Syllabus

POINT 1902 LOMA NAZARENE UNIVERSITY	**Physics & Engineering** **EGR 2024 & 2024L Linear Circuit Analysis** **4 Units** **Lecture: Tu/Th 1:30-2:45 pm (RS 365)** **Lab: Tu 10:00-11:45 am (RS 265)**
Fall 2021	

Instructor: Tom Carter, Ph.D.

Phone: 619-849-2219

Email: TomCarter@pointloma.edu

Office: RS 276

Office hours: **(call my office if drop in)**

- Tuesday: by appointment between lab & lecture (RS265)
- Thursday: 12:30 – 1:30 pm (RS265) & 3 – 4:45pm (RS365)
- Other by appointment on Zoom

PLNU Mission

To Teach ~ To Shape ~ To Send

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.

COURSE DESCRIPTION

EGR2024 Electric Circuits Analysis (3)

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.

EGR2024L Electric Circuits Analysis Lab (1)

A lab course designed for a hands-on exploration of Electronics Circuits Analysis.

COURSE LEARNING OUTCOMES

1. You will be able to explain and apply basic electrical principles to analyze linear DC and AC circuits, including KVL, KCL and various circuit topologies.
2. You will be able to apply circuit theorems to find voltage, current, and power in linear DC & AC circuits, including voltage and current division, mesh and node analysis, superposition, and Thevenin and Norton equivalencies.
3. You will be able to describe basic waveforms, define, measure and calculate key parameters such as period, frequency, phase of periodic signals.
4. You will be able to calculate the transient response of linear DC RC, RL & RLC circuits, including time constants, initial and final conditions, and response in switched DC circuits.
5. You will be able to analyze the sinusoidal steady-state response of linear AC circuits using phasors.
6. You will be able to analyze the full response of linear AC circuits using Laplace Transforms and assess implications across the frequency domain.
7. You will be able to understand, build and test linear circuits from discrete components and utilize basic electrical test equipment, signal generators and power supplies.

8. You will learn rudimentary skills for group collaboration focused on joint topic investigation, as well as lab and project execution/documentation/demonstrations

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES

'***The Analysis and Design of Linear Circuits***', 8th Edition, by Roland Thomas, Albert Rosa, & Gregory Toussaint, 2016

COURSE CREDIT HOUR INFORMATION

In the interest of providing sufficient time to accomplish the stated Course Learning Outcomes, this class meets the PLNU credit hour policy for a 4 unit class (including lab) taught over 15 weeks. Specific details about how the class meets the credit hour requirement can be provided upon request. (Based on 37.5 hours of student engagement per credit hour.)

Distribution of Student Learning Hours

Category	Time Expectation in Hours
Lectures	33
Lab/Projects	26
Homework Assignments	50
Reading Text, Review & Group Discussions	35
Exams	6
Total Hours	150

ASSESSMENT AND GRADING

Graded Components

- **Labs & Projects:** Labs will be conducted with assigned groups according to provided instructions. The lab reports are due at the scheduled dates and times (typically Tuesday at the end of lab period), and submitted ONLY in Word, Excel, or .pdf format in Canvas (pictures of equations, circuit diagrams, set up, measurements, graphs, etc. may be embedded as long as legible). Up to 10% extra credit will be awarded for work done on the "If you have time"

problems at the end of the lab, which may be turned in later (but before the next lab). A single grade will be given to each assigned groups (for all who participate). In addition, as part of the lab grade, each group will do a final project demonstrating an application of a reasonable technical implementation learned in the semester. This project will be graded on content (degree to which it shows knowledge of the subject), teamwork, creativity, execution and presentation. In this case the group will be asked to identify who in the group was responsible for which part and the group grade for the project may be increased or decreased by up to 20% based on the individual's contribution.

- **Homework**: Homework will be due at the scheduled dates and times (typically Thursday night at midnight the week after assigned) and submitted ONLY in Word, Excel, or .pdf format in Canvas (pictures of equations, circuit diagrams, set up, measurements, graphs, etc. may be embedded as long as legible). Homework feedback, if needed, will be posted in comments on Canvas upon completion of grading.
- **Collaborative Discussion Groups**: A general discussion question or set of related questions will be posted once a week (typically on Tuesday) which requires independent research and/or explanation. Each assigned group will address the question(s), including references used, and collaborate to get to their best answer(s) in a weekly Canvas Discussion. These discussions must be completed by the scheduled dates and times (typically Tuesday midnight, the week after assigned). Some of the topics will involve questions and problems with no single “right” answer. Those will be graded based on clarity, completeness of source references, collaboration and ability to independently research. In some cases, creativity may also be required and evaluated. Each group member should clearly specify what they did (with references) in investigating the question as part of their discussion. A grade will be given to each group and then adjusted up or down by up to 20% for each individual that participated based on an assessment of their contributed effort.
- **Midterm Examinations and Final Examination**. Midterm examinations and the Final examination will include problems and questions covering material assigned in the text as well as material presented in class. Personal notes, in your own handwriting of any length or format, may be used for the exams, along with a dedicated calculator (no cell phones or computers). No examination shall be missed without prior consent or a well-documented emergency beyond your control. A score of zero will be assigned for an examination that is missed without prior consent or a well-documented emergency beyond your control.
- **Late work will not be accepted** without prior consent, except for homework assignments which may be submitted up to a day late - grades for the portion of the homework submitted after the time due but within the grace period of one day will be reduced by 10%. To allow for unexpected personal issues, the lowest score during the semester for each of homework, labs (excluding final project) and group discussions will be dropped from the calculations of the overall grade.

