ECE 2850
Principles of Electric Circuits
[Spring 2024]

ECE 2850 - 001, TR 4:30 pm - 5:45 pm, Bruner Hall 119, 3 credit hours, Spring 2024

Catalog Description:
Lec. 3. Credit 3.
Prerequisites: C or better in MATH 1920, C or better in MATH 2010.

Introduction to electric circuit quantities and components, systematic application of Ohm's and Kirchhoff's laws, superposition, Thévenin and Norton Theorems, operational amplifiers, RL and RC transients, Laplace transform methods for electric circuit analysis, steady-state ac-circuit solution, power in ac-circuits, and 3-phase circuits [This course does not count for credit for Electrical Engineering or Computer Engineering majors]

Instructor [Mohamed Mahmoud]:
- Office: Brown Hall – 332
- Email: mmahmoud@tntech.edu
- Office Hour: By appointment --- Please email to set an appointment.

Textbook:
Dorf, R.C. and Svoboda, J. A., Introduction to Electric Circuits, 9th-Edition, John Wiley and Sons, Inc., 2014 - ISBN: 9781118477502.

Course Description:
The goal of this course is to introduce students to the: analysis of dc-circuits, circuits in transient state, ac-circuits in steady state [both 1-phase and 3-phase circuits].

Instructional outcomes for the course:
Upon completion of this course, students should be able to:

- apply the differential and integral relationships between charge, current, voltage, power and energy.
- set up and solve node and mesh equations for circuits with resistors independent sources, dependent sources, and operational amplifiers.
- determine Thévenin and Norton equivalent circuits.
- analyze circuits with operational amplifiers.
- solve for the complete response of RL and RC circuits with dc-sources and switches.
- use Laplace Transforms to describe the behavior of electric circuits.
- apply phasors to analyze ac-circuits.
- calculate complex power and power factor correction in ac-circuits.
- analyze circuits containing transformers.
- analyze 3-phase ac-circuits.

Course Topics:

- Electrical quantities and units (5%).
- Introduction to dc-circuit elements (5%).
- Analysis of resistive circuits (15%).
- Circuit Theorems (15%).
- Operational amplifiers (10%).
- Complete response of RL and RC circuits (10%).
- Natural response, forced response and complete response of electric circuits using Laplace transforms (10%).
- Steady-state analysis of ac-electric circuits (15%).
- Real power, reactive power, complex power, power-factor, power-factor correction, and transformers (10%).
- Three-phase circuits (5%).

Assessment Tools:

Exams, including:
Tests/Quizzes and Final.

Attendance Policy:

Attendance is required.

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Grading and Evaluation Procedure:

HW-Assignments:
- Several HW-problems are assigned. These problems are not collected.
- Tests and final-exam are very much related to HW-problems.

Grading Scale:

A $\geq$ 90 %   [Excellent]   D $\geq$ 60 %, but $<$ 70 % [Passing]

B $\geq$ 80 %, but $<$ 90 % [Good]   F $<$ 60 % [Failure]

C $\geq$ 70 %, but $<$ 80 % [Satisfactory]

Grading Points:

Quizzes   [30 points]: Several Quizzes.

Tests   [30 points]: Several tests.

Final Exam   [40 points]: Final Exam is comprehensive, including all materials covered.

Total   [100 points].

Notes:
- Make-up test/final will be given only under exceptional circumstances.
- For Honor credit, the above assignments count for 80 % of the overall grade. Additional assignments are given for the remaining 20 %.

Course Content:
We will cover the following from our textbook:

- Electric Circuit Variables [Chap 1]

- Circuit Elements [Chap 2]

- Resistive Circuits [Chap 3]

- Methods of Analysis of Resistive Circuits [Chap 4]

- Circuit Theorems [Chap 5]

- The Operational Amplifier [Chap 6]

- Energy storage elements [Chap 7]

- The complete response of RL and RC circuits [Chap 8]

- Sinusoidal Steady-State Analysis [Chap 10]

- AC Steady State Power [Chap 11]

- Three-phase AC-Circuits [Chap 12]

- Single-phase and 3-phase Transformers [Chap 12.5]

[Over]

[Disability Accommodation](#):
Students with a disability requiring accommodations should contact the accessible education center (AEC). An accommodation request (AR) should be completed as soon as possible, preferably by the end of the first week of the course. The AEC is located in the Roaden University Center, room 112; phone 931-372-6119. For details, view Tennessee Tech's policy 340 – [services for students with disabilities at policy central](#).

[Additional Resources](#):

Technical Help
If you are experiencing technical problems, visit the [myTech IT Helpdesk](#) for assistance.
If you are having trouble with one of the instructional technologies (i.e. Zoom, Teams, Qualtrics, Respundus, or any technology listed [here](#))visit the [Center for Innovation in Teaching and Learning](#) (CITL) website or call 931-372-3675 for assistance.
For accessibility information and statements for our instructional technologies, visit the [CITL's Learner Success Resource page](#).

Tutoring
The university provides free tutoring to all Tennessee Tech students. tutoring is available for any class or subject as well as writing, test prep, study skills, resumes. Appointments are scheduled. Please see the [Learning Center website](#) for more information.

Health and Wellness:

Counseling Center:
The Counseling Center offers brief, short-term, solution-focused therapeutic interventions for Tennessee Tech University students. The staff of the Counseling Center is available to assist students with their personal and social concerns in hopes of helping them achieve satisfying educational and life experiences. To learn more or schedule an appointment, visit the Counseling Center website.

Health Services:
Health Services offers high-quality, affordable care that is accessible and promotes the health and wellness of our Tennessee Tech community. Visit the Health Services website to learn more.