Circuits & Signals I
Fall, 2020
Lecture: on M W F, 9:50 – 10:40

Instructor: Sihua Shao
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Office Hours: Same-day or next-day appointment (Zoom)

Course Description: Principles of electrical circuit analysis. Kirchhoff's laws, equivalent circuits, dependent sources, node and mesh analyses, signals, RLC components. Introductory circuits and operational amplifier circuits as examples.

Mode of Instruction: Synchronously online delivery via Zoom with asynchronous video recording (access through Canvas - *Panopto Recordings* tab) for later review. Guest lectures will be offered occasionally via face-to-face/hybrid lecture.

Pre-requisites: *MATH 132* (Calculus and Analytic Geometry II)

Place in Curriculum: This course is normally offered in Fall semester. It is a requirement for the Electrical Engineering major.

Course Learning Outcomes:
After completion of this course, students are expected to be able to:

- Analyze circuits with basic elements using Ohm's law, KCL, and KVL.
- Calculate instantaneous power absorbed or supplied by elements.
- Apply nodal or mesh analysis to form system of linear equations and solve it.
- Understand the principles of op-amp, non-ideal source, and superpositions.
- Leverage Thevenin's Theorem and Norton's Theorem to evaluate the load conditions.
- Analyze circuits with energy-storage elements, e.g., capacitors and inductors.
- Resolve the integrodifferential equations with non-zero initial conditions and inputs.

Program Learning Outcomes: https://www.nmt.edu/academics/eleceng/undergrad/index.php

Course Requirements:
Textbook: *Elementary Linear Circuit Analysis (Second Edition). Leonard S. Bobrow, Oxford University Press 1987.*

errata: http://www-unix.ecs.umass.edu/~bobrow/elca-err.html

Course Schedule:

Date	Chapter	Topic
Aug. 17 – 31	Chap. 1	Sources, Ohm's Law, KCL, KVL, Instantaneous Power
Sep. 2 – 4	Chap. 2	Nodal Analysis
Sep. 7	Holiday	
Sep. 9 – 16	Chap. 2	Nodal Analysis, Mesh Analysis
Sep. 18 – 21	Chap. 3	Op-Amp, Non-Ideal Sources
Sep. 23		Midterm 1 (Until Chap. 2)
Sep. 25 – Oct. 5	Chap. 3	Thevenin's Theorem, Norton's Theorem, Superposition
Oct. 7 – 14	Chap. 4	Inductor, Capacitor, Input Functions
Oct. 16	Holiday	
Oct. 19 – 23	Chap. 4	Integrodifferential Equations, Initial Conditions
Oct. 26 – Nov. 2	Chap. 5	Zero-Input and Zero-State Response, Linearity and Superposition
Nov. 4		Midterm 2 (Until Chap. 4)
Nov. 6	Chap. 5	Other Forcing Functions
Nov. 9 – 20	Chap. 6	RLC Circuits, Non-Zero Inputs and Initial Conditions
Nov. 23 – 27	Holiday	
Nov. 30 – Dec. 2	Chap. 6	Non-Zero Inputs and Initial Conditions
Dec. 4		Final Term Review

Grading:

- Homework: 30%
- 2 Midterm: 20% each
- Final term: 20%
- In-class quest (group): 10%

A	90-100	C	70-72
A-	86-89	C-	66-69
B+	83-85	D+	63-65
B	80-82	D	60-62
B-	76-79	F	<60
C+	73-75		

There will be no make-up exams except in the case of extraordinary circumstances. All homework with the due dates will be available on Canvas at the beginning of the semester. Submission of homework and exams will be done via Canvas online assignment portal. Students may work together on homework but must turn in individual assignments that CANNOT BE IDENTICAL. Students must work on exams individually and any validated cheating in exams will be reported to NMT Academic Affairs. Late homework will not be accepted unless requested via email before the due date with a valid reason (e.g., family emergency).

In-class quest: i) 10 minutes at the beginning of each lecture. ii) 5 or 6 students in each group, 3 or above show up in the synchronous course can take the quest. iii) Performance during the in-class quest will be used as reference to determine the final score. iv) Given a certain topic, the group will decide who will be raising the question and who will be solving the question.

Academic Honesty: New Mexico Tech's Academic Honesty Policy for undergraduate and graduate students is found in the student handbook, which can be found at: https://www.nmt.edu/studentlife/dos/NMT%20Student%20Handbook%202019-20.pdf. You are responsible for knowing, understanding, and following this policy.

Reasonable Accommodations:
New Mexico Tech is committed to protecting the rights of individuals with disabilities. Qualified individuals who require reasonable accommodations are invited to make their needs known to the Office for Disability Services (ODS) as soon as possible. To schedule an appointment, please call 835-6209, or email disability@nmt.edu.

Counseling Services:
New Mexico Tech offers individual and couples counseling, safety assessments, crisis intervention and consultations through The Counseling Center. These confidential services are provided free of charge by licensed professionals. For more information, please call 835-6619, email counseling@nmt.edu or complete an Intake Form on our website at https://www.nmt.edu/cds/. All services are provided via phone or Zoom during the Covid-19 pandemic.

Respect Statement: New Mexico Tech supports freedom of expression within the parameters of a respectful learning environment. As stated in the New Mexico Tech Guide to Conduct and Citizenship: "New Mexico Tech's primary purpose is education, which includes teaching, research, discussion, learning, and service. An atmosphere of free and open inquiry is essential to the pursuit of education. Tech seeks to protect academic freedom and build on individual responsibility to create and maintain an academic atmosphere that is a purposeful, just, open, disciplined, and caring community."

COVID-19 Safety Issues for Face-to-Face Instruction: Students must follow campus-wide safety protocols, including mandatory use of face coverings and maintaining a minimum of 6 ft social distance from other students and faculty. Students should not enter the classroom earlier than 10 minutes prior to start of class and should exit the classroom within 10 minutes of the end of class. Students who fail to comply are subject to disciplinary procedures. [*Only needed for F2F classes.*]

Title IX Reporting:
Sexual misconduct, sexual violence and other forms of sexual misconduct and gender-based discrimination are contrary to the University's mission and core values, violate university policies, and may also violate state and federal law (Title IX). Faculty members are considered "Responsible Employees" and are required to report incidents of these prohibited behaviors. Any such reports should be directed to Tech's Title IX Coordinator (Dr. Peter Phaiah, 20D Brown Hall, 575-835-5187, titleixcoordinator@nmt.edu). Please visit Tech's Title IX Website (www.nmt.edu/titleix) for additional information and resources.