EE 2351: ELECTRIC CIRCUITS II

Fall 2016

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.

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

You may acquire either the online or hardcopy editions. You are required to purchase access to MasteringEngineering website which includes electronic access to the book.

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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 your 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 for virtually every class period. Homework will be submitted and graded using Mastering Engineering.

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

1. Course ID: This will be provided by the instructor.
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.

Cheating and Plagiarism:

Cheating is unethical and not acceptable. Plagiarism is using information or original wording in a paper without giving credit to the source of that information or wording: it is also not acceptable. Do not submit work under your name that you did not do yourself. You may not submit work for this class that you did for another class. If you are found to be cheating or plagiarizing, you will be subject to disciplinary action, per UTEP catalog policy.

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, 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.

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 or 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	N/A	Introduction, Syllabus • Quick overview of circuit elements and laws, • Circuit analysis techniques, • Thevenin and Norton equivalent circuits, • Superposition principle
2-3	7	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.
11	7&8	Circuits with OP-Amps: Integrators & Differentiators
Exam #1		
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.
Exam #2		
17-18	14-15	Frequency selective circuits: Passive circuits.
19-20	15	Frequency selective circuits: Active Filters.
21-22	9-10	Review of AC circuit analysis
22-23	16	Fourier series representation of periodic signals. Effective values for non-sinusoidal periodic signals

Lecture	Chapter	Topic
24-25	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.
26	16	Amplitude and phase spectra. Power spectra plots.
Exam #3		
27-28	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.
Final Exam (total)		

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

Revised by Dr. Miguel Velez-Reyes in August 2016.