ECE 3301
General Electrical Engineering
Fall 2025
Syllabus

Instructor: Dr. Seyed Mahdi Ghamkhari
Email: seghamkh@ttu.edu
Class Location: Electrical Engineering Department, Room 101
Prerequisites: CE, CHE, CONE, CS, ENVE, IE, ME, and PETR majors only; 2.0 TTU GPA; C or better in MATH 1452. For non-majors only.
Office Hours: Wednesdays from 11 a.m. to 12 p.m.
Office Location: Electrical Engineering Department Room 223, or online by appointment.

Dates
Classes begin: 08/25
Holidays: 09/01, 11/26 to 11/30.
Last day to drop a course without academic penalty: 09/10
Last day to drop a course with academic penalty: 11/17
Last day of classes: 12/03

Course Description
Analysis of electric circuits. Introduction to electronic instrumentation and electromechanics.

Course learning outcomes
1. Analyze linear electric circuits to determine DC response.
2. Analyze linear electric circuits to determine AC response.
3. Analyze linear electric circuits to determine basic transient response.
5. Demonstrate basic knowledge of electronics.
6. Demonstrate basic knowledge of electric machines.

Textbook
Hambley, Allan R., Electrical Engineering – Principles and Applications, seventh edition, Prentice Pearson, January 2017
ISBN: 978-0134484143
Link: https://www.amazon.com/Electrical-Engineering-Principles-Applications-7th/dp/0134484142

Course Components
Assignments (Homework/Quizzes/Projects): 40%
Midterm Exam: 30%
Final Exam: 30%

Conversion of the numerical grade to letter grade
A: 90 – 100%

B: 80 – 90%
C: 70 – 80%
D: 60 – 70%
F: 0 – 60%

Guideline

- Students who enroll in this course must have the required prerequisites.
- The course materials, quizzes, projects and assignments are uploaded on Canvas platform. Students' responses to the assignments should be uploaded on the same platform.
- Requests for re-grading of an assignment must be received within one week from the time the assignment is graded.
- Students should check Canvas for the announcements regarding the course. It is recommended that you set up your Canvas account to receive notification Emails immediately when a new announcement is made or a new assignment is uploaded.
- A response to quizzes, projects, assignments and exams that is submitted after the deadlines is not accepted and receives a grade of zero.
- Students should take notes from the materials presented in the class.
- Students should use their university email address when communicating with the instructor.
- Students should be present in the exam sessions. Makeup exams are not provided to the students who miss the exams.

Topics:

1. Electrical Quantities and Units
- Voltage, current, power, energy
- Ohm's law, efficiency
- Power relations

2. Circuit Laws & DC Analysis
- Kirchhoff's Current & Voltage Laws
- Series & parallel resistors, voltage/current division
- Nodal & mesh analysis

3. Transients in RC/RL Circuits
- Capacitor charging/discharging
- Inductor current response

4. AC Circuits & Phasor Analysis
- Sinusoids, RMS, average power
- Impedance & admittance
- Power factor & correction

5. Signals & Fourier Basics
- Sinusoidal representation & superposition
- Fourier series for periodic signals

6. Transformers & Power Systems
- Ideal transformer equations
- Equivalent circuit, efficiency
- Single-phase & three-phase power
- Complex power, power factor

7. Electronics Fundamentals
- Diode I–V relation, rectifiers
- Ideal op-amp circuits
- non-Ideal op-amp circuits

8. Power Electronics
- AC–DC converters
- DC-AC Inverters

9. Introduction to Control & Automation
- Open-loop vs. closed-loop systems
- Simple feedback system
- First-order response, time constant

10. Review

Calendar

Week 1	Electrical Quantities and Units
Week 2-3	Circuit Laws & DC Analysis
Week 4	Transients in RC/RL Circuits
Week 5-6	AC Circuits & Phasor Analysis
Week 7	Signals & Fourier Basics
Week 8-9	Transformers & Power Systems
Week 10	Electronics Fundamentals
Week 11-12	Power Electronics
Week 13	Introduction to Control & Automation
Week 14	Review

Texas Tech University Student Code of Conduct
https://www.depts.ttu.edu/dos/docs/1819PARTI.pdf

Attendance
Attendance in class is required.

