Electric Circuits 1
EE 2350-003 – CRN-13667 – Fall 2020

Syllabus
Monday, August 24, 2020

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1 General Information

- **Course ID:** Electric Circuits 1, EE 2350-003, CRN-13667
- **Time:** Monday and Wednesday, 3:00 pm – 4:20 pm
- **Required Textbook and Online System:** [NR18, Textbook] and [Pee, System]
- **Format:** delivered in a hybrid format, online Blackboard lectures
- **Prerequisites:** EE 1305, MATH 1312, MATH 2326 and PHYS 2421, each with a grade of C or better and department approval. MATH 2326 and PHYS 2421 may be taken concurrently with EE 2350.
- **Instructor:** von Borries – rvonborries@utep.edu
- **Office Hours:** online Blackboard, Monday and Wednesday 4:30 pm to 6:00 pm
- **Teaching Assistant:** Felipe B. da Silva (fbdasilva@miners.utep.edu)
  - **Office Hours:** online Blackboard, Friday 3:00 pm to 4:00 pm
- **Version:** September 30, 2021

2 Description

Theory of electric circuits including circuit variables (voltage, current, power and energy) and elements (sources, resistors, capacitors and inductors), Ohm’s law, Kirchhoff’s laws, Thévenin and Norton equivalents, node-voltage and mesh-current methods, sinusoidal steady-state analysis and power calculations, and balanced three-phase circuits.

Prerequisites: EE 1305 Introduction to Electrical Engineering, PHYS 2421 Fields and Waves, MATH 1312 Calculus II, and MATH 2326 Differential Equations, each with a grade of C or better and department approval. MATH 2326 and PHYS 2421 may be taken concurrently with EE 2350.
3 Textbook and Online System

Electric Circuits 1 EE 2350 has two required resources: (1) the textbook by J. W. Nilsson and S. Riedel, Electric Circuits. Pearson, Upper Saddle River, N.J, Eleventh edition, 2018 (in printed or in electronic format); and (2) the Mastering Engineering for Electric Circuits, an online tutorial and homework system [Pea, System]. You will use Mastering Engineering for the homework. Both the textbook and the online system are published by Pearson Education and they can be purchased as a bundle at a lower cost.

I will use Matlab software to find numerical solutions to some problems and as a tool to explain concepts in electric circuits [uM, Matlab]. You also should use Matlab to work on the numerical solution to problems, instead of using a pocket calculator. If you don’t have Matlab installed in your computer, you can get Matlab from the Engineering Technology Center (ETC) at the Engineering building E351D, College of Engineering, located between the Engineering and Classroom buildings on the 3rd floor. http://etc.utep.edu. e-mail: etchehelpdesk@utep.edu. Alternatively, you can have access to Matlab at https://my.app s.utep.edu/vpn/index.html.

The numerical computation and graphic visualization in Matlab software can enhance both teaching and learning of new ideas and concepts in EE 2350. In addition to solving numerical problems, during the lectures, I will use the Analog Discovery Kit by Digilent Inc. to run simple experiments and illustrate concepts in the theory of electric circuits [uDI, Discovery].

4 Student Outcomes

The focus in EE 2350 is the study of electric circuits in the steady-state. The course has seven student outcomes:

1. Students will use their now knowledge of resistive circuit parameters, the concepts of current, voltage, and power and dc sources to analyze simple circuits (Critical);
2. Students will learn techniques of circuit analysis such as parallel/series combinations, delta-wye transformations, mesh and loop analysis, and superposition (Critical);
3. Students will learn the voltage-current relationships for inductors and capacitors and will use them, together with the techniques of circuit analysis to study steady-state responses of circuits (Critical);
4. Students will learn the concept of phasor and will use it in solving the sinusoidal response of circuits (Critical);
5. Students will learn power calculations and analysis of electric circuits in the sinusoidal steady-state (Critical);
6. Students will learn concepts in frequency selective circuits, Fourier series and two-port circuits (Important); and
7. Students will become familiar with MATLAB for plotting, calculating, solving simple numerical linear algebra problems (Important).
As a student, you will devote much of your attention and time to the discussion of problems already solved; problems solved in the classroom and problems solved in the textbook [NR18, Textbook]. You will only begin to develop the skills to successfully attack unsolved problems that you will face as a practicing engineer by reading and discussing the solutions to the problems presented in the classroom and in the textbook. You will need to discuss old and new problems with the instructor, teaching assistant and your colleagues, inside and outside the classroom, and during office hours. The homework and the quizzes will allow you and the instructor to assess your learning before the exams. By doing so, you will learn some general problem-solving procedures:

- Identify what’s given and what’s to be found;
- Sketch a circuit diagram;
- Think of several solution methods and choose one among them;
- Calculate a solution;
- Test your solution; and
- Use creativity.

These procedures are discussed in [NR18, Textbook].

5 Course Topics

- **Chapter 1** Circuit Variables
  International System of Units (SI); overview of circuit analysis; voltage and current; ideal basic circuit element; power and energy.

- **Chapter 2** Circuit Elements
  Voltage and current sources; electrical resistance (Ohm’s law); construction of a circuit model; Kirchhoff’s laws; analysis of a circuit containing dependent sources.

- **Chapter 3** Simple Resistive Circuits
  Resistors in series; resistors in parallel; voltage-divider and current divider circuits; voltage division and current division; measuring voltage and current; measuring resistance (Wheatstone bridge); delta-to-wye equivalent circuits.

