COLORADO SCHOOL OF MINES
ELECTRICAL ENGINEERING & COMPUTER SCIENCE DEPARTMENT

EENG 282 – Introduction to Circuits for Electrical Engineers
Spring 2017

Instructor: **Dr. Abd A. Arkadan**
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Prerequisite: PHGN 200 (Physics II)

Lecture Times: MWF: 8:00 – 8:50 AM

Lecture Room: BB W210

Office Hours: MTW: 10:00 - 11:00 AM

Course Description:

Electrical circuits are an essential part of engineering curricula. Circuit analysis provides the foundation for all areas of specialization within the electrical engineering field of study. EENG 282: Introduction to Circuits for Electrical Engineers is coordinated with the upper level electrical engineering curriculum to provide the expanded coverage of electric circuits needed to properly prepare the electrical engineering students for their chosen profession. Emphasis will be placed on the mastery of circuit analysis, problem solving and applications. DC and AC (single-phase and three-phase) networks are presented. Transient analysis of RC and RL circuits is studied as is the analysis of circuits in sinusoidal steady-state using phasor concepts.

Course Objectives:

1) Students will demonstrate proficiency in dc and ac analysis of RLC circuits. The following topics are included: DC and AC circuit analysis, current and charge relationships. Ohm's Law, resistors, inductors, capacitors, equivalent resistance and impedance, Kirchhoff's Laws, Thévenin and Norton equivalent circuits, superposition and source transformation, power and energy, maximum power transfer, first order transient response, algebra of complex numbers, phasor representation, time domain and frequency domain concepts, and steady-state analysis of single-phase and three-phase ac power circuits.

2) Students will demonstrate an understanding of ideal operational amplifiers. 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 and RL circuits.
4) Students will demonstrate an understanding of basic power and energy concepts in ac and dc circuits. Students will demonstrate proficiency in the steady-state analysis of single-phase and three-phase AC circuits.

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: 9780133875904). We will also be using the MasteringEngineering feature that Pearson Publishing provides, so you will need to purchase an access code card too. 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 11:59 pm 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.
Short quizzes will 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 "EENG282 - Introduction to Circuits for Electrical Engineers – Spring 2017" and enter the course ID "EENG282EECIRCUITSSPRING2017".

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

MasteringEngineering Homework	12.5%
Handwritten Homework	12.5%
Short Quizzes/Instructor Discretion	5%
2 Exams @ 15% each	30%
Final Exam	15%
Laboratory	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.

Disability Support Statement:
The Colorado School of Mines is committed to ensuring the full participation of all students in its programs, including students with disabilities. If you are registered with Disability Support Services (DSS) and I have received your letter of accommodations, please contact me at your earliest convenience so we can discuss your needs in this course. For questions or other inquiries regarding disabilities, I encourage you to visit disabilities.mines.edu for more information.

ENG 282 – Introduction to Circuits for Electrical Engineers
Spring 2017 Course Schedule

Class	Date	Lecture Topic	Reading	Homework Assignment
1.	Tuesday, Jan. 10	Course Introduction Circuit Fundamentals	Chapter 1 Pages 2 – 18	
2.	Wednesday, Jan. 11	Voltage & Current Sources Resistors & Ohm's Law	Chapter 2 Pages 24 – 36	
3.	Friday, Jan. 13	Kirchhoff's Laws	Chapter 2 Pages 37 – 48	
	Monday, Jan. 16	**No Classes MLK Day**		
4.	Wednesday, Jan. 18	Simple Resistive Circuits Series & Parallel Voltage Divider and Current Divider Circuits	Chapter 3 Pages 56 – 65	HW1-MasteringEngineering (Online Assignment) Written HW Chapter 1: 14,29 Chapter 2: 6,18
5.	Friday, Jan. 20	Measurements Delta-Wye Transforms	Chapter 3 Pages 66 – 76	
6.	Monday, Jan. 23	Introduction to the Node-Voltage Method	Chapter 4 Pages 88 – 98	
7.	Wednesday, Jan. 25	Introduction to the Mesh-Current Method	Chapter 4 Pages 99 − 105	HW2-MasteringEngineering (Online Assignment) Written HW Chapter 3: 8,29,30,59
8.	Friday, Jan. 27	Node-Voltage Method Versus Mesh-Current Method	Chapter 4 Pages 106 – 109	
9.	Monday, Jan. 30	Source Transformations	Chapter 4 Pages 109 – 112	
10.	Wednesday, Feb. 1	Thévenin & Norton Equivalent Circuits	Chapter 4 Pages 113 – 117	HW3-MasteringEngineering (Online Assignment) Written HW Chapter 4: 12,28,34,59
11.	Friday, Feb. 3	Thévenin and Norton Equivalent Circuits	Chapter 4 Pages 117 – 119	
12.	Monday, Feb. 6	Maximum Power Transfer Theorem Superposition Principle	Chapter 4 Pages 120 – 129	
13.	Wednesday, Feb. 8	Introduction to Operational Amplifiers	Chapter 5 Pages 144 – 153	HW4-MasteringEngineering (Online Assignment) Written HW Chapter 4: 66,69,82,93
14.	Friday, Feb. 10	Operational Amplifier Applications	Chapter 5 Pages 153 – 159	

