



Department of Physics and Engineering

## **EGR3053/3053L Analog Electronics and Lab**

2 +1 Units

Fall 2025

**MW | 2:25 PM - 3:50 PM; R | 1:30 PM - 4:20 PM (Lab)**

**Meeting location Rohr Science Hall (RS) 295**

**Final Exam: 12/17 1:30 AM - 4:00 PM**

**Instructor Title and Name:** Dr. José Manjarrés

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**Email:** josemanjarres@pointloma.edu

**Office Location and Office Hours:** RS 276 | MW 8:30 - 9:30 AM, 1:00 PM - 3:00 PM; T 8:30 - 9:30 AM; R 1:00 PM - 1:30 PM; F 8:30 - 9:30 AM, 1:00 PM - 1:30 PM

### **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

AC/DC circuit analysis, transients, characteristics of equivalent circuits for diodes, transistors, power supplies, transistor/operational amplifiers, and feedback applications.

Prerequisite(s): EGR 2024 with a grade of C- or higher.

Corequisite(s): EGR 3053L

## Program and Course Learning Outcomes

Student Outcomes:

- Identify the basic components used in analog electronics such as diodes, transistors, operational amplifiers, and regulators.
- Describe the concept of frequency response and its importance in analog circuits.
- Apply Ohm's Law and Kirchhoff's Laws to analyze simple analog circuits.
- Use diodes in applications like rectification and voltage regulation.
- Analyze the performance of multistage amplifiers and filters in terms of gain, bandwidth, and signal integrity.
- Evaluate the suitability of different types of amplifiers and active filters for specific applications.
- Design and implement simple analog circuits like amplifiers and filters as part of a larger system to meet specified requirements.
- Integrate various analog components to create a comprehensive project, such as an audio amplifier system.

Program Outcomes:

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (LO1)
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. (LO2)
- An ability to communicate effectively with a range of audiences. (LO3)

## Required Texts and Recommended Study Resources

Students are responsible for having the required course textbooks prior to the first day of class.

All supplemental materials posted on this course site (including articles, book excerpts, or other documents) are provided for your personal academic use. These materials may be protected by copyright law and should not be duplicated or distributed without permission of the copyright owner.

Required texts:

- A. Malvino, D. Bates, P. Hoppe. *Electronic Principles*, 2025 Release. McGraw-Hill, 2025. ISBN 9781266024269.
- A. Malvino, D. Bates, P. Hoppe. *Experiments Manual to Accompany Electronic Principles*, 2025 Release. McGraw-Hill, 2025. ISBN 9781265465797.

### 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 3-unit class delivered over 15 weeks. It is anticipated that students will spend a minimum of 37.5 participation hours per credit hour on their coursework. For this course, students will spend an estimated 112.5 total hours meeting the course learning outcomes. The time estimations are provided in the Canvas modules.

### Assessment and Grading

This course will have five ways to assess knowledge and learning, described as follows.

1. Pre-class readings: Short quiz related to a pre-session reading to be completed before the class session.
2. Questionnaires: A set of technical questions in the style of a job interview to which students have to record their responses in real time.
3. Lab reports: Technical document summarizing an experiment set and a brief result analysis.
4. Tests: 50-minute evaluations on a group of related topics.
5. Final Project: A comprehensive design problem encompassing several topics from the course. It includes a report and a presentation to the general public during the time designated for the final exam.

The table below outlines the assessment criteria for this course.

Activity	Points Per Activity	Quantity	Total Points
Pre-class Readings	10	23	230
Questionnaires	50	6	300
Lab Reports	50	5	250
Tests	100	4	400
Final Project	200	1	200
			1380

Grades will be based on the following:

### Sample Standard Grade Scale Based on Percentages

A	B	C	D	F
A 93-100	B+ 87-89	C+ 77-79	D+ 67-69	F Less than 59
A- 90-92	B 83-86	C 73-76	D 63-66	
	B- 80-82	C- 70-72	D- 60-62	

### Final Examination Policy

Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the [Traditional Undergraduate Records: Final Exam Schedules](#) site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

### Incompletes and Late Assignments

No examination shall be missed without prior consent or a well-documented emergency beyond the student's control. A score of zero will be assigned for an examination that is missed without prior consent or a well-documented emergency beyond the student's control. If a student misses an online test, any attempt to complete it outside of the classroom will be considered an act of academic dishonesty and will nullify the test score as well as prompt disciplinary actions.

### Artificial Intelligence (AI) Policy

You are allowed to use Generative Artificial Intelligence (GAI) tools (e.g., ChatGPT, Claude, Gemini, etc.) in this course as a study support tool. You may not use GAI to write content for any kind of evaluation; if you do so, it'll be considered a case of academic dishonesty and prompt disciplinary action.

### PLNU Academic Accommodations Policy

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities in accordance with the Americans with Disabilities Act (ADA). Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center ([EAC@pointloma.edu](mailto:EAC@pointloma.edu) or 619-849-2533). Once a student's eligibility for an accommodation has been determined, the EAC will work with the student to create an Accommodation Plan (AP) that outlines allowed accommodations. Professors are able to view a student's approved accommodations through Accommodate.

