ECE 211: Circuit Analysis I

Department of Electrical & Computer Engineering
University of Massachusetts
Fall 2009

"E&C-ENG211-Circuit Analysis I - 09FA31797-SEC01" on SPARK

Purpose:

The objective of this course is to introduce you to the methodology of electrical and computer engineering and lay a foundation for future work in the field through the study of electrical circuits. In particular, at the conclusion of this course you will:

* understand the methodology of modeling real-life systems by lumped circuit models;

* be able to analyze DC resistive circuits using network theorems such as superposition, Thevenin's Theorem, and Norton's Theorem;

* be able to analyze RC, RL, and RLC circuits through the use of differential equations;

* be able to analyze basic RC, RL, and RLC circuits through the use of Laplace transform techniques; and

* be able to use modern software tools, like PSpice, for the analysis and simulation of electric circuits.

Time & Place

Lectures: MWF 2:30 pm – 3:20 pm, ELAB-II 119

Discussions: R 9:30-10:45, 11:15-12:30, 1:00-2:15, ELAB 305

Instructors

Stephen Frasier (lecture), KEB 113A, 545-4582, frasier@ecs.umass.edu

Rama Janaswamy (discussion), Marcus 215D, 545-0937, janaswamy@ecs.umass.edu

Office hours: TBA (see SPARK site), or by appointment.

Teaching Assistants

Brian Paulsen, Selman Ozbayat, Jason Donovan

Prerequisites:

Earned a C or better in the following: Math 132 or 136; Physics 151 and 153; ENGIN 112; and ECE 122. Physics 152 and 154 are corequisites, though it is recommended that you complete them before attempting this course.

A status of EE or CSE standing is required. If you have not qualified for EE or CSE yet (e.g., you are still an ENGIN major), you will be withdrawn from the course. To look into changing your major, go to the ECE Undergraduate Programs Office in Marcus 8.

Required Text:

Circuits, by Ulaby and Maharbiz, NTS Press, 2009, ISBN: 978-1-934891-00-1.

PSpice for Linear Circuits (w/CD-ROM), by J.A. Svoboda, Wiley, 2007.

Both of these are available from online sources. Text is available directly from NTS Press for $90 + shipping. Also available from UStore for $120. Pspice text is about $25 available from Amazon.

Computer Requirements:

Three virtual labs using PSpice. Three projects using Excel/Matlab. These software packages are available in the college's computer labs if you do not have access via your own computer. Please note that your text comes bundled with a PSpice-like application called NI-MultiSim (student version), which is available for you to install and use on your own computer. Several nice tutorials using MuliSim are included in the text. However, due to software licensing issues, use of this particluar package is not a *formal* part of this course (though it might be in the future). You are encouraged to try it out and tell us what you think of it. Virtual labs should be completed using the software included with the PSpice text (which is also available in computer labs)

Course Grading:

four (4) in-class quizzes – 30%

one Midterm Exam – 30%

one Final Exam – 30%

Labs and Projects – 10%

A note on grading policy: a grade of C or better is required to "pass" this course and continue on to ECE 212. Nominally, this means a course average exceeding 70%. However, the following stipulations will also apply.

1. All quizzes must be taken, with an average score exceeding 6/10.

2. Both midterm and final must be taken, with an average score exceeding 60%.

3. All labs and projects must be completed. They may be returned to you if they are not correct. You have the opportunity to resubmit them.

Homework:

Homework exercises will be assigned approximately weekly, and will constitute material for the weekly discussion sessions. These are entirely for your learning and understanding. Homework will not be collected nor graded. Solutions will be distributed, however. You are *strongly* encouraged to attempt the homework, as it will be helpful for your quizzes and exams.

Course Content:

During this course we will cover the topics in Chapters 1-6 and some of chapter 10. The topics cover DC analysis of resistive networks, operational amplifiers, time-domain (AC) analysis of first-order (RC, RL) and second-order (RLC) circuits, and a glimpse of frequency-domain techniques using the LaPlace Transform. You will study frequency domain techniques in more depth in ECE 212.

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Fall 2009 - Preliminary Schedule

Meetings	Week of	Topic	Assignment
1-2	W Sep 9	Circuit Terminology	Ch. 1
3-5	M Sep 14	Resistive Circuits, Voltage & Current Laws,	Ch. 2
6-8	M Sep 21	Nodal & Mesh Analysis, Superposition	Ch. 3
	W Sep 23	**Quiz 1**	in-class
9-11	M Sep 28	Thevenin and Norton Equivalents, Power	Ch. 3
	W Sep 30	*Project 1 Due*	P1
12-14	M Oct 5	Operational Amplifiers	Ch. 4
15-17	T Oct 13	Operational Amplifiers	Ch. 5
	W Oct 14	**Quiz 2**, Project 2 Due	P2, in-class
18-20	M Oct 19	RC, RL Circuits	Ch. 5
21-23	M Oct 26	RC, RL Circuits	Ch. 6
	W Oct 28	*Virtual Lab 1 Due*	V1
	R Oct 29	**Midterm Exam**	evening
24-26	M Nov 2	RLC Circuits	Ch. 6
	F Nov 6	*Project 3 Due*	P3
27-28	M Nov 9	RLC Circuits	
	W Nov 11	**Quiz 3**	in-class
29-31	M Nov 16	Complex Arithmetic	Ch. 7
	W Nov 18	*Virtual Lab 2 Due*	V2
32-33	M Nov 23	Laplace Transform	Ch. 10
34-36	M Nov 30	S-domain Circuit Analysis	Ch. 10
	M Nov 30	**Quiz 4**	in-class
	W Dec 2	*Project 4 Due*	P4
37-39	M Dec 7	S-domain Circuit Analysis	Ch. 10
	F Dec 11	*Virtual Lab 3 Due*	V3
	TBD	Final Exam	