Class	Date	Lecture Topic	Reading	Homework Assignment
15.	Monday, Feb. 13	Operational Amplifier Applications		
16.	Wednesday, Feb. 15	**Review**		HW5-MasteringEngineering (Online Assignment) Written HW Chapter 5: 6,23,35,40
17.	**Thursday, Feb 16**	**Exam –I (Ch. 1-5)**		
	Friday, Feb. 17	**No Class**		
	Monday Feb. 20	**No Classes Presidents Day**		
18.	Wednesday, Feb. 22	Inductance and Capacitance	Chapter 6 Pages 174 – 189	
19.	Friday, Feb. 24	Transient Response First-Order Circuits	Chapter 7 Pages 212 – 230	
20.	Monday, Feb. 27	Transient Analysis Step-by-Step Procedure	Chapter 7 Pages 231 – 236	HW6-MasteringEngineering (Online Assignment) Written HW Chapter 6: 1,19,22,27
21.	Wednesday, Mar. 1	Transient Analysis Sequential Switching	Chapter 7 Pages 236 – 240	
22.	Friday, Mar. 3	Transient Analysis Unbounded Response	Chapter 7 Pages 240 – 241 and Pages 245 - 246	
23.	Monday, Mar. 6	Sinusoidal Sources & Complex Numbers	Chapter 9 Pages 304 – 310 & Pages 723 − 728	HW7-MasteringEngineering (Online Assignment) Written HW Chapter 7: 9,21,74,85
24.	Wednesday, Mar. 8	Phasors & Impedance	Chapter 9 Pages 310 – 314	
25.	Friday, Mar. 10	Phasors & Impedance	Chapter 9 Pages 315 – 326	
26.	Monday, Mar. 13	Sinusoidal Steady-State Analysis	Chapter 9 Pages 327 – 331	HW8-MasteringEngineering (Online Assignment) Complex Numbers Prob. Set
27.	Wednesday, Mar. 15	Ideal Transformers	Chapter 9 Pages 336 − 341	
28.	Friday, Mar. 17	Ideal Transformers		

Class	Date	Lecture Topic	Reading	Homework Assignment
29.	Monday, Mar. 20	**Review**		HW9-MasteringEngineering (Online Assignment) Written HW Chapter 9: 11,12,14,22
30.	Wednesday, Mar. 22	**Exam –II (Ch. 6,7,9 & Complex Numbers)**		
31.	Friday, Mar. 24	**Exam Problems Solution**		
	Monday, Mar. 27-31	**No Classes Spring Break**		
32.	Monday Apr. 3	Sinusoidal Steady- State Power	Chapter 10 Pages 358 – 364	
33.	Wednesday, Apr. 5	Power Calculations Complex Power	Chapter 10 Pages 365 – 376	
34.	Friday, Apr. 7	Power Calculations Power Triangle	Chapter 10 Pages 377 – 384	
35.	Monday, Apr. 10	Power Calculations Power Factor Correction		
36.	Wednesday, Apr. 12	Power Calculations		
37.	Friday, Apr. 14	Balanced 3Φ Circuits Wye and Delta	Chapter 11 Pages 396 – 404	HW10-MasteringEngineering (Online Assignment) Written HW Chapter 10: 2,8,22,61
38.	Monday, Apr. 17	Balanced 3Φ Circuits Per Phase Analysis	Chapter 11 Pages 405 – 407	
39.	Wednesday, Apr. 19	Balanced 3Φ Circuits Per Phase Analysis		
40.	Friday Apr. 21	Balanced 3Φ Circuits Power Calculations	Chapter 11 Pages 408 – 412	
41.	Monday Apr. 24	Balanced 3Φ Circuits Power Calculations		HW11-MasteringEngineering (Online Assignment) Written HW Chapter 11: 1,10,14,20
42.	Wednesday Apr. 26	Electrical Safety & Residential Wiring		
43.	Friday, Apr. 28	Electrical Safety & Residential Wiring		
44.	Monday, May 1	Electrical Safety & Residential Wiring		
45.	Wednesday, May 3	Review for Final Exam		HW12-Special Problem Set