



Department of Physics and Engineering

EGR1012/L - Introduction to Engineering I (1 unit + 1 unit)

T 12:30-2:15, R 1:30-2:25 Rohr Science 265

Fall 2021: August 31-December 10

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Instructor: Dr. Paul D. Schmelzenbach

Phone: 619.849.2933 Email: [paulschmelzenbach@pointloma.edu](mailto:paulschmelzenbach@pointloma.edu)

Office hours: Appointment as needed.

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**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** An introduction to engineering as a career, including problem solving, engineering disciplines, design, teamwork, and communication. Introduction to multiple tools/techniques used by engineers, including data analysis, numerical methods, error analysis, and the use of computers for solving problems in physics and engineering.

#### **Course Learning Outcomes**

1. understand the basics of the engineering profession, including problem solving, design, teamwork, creativity, and ethics.
2. develop skill in communicating complex and technical ideas

3. acquire skills to learn how to develop solutions for certain kinds of physics and engineering problems using computational techniques
4. understand key ideas of how to use Excel as a tool to solve problems and communicate data in science and engineering
5. become proficient at using MATLAB, including writing .m files and correcting or modifying existing code.
6. understand how to utilize a microcontroller to solve certain engineering problems

**Program Learning outcomes** This course contributes to meeting the program outcomes by developing student skills in the following areas. Students will have

1. an ability to apply knowledge of mathematics, science, and engineering;
2. an ability to design a system, component, or process to meet desired needs within realistic; constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
3. an understanding of professional and ethical responsibility;
4. an ability to communicate effectively;
5. a recognition of the need for, and an ability to engage in life-long learning;
6. an ability to use the techniques, skills, and modern engineering tools necessary for engineering

### **Required Texts and Materials**

- Access to MATLAB
- Access to Excel
- Arduino kit
- Access to SOLIDWORKS

**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 2 unit class (1 unit class + 1 unit lab) delivered over 15 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

### **Assessment and Grading**

The grade you earn in this course is based on the scale below. The points you receive during the course are weighted accordingly:

**(5%) Preclass** Submitted before class lecture days through canvas.

**(45%) Projects** are a major component of this class. I encourage collaboration between you and your peers while working on tasks and projects, but your work you say is your own must be your own. The guideline is: you should never have any trouble explaining your work.

**(15%) Team Notebook:** Each of the projects will have a component involving a more significant amount of teamwork. An electronic notebook will be created and shared between group members and submitted each week.

**(25%) Tests** Two tests will be given during the semester allowing you to demonstrate your understanding of what you have been learning.

**(10%) Final Project:** A final project will provide some constraints and parameters but will allow you considerably more freedom to demonstrate the skills you have developed through the semester.

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>F</b>
A 92-100	B+ 87-89	C+ 77-79	D+ 67-69	F Less than 59
A- 90-91	B 83-86	C 73-76	D 63-66	
	B- 80-82	C- 70-72	D- 60-62	

**Exams** Examinations and the Final Examination will include problems and questions over material explored throughout the class. 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.

**Final Exam** 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.

**Incompletes and Late Assignments** All written assignments are to be submitted/turned in by the beginning of the class session when they are due. One project can be submitted up to a week late, with an email conformation sent indicating you are using your one late assignment. *All other Late work will not be accepted* without prior consent or a well-documented emergency. Preclass assignments are due at the time indicated on Canvas. Incompletes will only be assigned in extremely unusual circumstances.

**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 Policies](#) 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](mailto: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 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 Policies site](#) in the Undergraduate Academic Catalog. If absences exceed these limits but are due to university excused health issues, an exception will be granted.

**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.](#)

**Topics and Assignments at a glance:**

Date	Topic	Project	Team
9/02	Welcome and Introductions & Productivity	Short intro video	
9/07	Input/Output; Intro to Excel		
9/09	Input/Output II	Excel Project I	Team 1
9/14	Feedback Loops & Chaotic Behavior		
9/16	Chaotic Behavior II	Excel Project II	Team 2
9/21	Intro to MATLAB; Soft skills I		
9/23	Soft skills II	MATLAB Project 1	Team 3
9/28	Computational Thinking		
9/30	MATLAB fundamentals	MATLAB Project 2	Team 4
10/05	Transient & Steady State		
10/07	MATLAB fundamentals	MATLAB Project 3	Team 5
10/12	Monte Carlo; MATLAB		
10/14	MATLAB	MATLAB Project 4	Team 6
10/19	<b>In class Exam 1</b>		
10/21	Wrap up MATLAB	MATLAB Project 5	
10/26	Intro to Arduino; Documentation		
10/28	Documenting your Process	Arduino Project 1	Team 7
11/02	Arduino and Scopes		
11/04	Intro to Ethics & Decisions	Arduino Project 2	Team 8
11/09	Intro to Engineering Design; Arduino		
11/11	Arduino Exploration	Arduino Project 3	Team 9
11/16	Creative Thinking; Planning; Arduino		
11/18	Arduino Exploration	Arduino Project 4	Team 10
11/23	Intro First semester projects		
11/30	Design Tradeoffs; Work of Projects	Final Project Guidelines	
12/02	Projects		

12/07	<b>In class Exam 2</b>		
12/09	Projects		
12/16	Final Project Presentations: Thursday 1:30-4:00 pm		