu. Visit www.emergency.mssstate.edu/trainings for upcoming sessions or contact Emergency Management to request training.
To report suspicious activity or to request a courtesy escort via Safe Walk, call University Police at 662-325-2121, or in case of emergency, call 911.
Starkville Campus Police: 662-325-2121

Disability Resource Center www.drc.msstate.edu

Mississippi State University is committed to providing equitable access to learning opportunities for all students. Should you need to access services, The Disability Resource Center is located at 01 Montgomery Hall and collaborates with students who have disabilities to arrange reasonable accommodations. If you have, or think you may have, a disability, please contact drc@saffairs.msstate.edu or 662- 325-3335 to arrange a confidential discussion regarding equitable access and reasonable accommodations. Disabilities may include, but are not limited to, conditions related to mental health, chronic health, attention, learning, autism, brain injury, vision, hearing, mobility, speech, or intellectual disabilities. In the case of short-term disabilities (e.g., broken arm), students and instructors can often work to minimize barriers. If additional assistance is needed, please contact the Disability Resource Center (https://www.drc.msstate.edu/).

Copyright

Copyrighted materials within the course are only for the use of students enrolled in the course for purposes associated with this course and may not be retained or further disseminated.

Course materials must not be posted on any website or added to any database without the instructor's written permission. Do not distribute test problems, homework, or any other materials. Do not post course materials on websites such as chegg.com, slader.com, etc. Violations of this policy will be referred to the Honor Court.

GENERATIVE AI

Generally, students are NOT permitted to use generative AI tools such as ChatGPT for assignments except those authorized specifically by their instructor in the assignment directions. The unauthorized use of a generative AI tool to complete an assignment constitutes academic dishonesty and may be reported as an Honor Code violation. All submitted work will be filtered through Turnitin's AI writing detection tool, and other screeners may also be used.

For assignments in which generative AI has been explicitly permitted by your instructor, students must give credit and cite any AI-generated material according to citation-specific rules (e.g., IEEE style), including in-text citations, quotations, and references. Any work with more than the allowable percentage of AI-generated material specified in the assignment instructions, if applicable, could be reported as an Honor Code violation. Students must also include the following statement in assignments to indicate use of a generative AI tool: "The author(s) acknowledges the use of [Tool Name] in the preparation of this assignment for [brainstorming, grammatical correction, citation, etc.]." Failure to acknowledge use of generative AI could be reported as an Honor Code violation.
