COLORADO SCHOOL OF MINES
ELECTRICAL ENGINEERING & COMPUTER SCIENCE DEPARTMENT

EENG 281 – Introduction to Electrical Circuits
Fall 2013

Instructors:

Dr. Ravel F. Ammerman
Office: BB 314F
303-273-3686
rammerma@mines.edu
Office Hours: MWF: 1-2pm, Tuesdays: 1-3pm

Dr. Stephanie Claussen
Office: BB 280C
303-273-3650
sclausse@mines.edu
Office Hours: MWF:1-3pm, T: 10:30am-12:30pm

Dr. Vibhuti Dave
Office: BB 314C
303-273-3670
vdave@mines.edu
Office Hours: M: 4-5pm, W: 2-3pm, F: 1:30-3pm

Dr. William Bahn
Office: BB 310E
303-273-3581
wbahn@mines.edu
Office Hours: MWF: 10am-12pm

Prerequisite: PHGN 200 (Physics II)

Lectures:

Section A (Ammerman) MWF: 8:00 – 8:50 AM, BB W250
Section B (Ammerman) MWF: 9:00 – 9:50 AM, BE 243
Section C (Claussen) MWF: 10:00 – 10:50 AM, BB W250
Section D (Dave) MWF: 11:00 – 11:50 AM, MZ 335
Section E (Bahn) MWF: 1:00 – 1:50 PM, AH 340

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, Ninth Edition, Pearson/Prentice-Hall, © 2011 (ISBN-13: 978-0-13-611499-4). 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 1256555053. The text should be used to supplement the lecture material. Carefully reading the text and working the example problems 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 Wednesday at 5:00pm. Handwritten homework assignments are due each Wednesday at the beginning of class. The first homework assignment is due on Wednesday, August 28, 2013. 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 - Fall 2013" and enter the course ID "EENG281CIRCUITSFALL2013".

Piazza:

Piazza will be used to assist with student questions. 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 four 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. In addition, students are also allowed to send questions to individual instructors instead of posting it for everyone to see.

Find our class page at: https://piazza.com/mines/fall2013/eeng281/home

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 - 89)	
B^+ (83 –85)	B (80 – 82)	B^- (76 –79)
C^+ (73 –75)	C (70 – 72)	C^- (66 –69)
D^+ (63 –65)	D (60 – 62)	D^- (56 –59)
F < 55		

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
Fall 2013 Course Schedule

Class	Date	Lecture Topic	Reading	Homework Assignment
1	Wednesday, August 21	Course Introduction Circuit Fundamentals	Chapter 1 Pages 2 – 18	
2	Friday, August 23	Voltage & Current Sources Resistors & Ohm's Law	Chapter 2 Pages 26 – 38	
3	Monday, August 26	Kirchhoff's Laws	Chapter 2 Pages 39 – 50	
4	Wednesday, August 28	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: 7,21
5	Friday, August 30	Measurements Delta-Wye Transforms	Chapter 3 Pages 71 – 80	
6	Monday, September 2	Introduction to the Node-Voltage Method	Chapter 4 Pages 96 − 107	
7	Wednesday, September 4	Introduction to the Mesh-Current Method	Chapter 4 Pages 108 − 114	MasteringEngineering HW (Online Assignment) Written HW Chapter 3: 7,10,25,58
8	Friday, September 6	Node-Voltage Method Versus Mesh-Current Method	Chapter 4 Pages 115 – 117	
9	Monday, September 9	Source Transformations	Chapter 4 Pages 118 – 120	
10	Wednesday, September 11	Thévenin & Norton Equivalent Circuits	Chapter 4 Pages 121 – 124	MasteringEngineering HW (Online Assignment) Written HW Chapter 4: 15,27,38,61
11	Friday, September 13	Thévenin and Norton Equivalent Circuits	Chapter 4 Pages 125 – 127	
12	Monday, September 16	Maximum Power Transfer Theorem Superposition Principle	Chapter 4 Pages 128 – 137	
13	Wednesday, September 18	Introduction to Operational Amplifiers	Chapter 5 Pages 156 – 163	MasteringEngineering HW (Online Assignment) Written HW Chapter 4: 64,65,69,79,92
14	Friday, September 20	Operational Amplifier Applications	Chapter 5 Pages 164 – 170	
15	Monday, September 23	Operational Amplifier Applications		

