COLORADO SCHOOL OF MINES
ELECTRICAL ENGINEERING & COMPUTER SCIENCE DEPARTMENT

EENG 281 – Introduction to Electrical Circuits
Spring 2017

Instructors

Dr. R. Ammerman	Dr. S. Claussen	Dr. P.K. Sen	Dr. M. Hadi
Office: BB 314G	Office: BB 251	Office: BB 320	Office: BB 314-A
303-273-3686	303-273-3462	303-384-2020	303-927-8224 (text only)
rammerma@mines.edu	sclausse@mines.edu	psen@mines.edu	mhadi@mines.edu
Office Hours: MWF 11-11:50am, T 1-3pm	Office Hours: M 3-4:30pm, W 9-10:30am, F 11am-12pm and by appointment	Office Hours: M 12-1pm, W 12-2pm, F 12–1pm and M 3–6pm for appointments	Office Hours: M 1-2pm, W 10:30am – 12pm, F 11am-12pm

Prerequisite

PHGN 200 (Physics II)

Lectures

Section A (Ammerman) MWF: 9:00 – 9:50 AM, GC 263
Section B (Ammerman) MWF: 10:00 – 10:50 AM, GC 263
Section C (Sen) MWF: 11:00 – 11:50 AM, GC 263
Section D (Hadi) MWF: 12:00 – 12:50 PM, MZ 235
Section E (Claussen) MWF: 1:00 – 1:50 PM, BB W210

Course Description

Electrical circuits are an essential part of engineering curricula. Emphasis will be placed on the mastery of circuit analysis and problem solving. Once the circuit analysis skills are presented they will be used to develop an understanding of operational amplifiers and some fundamental electrical engineering system concepts.

Course Objectives

1) Students will demonstrate proficiency in dc and ac analysis of RLC circuits. This involves solving problems by applying Kirchhoff's and Ohm's laws. The specific circuit analysis techniques of voltage and current division, node-voltage, mesh-current, superposition, and Thevenin's theorem will be emphasized. Mastering the frequency domain concepts of phasors and impedance will be required to analyze ac circuits.

2) Students will demonstrate an understanding of operational amplifiers (ideal and non-ideal). Emphasis will be placed on an understanding of the basic structure of these devices, circuit modeling, and their operation in circuits.

3) Students will demonstrate proficiency in the transient analysis of RC, RL, and RLC circuits.

4) Students will demonstrate an understanding of basic power concepts in ac and dc circuits. Maximum power transfer, ideal transformers, and electrical safety will be emphasized.

Blackboard

Given that Blackboard will be used to disseminate information about the course, it is important that you regularly log into the system. Solutions to assigned problems will be posted after the homework is collected.

Required Textbook

The required text for the course is: Electric Circuits, by James W. Nilsson and Susan A. Riedel, Tenth Edition, Pearson/Prentice-Hall, © 2015 (ISBN-13: 978-0-13-376003-3). We will also be using the MasteringEngineering feature that Pearson Publishing provides, so you will need to purchase an access code card too. The required textbook material is also available from the Pearson Custom Library at a reduced cost. The CSM bookstore carries the custom text with the MasteringEngineering access code cards. The ISBN for the EENG 281 course is 1269690450. The text should be used to supplement the lecture material. Carefully reading the text, working the example problems and class participation is an important part of learning the fundamentals of this course.

Homework and Quizzes

Homework will be assigned on a weekly basis, consisting of an online assignment (submitted using the Pearson Publishing MasteringEngineering platform) as well as a handwritten assignment. **No late assignments will be accepted!** All of the MasteringEngineering online homework assignments are due at 11:59pm on the date listed on the course schedule. Handwritten homework assignments are due at the beginning of class on the date listed on the course schedule. The first homework assignment is due on Wednesday, January 18, 2017. After the homework has been collected, solutions will be posted on Blackboard.

A few short quizzes may be given during the semester based on the assigned homework problems. You may use your textbook and notes during these quizzes.

MasteringEngineering

Each student will solve and submit the homework problems online using "MasteringEngineering" website. The textbook package contains a personalized access code for a student to login as a "New Student". Each student must register for "MasteringEngineering" at http://www.masteringengineering.com. Click on courses and select "EENG281 - Introduction to Circuits - Spring 2017" and enter the course ID "EENG281CIRCUITSSPRING2017".