Texas Tech University Policy

- **Students with Disabilities**
  Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note: instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services in Weeks Hall or call 806-742-2405.

- **Academic Integrity**
  Academic integrity is taking responsibility for one's own class and/or course work, being individually accountable, and demonstrating intellectual honesty and ethical behavior. Academic integrity is a personal choice to abide by the standards of intellectual honesty and responsibility. Because education is a shared effort to achieve learning through the exchange of ideas, students, faculty, and staff have the collective responsibility to build mutual trust and respect. Ethical behavior and independent thought are essential for the highest level of academic achievement, which then must be measured. Academic achievement includes scholarship, teaching, and learning, all of which are shared endeavors. Grades are a device used to quantify the successful accumulation of knowledge through learning. Adhering to the standards of academic integrity ensures grades are earned honestly. Academic integrity is the foundation upon which students, faculty, and staff build their educational and professional careers. [Texas Tech University ("University") Quality Enhancement Plan, Academic Integrity Task Force, 2010].

- **Religious Holiday**
  "Religious holy day" means a holy day observed by a religion whose places of worship are exempt from property taxation under Texas Tax Code §11.20. A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. A student who is excused under section 2 may not be penalized for the absence; however, the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.

- **Accommodation for Pregnant Students**
  To support the academic success of pregnant and parenting students and students with pregnancy related conditions, the University offers reasonable modifications based on the student's particular needs. Any student who is pregnant or parenting a child up to age 18 or has conditions related to pregnancy may contact Alex Faris, the Texas Tech University designated Pregnancy and Parenting Liaison, to discuss support available

through the University. The Liaison can be reached by emailing alfaris@ttu.edu. Should a student communicate with the instructor that they are pregnant or have a pregnancy related condition or may need additional resources related to pregnancy or parenting, the instructor will communicate that student's information to the Title IX Coordinator, who will work with the student and others, as needed, to ensure equal access to the University's education program or activity.

For more information regarding supportive measures, please contact pregnancy & parenting liaison Alex Faris (alfaris@ttu.edu | 806.834.3420) or visit https://www.depts.ttu.edu/titleix/PregnacnyandParenting/index.php. You can also visit https://www.depts.ttu.edu/titleix/PregnacnyandParenting/index.php to submit a request to Alex Faris for assistance.

- **Safety and Wellness**
  The Texas Tech University (TTU) and Edward E. Whitacre Jr. College of Engineering are committed to the safety and wellness of our students by providing various services and resources.
  Make sure you register with Tech Alert to get emergency notifications by phone call, text, or email. You are encouraged to review the Emergency Action Plans (EAPs) and watch the videos of Know What To Do In Emergency Events and Surviving an Active Shooter Event Training to be prepared for those emergency situations. Additionally, due to the nature of laboratory or design courses, it is mandatory for you to follow the university safety policies and any additional safety training and protocols required by the course instructor(s).

  For your wellbeing, various services are available at Student Counseling Center and Student Health Services. The Student Wellness Center provides convenient walk-in services M-F from 8 AM to 5 PM. Furthermore, the Texas Tech Crisis HelpLine (806-742-5555) provides 24/7/365 assistance for students experiencing a crisis or distress.

Emergency/Crisis Phone Number

TTU Police (UPD) Emergency	911
TTU Police (UPD) Non-Emergency	806.742.3931
TTU Emergency Maintenance	806.742.4OPS (4677)
TTU EHS (M-F, 8 am – 5 pm)	806.742.3876
SafeRide	806.742.RIDE (7433)
TTU Crisis HelpLine	806.742.5555
Student Wellness Center (From Urgent Care to a Full-Service Pharmacy on site)	806.742.2848
Title IX Reporting	806.742.7233
The Dean of Students	806.742.2984

Disclaimer: The subject matter and dates for the course may evolve slightly and should be considered tentative. Updates will be announced.

Version
08/22/2025