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. Accommodations are not retroactive so clarifying with the professor at the outset is one of the best ways to promote positive academic outcomes.

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. Students cannot assume that because they had accommodations in the past, their eligibility at PLNU is automatic. All determinations at PLNU must go through the EAC process. This is to protect the privacy of students with disabilities who may not want to disclose this information and are not asking for any accommodations.

### **LomaBooks Instructions for Students**

This course is part of our course material delivery program, LomaBooks. The bookstore will provide each student with a convenient package containing all required physical materials; all digitally delivered materials will be integrated into Canvas.

You should have received an email from the bookstore confirming the list of materials that will be provided for each of your courses and asking you to select how you would like to receive any printed components (in-store pick up or home delivery). If you have not done so already, please confirm your fulfillment preference so the bookstore can prepare your materials.

For more information about LomaBooks, please go: [HERE](#)

### **Additional Course Information**

Additional PLNU policies and practices that apply to this course can be found at the following link: <https://docs.google.com/document/d/11BgAANLOJ9tjt837d24EZ181ukM2qzHF/edit>

### **Semester Schedule Outline**

<b>Date</b>	<b>Session</b>	<b>Topic</b>
<b>3-sep</b>	<b>0</b>	Welcome
<b>4-sep</b>	<b>L1</b>	LTSpice Onramp
<b>8-sep</b>	<b>1</b>	Voltage and Current Sources
<b>10-sep</b>	<b>2</b>	Thévenin Theorem and DC Troubleshooting
<b>11-sep</b>	<b>L2</b>	Experiments 2 and 3
<b>15-sep</b>	<b>3</b>	The PN Junction (2-6 to 2-14)
<b>17-sep</b>	<b>4</b>	The Diode (3-2 to 3-4)

<b>18-sep</b>	<b>L3</b>	Chapter 3 Job Interview Questions and Experiment 6
<b>22-sep</b>	<b>5</b>	Rectifier Circuits (including 4-4)
<b>24-sep</b>	<b>6</b>	The Capacitor-Input Filter (4-6)
<b>25-sep</b>	<b>L4</b>	Chapter 4 Job Interview Questions and Experiment 8
<b>29-sep</b>	<b>7</b>	The Zener Diode (5-2 to 5-7)
<b>1-oct</b>	<b>8</b>	Special-Purpose Diodes
<b>2-oct</b>	<b>L5</b>	Chapter 5 Job Interview Questions and System Application 2
<b>6-oct</b>	<b>T1</b>	Test 1
<b>8-oct</b>	<b>9</b>	BJT Fundamentals (6-1 to 6-8)
<b>9-oct</b>	<b>L6</b>	The Transistor Switch (6-10 to 6-14) and Experiment 16
<b>13-oct</b>	<b>10</b>	VDB Biasing (7-1 to 7-6)
<b>15-oct</b>	<b>11</b>	BJT Biasing
<b>16-oct</b>	<b>L7</b>	Chapter 6 and 7 (Select) Job Interview Questions and Experiments 19 and 21
<b>20-oct</b>	<b>12</b>	AC Models of a BJT Amplifier (8-1 to 8-6)
<b>22-oct</b>	<b>13</b>	Amplifier Gain and Loading Effect (8-7 to 8-11)
<b>27-oct</b>	<b>T2</b>	Test 2
<b>29-oct</b>	<b>14</b>	Buffering Stages (9-1 to 9-5, skipping 9-2)
<b>30-oct</b>	<b>L9</b>	Chapter 9 Job Interview Questions and Experiments 25 and 26
<b>3-nov</b>	<b>15</b>	Class-A and Class-B Amplifiers (10-1 to 10-5)
<b>5-nov</b>	<b>16</b>	Class-AB Amplifiers
<b>6-nov</b>	<b>L10</b>	Experiments 29 and 30
<b>10-nov</b>	<b>T3</b>	Test 3
<b>12-nov</b>	<b>17</b>	Decibels and Bode Plots (14-1 to 14-7)
<b>13-nov</b>	<b>L11</b>	Final Project Time
<b>17-nov</b>	<b>18</b>	Frequency Analysis of BJT Stages

<b>19-nov</b>	<b>19</b>	Introduction to Op-Amps (including 16-3, 16-4)
<b>20-nov</b>	<b>L12</b>	Experiments 41 and 42
<b>24-nov</b>	<b>20</b>	Negative Feedback
<b>1-dic</b>	<b>21</b>	First-Order Active Filters (including 19-4, 19-5)
<b>3-dic</b>	<b>22</b>	Higher Order Filters
<b>4-dic</b>	<b>L14</b>	Chapter 19 Job Interview Questions and Final Project Time
<b>8-dic</b>	<b>23</b>	Phase Response and Summary of Active Filters (19-9 to 19-12)
<b>10-dic</b>	<b>T4</b>	Test 4
<b>11-dic</b>	<b>L15</b>	Final Project Time
<b>15-dic</b>	<b>Final</b>	Final Project Presentations