Piazza

Piazza will be used to assist with student questions. Activation is required to access the course page. Students from any section can ask questions pertaining to problems or material discussed in class, homework problems, and review questions before the exams, etc. Separate folders have been created so that questions pertaining to a certain topic can be found in the same place. In order to protect privacy, Piazza allows students to post questions anonymously. Students from any section can answer questions posted by anybody. All instructors will be able to view the questions and provide their own answers. This will ensure quicker turnaround time on student questions since there is a higher probability someone will answer it.

You can sign up for our class page at: piazza.com/mines/spring2017/eeng281

Grading

The grade you receive in this course will be based on the following:

MasteringEngineering Homework	10%
Handwritten Homework	10%
Short Quizzes/Instructor Discretion	5%
2 Exams @ 25% each	50%
Final Exam	25%
Total	100%

Grade allocation for the course will be as shown in the table below:

A (>90)	A^- (>86 - 90)	
B^+ (>83 - 86)	B (>80 - 83)	B^- (>76 - 80)
C^+ (>73 - 76)	C (>70 - 73)	C^- (>66 - 70)
D^+ (>63 - 66)	D (>60 - 63)	D^- (>56 - 60)
F < 56		

Attendance

Excessive absences will result in a lowered and possibly even failing grade. Any short quizzes given during class may only be made up if you have an excused absence.

Colorado School of Mines Academic Dishonesty Policy

The consequences for academic dishonesty at the Colorado School of Mines are severe and can lead to expulsion. The CSM culture requires that you take responsibility for your education in a responsible manner and adhere to the academic dishonesty policy.

The policy on homework is that it is perfectly acceptable for groups to work on the homework together. However, all students must turn in individual homework (unless otherwise stated) and they must understand what they turn in. Copying of solutions without understanding them is not allowed; if a student copies a solution and cannot explain it adequately this is considered academic dishonesty. For computer exercises each student is expected to generate his/her own solution (i.e. one cannot simply copy another person's computer solution and modify it slightly to make it look like it is your own work).

For laboratories, again students can work in groups but must understand all aspects of the laboratory. Representation of calculated data (i.e. dry lab) as measurements is considered academic dishonesty.

During exams, students must do 100 percent of the work on their own.

EENG 281 – Introduction to Electrical Circuits
Spring 2017 Course Schedule

Class	Date	Lecture Topic	Reading	Homework Assignment
1	Tuesday, January 10	Course Introduction Circuit Fundamentals	Chapter 1 Pages 2 – 18	
2	Wednesday, January 11	Voltage & Current Sources Resistors & Ohm's Law	Chapter 2 Pages 26 – 38	
3	Friday, January 13	Kirchhoff's Laws	Chapter 2 Pages 39 – 50	
	Monday, January 16	**Martin Luther King, Jr. Day**		
4	Wednesday, January 18	Simple Resistive Circuits Series & Parallel Voltage Divider and Current Divider Circuits	Chapter 3 Pages 60 – 70	MasteringEngineering HW (Online Assignment) Written HW Chapter 1: 14,26 Chapter 2: 9,27
5	Friday, January 20	Measurements Delta-Wye Transforms	Chapter 3 Pages 70 – 80	
6	Monday, January 23	Introduction to the Node-Voltage Method	Chapter 4 Pages 96 − 108	
7	Wednesday, January 25	Introduction to the Mesh-Current Method	Chapter 4 Pages 105 − 114	MasteringEngineering HW (Online Assignment) Written HW Chapter 3: 7,10,20,24,57
8	Friday, January 27	Node-Voltage Method Versus Mesh-Current Method	Chapter 4 Pages 112 – 115	
9	Monday, January 30	Source Transformations	Chapter 4 Pages 115 – 118	
10	Wednesday, February 1	Thévenin & Norton Equivalent Circuits	Chapter 4 Pages 119 – 125	MasteringEngineering HW (Online Assignment) Written HW Chapter 4: 15,25,38,60
11	Friday, February 3	Thévenin and Norton Equivalent Circuits	Chapter 4 Pages 119 – 125	
12	Monday, February 6	Maximum Power Transfer Theorem Superposition Principle	Chapter 4 Pages 126 – 131	
13	Wednesday, February 8	Introduction to Operational Amplifiers	Chapter 5 Pages 152 – 161	MasteringEngineering HW (Online Assignment) Written HW Chapter 4: 67,70,77,81
14	Friday, February 10	Operational Amplifier Applications	Chapter 5 Pages 161 – 167	
15	Monday, February 13	Operational Amplifier Applications		

