Point Loma Nazarene University
EGR225: Electric Circuits Analysis
3 credits
Lecture: MWF 8:30-9:25, RS 219 Spring 2017

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Office Hours: 1-2PM M-W-Th and by apt, RS210
Class Materials:

> **Textbook –** *Analysis and Design of Linear Circuits*, Thomas, Rosa and Toussaint
> **Calculator**

Course Description – Theory and analysis of electrical and electronics circuits. Topics include basic circuit elements, laws of circuit analysis, Kirchoff's laws, loop and nodal analysis, differential equations for modeling electronic circuits, AC and DC analysis, transient analysis, complex impedance and steady state analysis, Laplace Transforms, and frequency domain analysis.

Learning Objectives – In this course there are a number of specific goals for you to meet from each chapter. These smaller goals fit into the following overall course learning objectives. Once you complete this course, you should be able to:

1. Explain and apply basic electrical principles to analyze linear DC and AC circuits.

2. apply circuit theorems to calculate voltage, current, and power in linear DC and AC circuits.

3. analyze linear DC circuits containing dependent sources.

4. describe basic waveforms.

5. calculate the transient response of linear RC and RL circuits with switches and DC sources.

6. analyze the sinusoidal steady-state response of linear AC circuits.

Grades – The grade you earn in this course is based on the scale shown below. At any point during the class I will be happy to provide you with a grade update.

A	91-100
A-	89.5-91
B+	87-89.5
B	81-87
B-	79.5-81
C+	77-79.5
C	71-77
C-	69.5-71
D+	67-69.5
D	61-67
D-	58-61
F	0-61

Lab – Lab meetings will be embedded in the lecture portion of the class, and will provide you the opportunity for hands-on experience of topics from class meetings, improve lab technique, and data analysis. Labs will be performed in small groups, but each individual is responsible for submitting his or her own results. Labs are worth 10% of your final grade. You must pass the lab portion of the class to pass the class.

Quizzes – Quizzes will be given from time to time, usually unannounced, and cannot be made up without a pre-approved class absence

Homework – Most days there will be homework due, homework is worth 25% of your final grade. Practicing working circuits problems is critical to your success in the class.

Exams – Three examinations over material through the class will be given. Exams will be primarily involve problem solving and will not be multiple choice. The final examination will be comprehensive. Exams will be closed book, but a sheet of formulas will be provided to you to use during your exam. Partial credit will be given for correct reasoning at any step of a problem, but only if it is communicated clearly enough for me to understand. For problems that call for a solution or explanation, no credit will be given for an answer alone; the method or reasoning must also be shown.

The points you receive during the course are weighted as follows:

-Quizzes   10%
-Lab: 10%
-Homework: 25%
-Tests (3)   30%
-Final Exam: 25%
        Final Exam date (no exceptions) is May 1, 7:30-10:00AM

Late Work. Late work <u>is not accepted</u> without a pre-approved excuse. This includes

- o   homework (due at the beginning of class on the assigned date)

- o   class pre-work (due at the beginning of class on the assigned date)

- o   quizzes (makeups are not allowed without an approved excuse ***prior to*** the quiz)

- o   exams (makeups are not allowed without an approved excuse ***prior to*** the exam)

Exceptions to the above policies, while rare, will be at the instructor's discretion. Note that some quizzes may be unannounced and cannot be made up for unexcused absences.

University Mission:
Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Department Mission:

The Physics and Engineering Department at PLNU provides strong programs of study in the fields of Physics and Engineering. Our students are well prepared for graduate studies and careers in scientific and engineering fields. We emphasize a collaborative learning environment which allows students to thrive academically, build personal confidence, and develop interpersonal skills. We provide a Christian environment for students to learn values and judgment, and pursue integration of modern scientific knowledge and Christian faith.

Attendance:

Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day.

Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See
http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Class_Attendance in the

Undergraduate Academic Catalog.

Class Enrollment:
It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

Academic Accommodations:
If you have a diagnosed disability, please contact PLNU's Disability Resource Center (DRC) within the first two weeks of class to demonstrate need and to register for accommodation by phone at 619-849-2486 or by e-mail at DRC@pointloma.edu. See Disability Resource Center for additional information. For more details see the PLNU catalog:
http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic_Accommodations

Students with learning disabilities who may need accommodations should discuss options with the instructor during the first two weeks of class.

Academic Honesty:
Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See
http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic_Honesty for definitions of kinds of academic dishonesty and for further policy information.

Final Exam: Date and Time:
The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student.

Copyright Protected Materials:
Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

Credit Hour:
In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 3 unit class delivered over 15 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

FERPA Policy As a student at Point Loma, you have a legal right to privacy as outlined in the federal FERPA (Family Educational Rights and Privacy Act) legislation. See Policy Statements for full text.

TENTATIVE **LABORATORY** Topics

Week	ACTIVITY
1	Introduction; Safety
2	Resistors; Voltage and Current Measurements
3	Series and Parallel Circuits
4	Open
5	Linearity and Superposition
6	Thevenin and Norton Equivalent Circuits
7	Operational Amplifiers I
8	Operational Amplifiers II
9	RC & RL Circuit Step Response
10	Capacitors; Inductors; Reactance and Impedance
11	Frequency analysis 1
12	Frequency analysis 2
13	
14	

Tentative Lecture Schedule

LESSON	TOPIC	SECTION
1	Introduction; Circuit Variables	1-1 to 1-3
2	Circuit Elements; KCL and KVL	2-1, 2-2
3	Circuit Analysis using Kirchhoff's Laws	2-3
4	Equivalent Circuits	2-4
5	Voltage and Current Division	2-5
6	Circuit Reduction	2-6
7	Nodal Analysis	3-1
8	Nodal Analysis, Mesh Analysis	3-1, 3-2
9	Mesh Analysis	3-2
10	Superposition	3-3
11	Thevenin and Norton Equivalent Circuits	3-4
12	Maximum Power Transfer	3-5
	FIRST MIDTERM EXAM	
13	Linear Dependent Sources	4-1, 4-2
14	Analysis of Circuits with Dependent Sources	4-2
15	The Operational Amplifier	4-4
16	Op Amp Circuit Analysis	4-5
17	Step and Exponential Waveforms	5-1 to 5-3
18	Sinusoidal and Composite Waveforms	5-4, 5-5
19	Waveform Partial Descriptors	5-6
20	Capacitors, Inductors	6-1, 6-2
21	Dynamic Op Amp Circuits; Equivalent C and L	6-3, 6-4
22	RC and RL Circuits	7-1
23	First-Order Circuit Step Response	7-2
24	Initial and Final Conditions	7-3
	SECOND MIDTERM EXAM	
25	Sinusoids and Phasors	8-1
26	Circuit Analysis with Phasors	8-2
27	Circuit Analysis with Phasors	8-3
28	Circuit Theorems with Phasors	8-4
29	More Circuit Analysis with Phasors	8-5
30	Energy and Power	8-6
31	Laplace Transforms	9-1,2
32	Pole-Zero diagrams	9-3
33	Inverse Laplace Transforms	9-4
34	Frequency Response	9-5
35	Open	
36	Open	