Syllabus
Department of Electrical & Computer Engineering
The University of Texas at El Paso, El Paso, Texas 79968, USA
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Electric Circuits 1
EE 2350-003 – CRN-13458 – Fall 2021

Syllabus
Monday, August 23, 2021

Ricardo von Borries
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The University of Texas at El Paso, El Paso, Texas 79968, USA
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1 General Information

⇒ Course ID: Electric Circuits 1, EE 2350-003, CRN-13458
⇒ Time: Monday and Wednesday, 3:00 pm – 4:20 pm
⇒ Lecture Room: Liberal Arts Building 207
⇒ 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.
⇒ Textbook: [1, Textbook] and [2, Master Engineering]
⇒ Computational Software: Matlab® [3], [4]
⇒ Instructor: von Borries – rvonborries@utep.edu
⇒ Office: Engineering Building 313
⇒ Office Hours: Monday and Wednesday 10:30 to 11:00 am (room 313 or Blackboard)  
Monday and Wednesday 4:30 to 5:00 pm (room 313 or Blackboard)  
Tuesday and Thursday 6:00 to 6:30 pm (room 313 or Blackboard) 
or by appointment on Blackboard
⇒ Version: Monday, August 23, 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 [2, 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 [4, 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: etchelpdesk@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 [5, 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. Ability to

1. apply basic concepts of current, voltage, sources, and power to analyze simple resistive circuits (Critical);
2. apply techniques of circuit analysis such as parallel/series combinations, delta-wye transformations, mesh and loop analysis, and superposition (Critical);
3. apply voltage-current relationships for inductors and capacitors and use them, together with the techniques of circuit analysis to determine the steady-state response of circuits (Critical);
4. apply the concept of phasor and use it in solving the sinusoidal response of circuits (Critical);
5. apply power calculations and analysis of electric circuits in the sinusoidal steady-state (Critical);
6. analyze frequency selective circuits, and apply Fourier series (Important); and
7. use MATLAB to do calculations and to generate plots needed in the analysis of circuits in the sinusoidal steady-state (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 [1, 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, as discussed in the textbook for EE2350 [1]:

- 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**.

## 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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<td>Homework</td>
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<td>Exam I</td>
<td>Chapters 1 to 4</td>
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Formulas are part of the material assessed in EE 3384 and formula sheets are not allowed during EE 3384 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  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 and II) on the Friday of the finals’ week (tentatively, December 11, 4:00 pm to 5:20 pm). Note that there is no make-up exam for more than one missed exam.
9 Academic Integrity

Review and comply with the policy on academic integrity available at https://www.utep.edu/student-affairs/osccr/student-conduct/academic-integrity.html.

10 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.

11 UTEP’s Covid-19 Precaution Statement

“Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidactionutep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing.”

12 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 cassutep.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.

13 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.
14 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.

15 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.”

16 Use of Electronic Devices

The use of cell phones or electronic devices may pose a negative distraction (social media, internet, email) and disrupt classroom discussions. Phones must be silenced during classes, exams, or quizzes, and if you need to answer a call during a class, please step out of the classroom. You can use an electronic notepad for note taking only [6].

17 Copyright Statement for Course Materials

Materials in this course, unless otherwise indicated, are protected by the United States copyright law. Materials are presented in an educational context for personal use and study and should not be shared, distributed, or sold in print or digitally, outside the course without permission.
18 References

Sorted by Order of Appearance


A Calendar

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

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- Labor Day, UTEP Closed: September 6, Monday
- Exam I: September 27, Monday
  Chapters 1, 2, 3, and 4
- Course Drop/Withdrawal Deadline: October 29
- Exam II: November 1, Monday
  Chapters 5, 6, 7, 8, and 9
- Thanksgiving, UTEP closed: November 25 to 26
- Comprehensive Final: December 6
  Monday, 1:00 pm to 3:45 pm
  Chapters 10, 11, 12, 13, 14, and 1 to 9