Class	Date	Lecture Topic	Reading	Homework Assignment
16	Wednesday, September 25	Operational Amplifiers Non-Ideal Models	Chapter 5 Pages 171 − 176	MasteringEngineering HW (Online Assignment) Written HW Chapter 5: 6,26,36,39
17	Friday, September 27	Operational Amplifiers Non-Ideal Models		
18	Monday September 30	REVIEW for EXAM 1		
19	**Tuesday, October 1**	**Exam 1 (6:30-8:00pm) Chapters 1 - 5**		
	Wednesday, October 2	*No Class*		
20	Friday, October 4	Inductance and Capacitance	Chapter 6 Pages 190 – 204	
21	Monday, October 7	Magnetically Coupled Circuits	Chapter 6 Pages 205 – 213	
22	Wednesday, October 9	Mutual Inductance Energy Calculations	Chapter 6 Pages 214 – 220	MasteringEngineering HW (Online Assignment) Written HW Chapter 5: 43,45,46,47
23	Friday, October 11	Transient Response First-Order Circuits	Chapter 7 Pages 232 – 250	
	Monday October 14	**Fall Break**		
24	Wednesday, October 16	Transient Analysis Step-by-Step Procedure	Chapter 7 Pages 251 – 255	MasteringEngineering HW (Online Assignment) Written HW Chapter 6: 2,17,26,43,45
25	Friday, October 18	Transient Analysis Sequential Switching	Chapter 7 Pages 256 – 259	
26	Monday, October 21	Transient Analysis Unbounded Response	Chapter 7 Pages 260 – 261	
27	Wednesday, October 23	Natural and Step Responses of Parallel RLC Circuits	Chapter 8 Pages 286 – 307	MasteringEngineering HW (Online Assignment) Written HW Chapter 7: 4,35,43,52,70,84
28	Friday, October 25	Natural and Step Responses of Series RLC Circuits	Chapter 8 Pages 308 – 311	
29	Monday, October 28	RLC Circuit Analysis		

Class	Date	Lecture Topic	Reading	Homework Assignment
30	Wednesday, October 30	Sinusoidal Sources	Chapter 9 Pages 330 – 340	MasteringEngineering HW (Online Assignment) Written HW Chapter 8: 18,29,30,31,50 (Please also include a graph for 8.29, 8.30, and 8.31)
31	Friday, November 1	Phasors & Impedance	Chapter 9 Pages 341 – 344	
32	Monday, November 4	Phasors & Impedance	Chapter 9 Pages 345 – 352	
33	Wednesday, November 6	Steady-State AC Sinusoidal Analysis		Complex Numbers Problem Set
34	Friday, November 8	Steady-State AC Sinusoidal Analysis		
35	Monday, November 11	Steady-State AC Sinusoidal Analysis		
36	Wednesday, November 13	REVIEW for EXAM 2		MasteringEngineering HW (Online Assignment) Written HW Chapter 9: 11,12,27,28,29
37	**Thursday, November 14**	**Exam 2 (6:30-8:00pm) Chapters 5-9**		
	Friday, November 15	*No Class*		
38	Monday, November 18	Ideal Transformers	Chapter 9 Pages 359 − 371	
39	Wednesday, November 20	Ideal Transformers		MasteringEngineering HW (Online Assignment) Written HW Chapter 9: 44,46,54,60,71
40	Friday, November 22	Electrical Safety		
41	Monday, November 25	Electrical Safety Residential Wiring		
	Wednesday, November 27	**No Class**		
	November 28-29	**Thanksgiving**		
42	Monday, December 2	Residential Wiring		
43	Wednesday, December 4	REVIEW for FINAL		Ideal Transformers, Electrical Safety, and Residential Wiring Problem Set