- **Chapter 4** Techniques of Circuit Analysis
  Terms for describing circuits; node-voltage method; node-voltage method and dependent sources; node-voltage method special cases; mesh-current method; mesh-current method and dependent sources; mesh-current method special cases; node-voltage method versus the mesh-current method; source transformations; Thévenin and Norton equivalents; deriving a Thévenin equivalent; maximum power transfer; superposition.
• **Chapter 6** Inductance, Capacitance, and Mutual Inductance
  Inductor; capacitor; equivalent inductance; equivalent capacitance; mutual inductance.

• **Chapter 9** Sinusoidal Steady-State Analysis
  Sinusoidal source; sinusoidal response; phasor; passive circuit elements in the frequency domain; Kirchhoff’s laws; series, parallel and delta-to-wye; Thévenin and Norton; node-voltage method; mesh-current method; transformer; ideal transformer; phasor diagrams.

• **Chapter 10** Sinusoidal Steady-State Power Calculations
  Instantaneous power; average and reactive power; root-mean-square (rms); complex power; power calculations; maximum power transfer.

We will use examples and problems in Chapters 14 to study the concepts learned in the sinusoidal steady-state analysis part, Chapters 9 and 10.

• **Chapter 14** Introduction to Frequency Selective Circuits
  Low-pass filters; high-pass filters; bandpass filters; bandreject filters.

### 6 Evaluation

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Formulas are part of the material assessed in EE 2350 and formula sheets are not allowed during EE 2350 exams. Two important rules for the exams and quizzes are: (1) closed textbook, notes and homework solutions; and (2) turned off electronic devices: calculator, computer, cell phone, smart watch, headphone, etc.

### 7 Grading

\[ A = 100 - 90\%, \ B = 90 - 80\%, \ C = 80 - 70\%, \ D = 70 - 60\% \text{ and } F = 60 - 0\%. \]

### 8 Attendance

Class attendance is mandatory and will be monitored. Any student who has more than two unexcused absences will be dropped out of the EE 2350.
9 Missed Exams

If you miss Exam I or Exam II without an acceptable excuse you will receive zero points for the missed exam. You may be excused from a scheduled exam time due to serious illness, funeral attendance, courtroom appearance, or a UTEP athletic participation. In the case of a missed exam, you must communicate and submit the appropriate documentation to me no later than ten days after the date of the missed exam. The make-up exam for either Exam I or Exam II is comprehensive (all the material for Exams I, II, and III) on the Friday of the finals’ week (tentatively, December 4, 4:00 pm to 5:20 pm). Note that there is no make-up exam for the Comprehensive Final or for more than one missed exam.

10 Grade Assignment for Drops and Withdrawals

If you drop the course before the drop deadline, the grade is “W.” However, please note the following regulation stated in the UTEP academic catalog (http://catalog.utep.edu/grad/academic-regulations/registration-and-records/): “... if the student drops after the student-initiated course drop deadline, instructors will determine a grade of “W” or “F” for each course. A grade of W will be considered only under exceptional circumstances and must be approved by the instructor and department chair for the course. A student may need to petition the instructor for a grade of “W” in writing with the necessary supporting documentation.”

11 Office Hours

In addition to attending the lectures, plan to use office hours to get most out of EE 2350. Feel encouraged to attend office hours and work with me on the textbook concepts and problems, Matlab simulations, and preparing for the homework and exams. I can help you to learn “Electric Circuits.” You can use office hours to get more information on anything you are struggling with in class. During office hours, I can provide you with an opportunity (1) to carefully walk through an idea and (2) to get answered lots of questions that are specific to your needs, helping you to effectively learn the material. You can also use office hours to get more information on anything covered in class that triggered your interest, that you enjoyed. I will not collect or grade the recommended exercises from the textbook and from past exams; however, note that you should work on all them as part of your study for EE 2350. I can work with you on the recommended exercises using my notepad and laptop computer (on Matlab simulations). In addition to regular office hours, you can contact me by email 24/7 with questions on the EE 3384 material and I will try to reply and help you as soon as possible.
12 UTEP E-mail Account

To communicate with me, make sure your UTEP e-mail account is working fine. It is your responsibility to have a UTEP e-mail account working properly. By the end of the first week of classes, every student should have received at least one e-mail message from EE 2350. If you detect an e-mail problem (no EE 2350 e-mail message received by the end of the first week of classes), you should request UTEP’s Help Desk assistance to fix the problem with your UTEP’s e-mail account.

13 Accommodations and Support Services

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email at cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, visit the CASS website at www.sa.utep.edu/cass.

14 Academic Integrity

Please review the policy on academic integrity available at https://www.utep.edu/student-affairs/osccr/student-conduct/academic-integrity.html.

References


15 Calendar

EE 2350, MW 3:00 pm to 4:20 pm

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**Exam I:** September 28, Monday  
Chapters 1, 2, 3 and 4

**Exam II:** November 2, Monday  
Chapters 4, 6 and 9 (exercises in 14, 16 and 18)

**Comprehensive Final:**  
December 7, Monday, 1:00 pm to 3:45 pm  
Chapters 9 and 10 (exercises in 14, 16 and 18)

**Labor Day Holiday – University Closed**  
September 4, Monday

**Fall Drop/Withdrawal Deadline**  
October 30

**Thanksgiving Holiday**  
November 26 to 27