- The examination schedule is included in the semester schedule. Note that Midterm Exams will be given during scheduled lab periods in order to provide additional time.

Grading Distribution	**Percent**
Two Midterms at 15% each	30
Final Exam	25
Labs	20
Homework	20
Collaborative Group Discussions	5
Total	100

Grading Scale

Approximate minimal percentages required to obtain a given grade are:

Standard Grade Scale Based on Percentages					
	A	**B**	**C**	**D**	**F**
+		87-90	77-80	67-70	
	93 -100	83-86.9	73-76.9	63 -66.9	0-59.9
–	90-92.9	80-82.9	70-72.9	60-62.9	

STATE AUTHORIZATION

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to

the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on State AuthorizationLinks to an external site. to view which states allow online (distance education) outside of California.

INCOMPLETES AND LATE ASSIGNMENTS

All assignments are to be submitted/turned in by the time due —including assignments posted in Canvas. Incompletes will only be assigned in extremely unusual circumstances.

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 th 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.

PLNU COPYRIGHT POLICY

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.

PLNU ACADEMIC HONESTY POLICY

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 Academic PoliciesLinks to an external site. for definitions of kinds of academic dishonesty and for further policy information.

PLNU ACADEMIC ACCOMMODATIONS POLICY

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic

accommodation plan (“AP”) to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student’s responsibility to make the first contact with the EAC.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Attendance (in class or online) 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 Academic PoliciesLinks to an external site. for further information about class attendance.

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.

SPIRITUAL CARE

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the Office of Spiritual Development Links to an external site.

EGR 2024 & 2024L
Course Syllabus

Lecture: Tu/Th 1:30-2:45 pm (RS 365)

Lab: Tu 10:00-11:45 am (RS 265)

Office hours (call my office if drop in):

- Tuesday: by appointment between lab & lecture (RS265)

- Thursday: 12:30 – 1:30 pm (RS265) & 3 – 4:45pm (RS365)

- Other by appointment on Zoom

Meet your Professor

COURSE SCHEDULE AND ASSIGNMENTS

The full course syllabus may be found here: Syllabus

Text: '***The Analysis and Design of Linear Circuits'***, 8th Edition, by Roland Thomas, Albert Rosa, & Gregory Toussaint, 2016

If you desire to see your work organized by week, you are able to access the weekly modules.

The table below provides the expected course schedule and material covered, by date

(pdf link here download).

LECTURE	TENTATIVE TOPICS *(subject to change)*	TEXT SECTIONS	LAB	Probable Date
1	Introduction; Key Terms	1-1 to 1-3		9/2
2	Circuit Elements; Analysis using KCL & KVL	2-1, 2-2, 2-3	Orientation & Basic Circuits	9/7
3	Equivalent Circuits, Voltage/Current Division	2-4, 2-5		9/9

4	Circuit Reduction	2-6	Resistor Fun	9/14
5	Nodal Analysis, Mesh Analysis	3-1, 3-2, 3-3		9/16
6	Nodal Analysis, Mesh Analysis (cont.)		Circuit Analysis	9/21
7	Thevenin & Norton Equivalent, Interface Design	3-4, 3-5, 3-6		9/23
8	Thevenin & Norton Equivalent, (cont.)		I/F Analysis	9/28
	Review/ Catch up			9/30
9	Signal Waveforms & Descriptors	5-1 to 5-6	**Midterm I EXAM**	10/5
10	Capacitors, Inductors; Equivalent C & L	6-1, 6-2, 6-4		10/7
11	RC and RL Circuits, First-Order Step Response	7-1, 7-2	Intro to Inductors & Capacitors	10/12
12	Dynamic Sources for RL & RC Circuits	7-3, 7-4		10/14
13	RLC Circuits	7-5, 7-6	RL & RC Circuits	10/19
14	Phasors for AC Analysis	8-1		10/21
15	Steady State AC Analysis with Phasors	8-2, 8-3	RLC Circuits	10/26
16	Steady State AC Circuit Techniques	8-4 to 8-6		10/28

17	Steady State AC Power & Analysis Examples		RL/RC Steady State AC Circuits	11/2
	Review/Catch up			11/4
	Final Project Requirements/Ideas		**Midterm II Exam**	11/9
18	Laplace Transforms, Pole-Zero diagrams	9-1 to 9-3		11/11
19	Inverse Laplace Transforms	9-4	RLC Steady State AC	11/16
20	Laplace Transform Circuit Analysis	10		11/18
21	Circuit Frequency Response		Final Project Plans	11/23
22	Filtering Circuits	12-3 to 12-4		11/25
23	Catch up/Problem Session/Q&A		RF Radio/Filtering	11/30
	Group Work on Final Project			12/2
	Final Project Demos		Final Projects	12/7
	Review for Final			12/9
	FINAL EXAM			Week of 12/13