

# EE 2351: ELECTRIC CIRCUITS II

Spring 2017

Course Description: Analysis of transient behavior in first-order and second order circuits. Circuit analysis using the Laplace transforms. Network functions and frequency response representation of circuits. Steady-state analysis of circuits fed by non-sinusoidal periodic signals using Fourier series. Two-port networks. Computer-aided analysis of circuits.

Pre-requisites: EE 2350, PHYS 2421, and MATH 2326, each with a grade of C or better.  
**You are not allowed to take any of these courses concurrently.**

Textbook: J.W. Nilsson and S.A. Riedel, **Electric Circuits**, 10<sup>th</sup> Edition, Prentice Hall, 2014.

You may acquire either the online, pdf or hardcopy editions. You are required to purchase access to Pearson Mastering Engineering website which may include electronic access to the textbook.

Mastering Engineering Course ID: **MVELEZREYEESEE2351FALL2016**

Instructor: Dr. Miguel Velez-Reyes, Professor of Electrical and Computer Engineering  
Office: Engineering Annex A-327 (or A-319)  
Phone: (915) 747-5534  
e-mail: mvelezreyes@utep.edu

Office Hours: Tue & Thu 10:00 am to 12:00 pm and by appointment. **I can also answer your questions via e-mail.**

Teaching Assistant: Ms. Pavithra Pochamreddy  
E-mail: ppochamredd@miners.utep.edu  
Office: TBD  
Office Hours: TBD

Grading policy: Your final grade will be based on three partial exams (60 %), a final exam (30%), and homework (10 %). Grades (for sure):

At least 90	A
At least 80	B
At least 70	C
At least 60	D
59 or less	F

There will be a “gray area” between two-letter grades in the final distribution, so that two people getting the same weighted average grade could get different letter grades. If you are in one of these gray areas, whether you get a higher or lower grade depends primarily on two factors: (a) class participation and (b) whether your performance has been improving or declining.

An **incomplete** grade is given **only** for a valid reason when arrangements have been made with me and, in that case, only if the student was passing the course.

Homework: Homework is an essential part of the course. You will be assigned Homework every week. It will be submitted and graded using Mastering Engineering.

Mastering Engineering is an online system that is supported by Pearson, the publisher of the textbook. You will be required to register for Mastering Engineering. For this you will need several things.

1. Course ID: **MVELEZREYESEE2351FALL2016**.
2. Pearson account: You will either create your Pearson student account or identify your existing account.
3. Access code or buy access: Either enter a student access code or buy access using a credit card or PayPal. A student access code card may be provided with your new textbook or you may be able to purchase this separately.

Mastering Engineering provides tutorial homework problems designed to emulate the instructor's office hour environment. The system can guide you through engineering concepts with self-paced individualized coaching. It will provide you with feedback that is specific to any errors you may happen to make. Also you may elect to receive optional hints that are capable of breaking a complex problem down into simpler steps.

Classroom Etiquette: Part of being a professional is being on time and being prepared to do your job. This applies to your career as a student as much as it does to your future career as an engineer. You are expected to be in class and prepared to participate at the scheduled start time. Wireless devices (cell phones, PDA's, MP3 players, Smart phones, etc.) are allowed in the classroom. It is recognized that devices of this sort provide emergency access for your family and loved ones. However, please use professional discretion with these devices. This includes shutting them off or setting them in the silent mode before coming to class. Do not use text messaging or web browser features while you are in class. If you must answer the phone, please do so after discretely leaving the room. You may return to class once your call is finished.

Attendance: Attendance is compulsory and will be taken using an electronic card reader. Card readers are located at the entrance of the classroom. When you enter class, simply hold your student ID card against the reader. It may not be necessary to remove the card from your wallet or purse. If the light on the device turns green or blue, your card has been read properly and your attendance has been recorded. If the light remains red, the device was unable to read your card; please present it again gently until the green or blue light appears. If you do not see the green or blue light, you may need to remove your card from your wallet or purse in order to ensure that it is detected. Your attendance will be recorded up to 15 minutes before and 15 after your class is scheduled to start.

More than 2 unexcused absences will result in being dropped from the class with F. Drops with W only with proper justification.