16	Wednesday, February 15	Operational Amplifiers Non-Ideal Models	Chapter 5 Pages 167 − 172	MasteringEngineering HW (Online Assignment) Written HW Chapter 5: 2,3,36,42
17	Friday, February 17	Operational Amplifiers Non-Ideal Models		
	Monday, February 20	**Presidents' Day**		
18	Wednesday, February 22	Inductance and Capacitance	Chapter 6 Pages 185 – 198	MasteringEngineering HW (Online Assignment) Written HW Chapter 5: 43,45,46,47
19	Friday, February 24	Magnetically Coupled Circuits	Chapter 6 Pages 199 – 207	
20	Monday, February 27	REVIEW for EXAM 1		
21	**Tuesday, February 28**	**Exam 1 Chapters 1 - 5**		
	Wednesday, March 1	*No Class*		
22	Friday, March 3	Mutual Inductance Energy Calculations	Chapter 6 Pages 207 – 212	
23	Monday, March 6	Transient Response First-Order Circuits	Chapter 7 Pages 226 – 245	
24	Wednesday, March 8	Transient Analysis Step-by-Step Procedure	Chapter 7 Pages 245 – 250	MasteringEngineering HW (Online Assignment) Written HW Chapter 6: 17,40,43,44
25	Friday, March 10	Transient Analysis Sequential Switching	Chapter 7 Pages 250 – 254	
26	Monday, March 13	Transient Analysis Unbounded Response	Chapter 7 Pages 254 – 255	
27	Wednesday, March 15	Natural and Step Responses of Parallel RLC Circuits	Chapter 8 Pages 280 – 301	MasteringEngineering HW (Online Assignment) Written HW Chapter 7: 14,43,70,84
28	Friday, March 17	Natural and Step Responses of Series RLC Circuits	Chapter 8 Pages 301 – 311	
29	Monday, March 20	RLC Circuit Analysis		
30	Wednesday, March 22	RLC Circuit Analysis Sinusoidal Sources	Chapter 9 Pages 322 – 333	MasteringEngineering HW (Online Assignment) Written HW Chapter 8: 27,28,29,45 (Please also include a graph for 8.27, 8.28, and 8.29)
31	Friday, March 24	Phasors & Impedance	Chapter 9 Pages 333 – 338	

	March 27 through March 31	**Spring Break**		
32	Monday, April 3	Phasors & Impedance	Chapter 9 Pages 338 – 350	
33	Wednesday, April 5	Steady-State AC Sinusoidal Analysis		MasteringEngineering HW (Online Assignment) Complex Numbers Problem Set
34	Friday, April 7	Steady-State AC Sinusoidal Analysis		
35	Monday, April 10	Steady-State AC Sinusoidal Analysis		
36	Wednesday, April 12	Steady-State AC Sinusoidal Analysis		MasteringEngineering HW (Online Assignment) Written HW Chapter 9: 13,15,25,32
37	Friday, April 14	Ideal Transformers	Chapter 9 Pages 350 − 359	
38	Monday, April 17	REVIEW for EXAM 2		
39	**Tuesday, April 18**	**Exam 2 Chapters 6-9**		
	Wednesday, April 19	*No Class*		
	Friday, April 21	*E-Days – No Class*		
40	Monday, April 24	Ideal Transformers		
41	Wednesday, April 26	Electrical Safety		MasteringEngineering HW (Online Assignment) Written HW Chapter 9: 46,48,66,71
42	Friday, April 28	Electrical Safety Residential Wiring		
43	Monday, May 1	Residential Wiring		
44	Wednesday, May 3	REVIEW for FINAL		Ideal Transformers, Electrical Safety, and Residential Wiring Problem Set