**Academic Integrity  
and Scholastic  
Dishonesty**

A fundamental principle for any educational institution, academic integrity is highly valued and seriously regarded at UTEP. More specifically, students are expected to maintain absolute integrity and a high standard of individual honor in scholastic work undertaken at the University.

At a minimum, you should complete any assignments, exams, and other scholastic endeavors with the utmost honesty, which requires you to: (i) acknowledge the contributions of other sources to your scholastic efforts; (ii) complete your assignments independently unless expressly authorized to seek or obtain assistance in preparing them; (iii) follow instructions for assignments and exams, and observe the standards of your academic discipline; and (iv) avoid engaging in any form of academic dishonesty on behalf of yourself or another student.

For the official policies on academic integrity and scholastic dishonesty, please refer to Handbook of Operating Procedures (<http://admin.utep.edu/hoop>).

**Center for  
Accommodations  
and Support Services  
(CASS):**

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 to [cass@utep.edu](mailto:cass@utep.edu), or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at [www.sa.utep.edu/cass](http://www.sa.utep.edu/cass).

**Course Learning Outcomes:**

Students completing EE 2351 will be able to:

- Apply circuit analysis techniques to analyze first and second order circuits in the time domain. (C)
- Understand the concepts of natural and forced response, zero-input, zero-initial conditions in the analysis of electric circuits. (I)
- Apply Laplace transform techniques to represent circuits in the frequency domain, analyze using systematic methods (node, mesh, terminal equivalency, and circuit theorems), and derive input-output representations such as transfer functions. (C)
- Understand the concept of resonance and apply circuit analysis techniques to series and parallel RLC circuits. (I)
- Apply Fourier series to analyze circuits fed by non-sinusoidal periodic sources in steady state. (C)
- Understand and determine using circuit analysis techniques representations of two-port circuits. (I)
- Apply software tools to the analysis of electric circuits in the frequency and time domain. (C)

**Schedule (Tentative):**

Lecture	Chapter	Topic
1-3	7	Introduction. Response of First-Order RL and RC Circuits: The Natural Response of RL & RC Circuits.
4-5	7	Response of First-Order RL and RC Circuits: The Step Response of RL and RC Circuits.
6	7	A general solution for step and natural responses (transient analysis of first-order circuits). Sequential switching.
7-8	8	Natural and Step Response of RLC Circuits: The Natural Response of a Parallel RLC Circuit, The Step Response of a Parallel RLC Circuit
9	8	Natural and Step Response of RLC Circuits: The Natural Response of a Series RLC Circuit, The Step Response of a Series RLC Circuit
10	7	A general solution for step and natural responses (transient analysis of second-order circuits). Sequential switching.
<b>Exam #1</b>		
11-12	13	Review of Laplace Transforms. Inverse LT using partial fraction expansions.
13-15	13	Circuit representation in the s-domain. Analysis of circuits in the s-domain using systematic methodologies. Determination of the zero-input and the zero-state response of a linear time invariant circuit.
16-17	13	Transfer functions in circuit analysis. Relation to the sinusoidal steady state response and frequency response. Frequency response plots. Relation to the impulse response.
<b>Exam #2</b>		
18-19	14-15	Frequency selective circuits: Passive circuits.
20-21	15	Frequency selective circuits: Active Filters.
22-23	18	Two-port networks: input/output representation of two-port networks using admittance, impedance and transmission parameters. Interconnection of two port networks. Using two-port representations to solve circuit problems involving two-port networks.
<b>Exam #3</b>		
24-25	16	Fourier series representation of periodic signals. Effective values for non-sinusoidal periodic signals
26-27	16	Steady-state analysis of linear time invariant circuits using Fourier series and the Superposition Theorem; Instantaneous, Apparent, Real and Reactive power, and power factor in circuits excited by non-sinusoidal periodic signals.
28	16	Amplitude and phase spectra. Power spectra plots.
<b>Final Exam (comprehensive)</b>		

**Computer Usage:** Use of MATLAB, PSpice or MultiSim in homework to complement class discussions.

**Revised by Dr. Miguel Velez-Reyes in January 2017.**