

**Department of Physics and Engineering**  
**EGR4072/PHY4072 -Senior Project I 2 units**

**Fall 2020 | August 17-December 4**

**Instructor: Dr. Paul D. Schmelzenbach**

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**Office hours: By appointment as needed.**

### **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**

**EGR4072:** This course provides students (teams with) the opportunity to design and build a prototype of a project of their choosing. The students will give an oral presentation of their project in a design review setting. This course will normally be completed in a student's senior year.

**PHY4072:** This course provides students the opportunity to prepare a technical paper on scientific or engineering research and to make an oral presentation of their results of this research. Initially topics investigated will draw on learning from the core curriculum, including topics in an advanced laboratory setting in mechanics, quantum mechanics, statistical mechanics, and electricity and magnetism. Students will then develop and explore a project of their choosing. This course will normally be completed in a student's senior year.

### **COURSE LEARNING OUTCOMES**

1. Use data analysis and error analysis techniques within lab experiments.
2. Employ proper techniques to minimize uncertainty and eliminate systematic errors in experiments.
3. Use knowledge from operational manuals to correctly use advanced equipment.
4. Present data effectively in written and oral formats.
5. Create near-publication-quality manuscripts in LaTeX.
6. Design and carry-out an experimental investigation.
7. Appraise manuscripts of peer investigations.
8. Make an effective presentation at a level appropriate to a technical meeting.
9. Respond effectively to technical questions about their investigation.

#### **REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES**

1. Access to MATLAB and LaTeX

#### **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 delivered over sixteen 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.)

<b>Category</b>	<b>Time Expectation in Hours</b>
Project development	50
Discussions	10
Other Assignments & Learning Activities	13
Quizzes, Surveys	2
<b>Total Hours</b>	<b>75</b>

#### **ASSESSMENT AND GRADING**

##### **Graded Components**

## Assignments are weighted by group:

Group	Weight
Project Talk	30%
Project Paper	30%
Weekly Tasks	30%
Notebook	5%
Video Questions	5%
Total	100%

The heart of the class is your project. You may choose to work by yourself or to pair up with one other person. Your grade is earned through various assignments associated with your project including:

Communication of your project:

- The project talk includes a final presentation, as well as 2 other talks given in the semester.
- The project paper includes the final paper, a draft, and a written proposal.

Documentation and development of your project:

Through the semester you will be keeping an Engineering Notebook to document your progress in your project. A variety of other tasks associated with your project as well as associated topics will be explored in the video questions, and other weekly tasks.

Deadlines in this course are important and late work will not generally be accepted. The acceptance is up to a maximum of one weekly task will be accepted up to 3 days late provided that consent is received from the professor before it is due. Homework assignments that are submitted late without prior consent will be recorded with a score of zero.

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.

### Grading Scale

Approximate minimal percentages required to obtain a given grade are:

## Standard Grade Scale Based on Percentages

	A	B	C	D	F
+		87.5- 90	77.5-80	67.5-70	
	92.5 -100	82.5-87.5	72.5-77.5	62.5 -67.5	0-60
-	90-92.5	80-82.5	70-72.5	60-62.5	

## 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 Authorization](#) 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 beginning of the class session when they are due—including assignments posted in 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

While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. ([DRC@pointloma.edu](mailto:DRC@pointloma.edu) or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and

benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

## 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](#) for further information about class attendance.

## 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](#)

## Course Summary:

Date	Details	
Mon Aug 17, 2020	Page <a href="#">Week 1: Course Orientation</a>	to do: 11:59am
Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm	
Page <a href="#">Week 1: Overview</a>		to do: 12:30pm
Page <a href="#">Home Page   Quick Links to Resources</a>		to do: 11:59pm
Page <a href="#">Meet Your Instructor</a>		to do: 11:59pm
Page <a href="#">Syllabus</a>		to do: 11:59pm

Fri Aug 21, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 1</a>	due by 11:59pm	
Assignment <a href="#">Task 1</a>	due by 11:59pm	
Assignment <a href="#">VQ 1</a>	due by 11:59pm	
Mon Aug 24, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 2: Overview</a>	to do: 11:59pm	
Fri Aug 28, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 2</a>	due by 11:59pm	
Assignment <a href="#">Task 2</a>	due by 11:59pm	
Assignment <a href="#">VQ 2</a>	due by 11:59pm	
Mon Aug 31, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 3: Overview</a>	to do: 11:59pm	
Fri Sep 4, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 3</a>	due by 11:59pm	
Assignment <a href="#">Task 3</a>	due by 11:59pm	
Assignment <a href="#">VQ 3</a>	due by 11:59pm	
Mon Sep 7, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 4: Overview</a>	to do: 11:59pm	
Fri Sep 11, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 4</a>	due by 11:59pm	
Assignment <a href="#">Task 4</a>	due by 11:59pm	
Assignment <a href="#">VQ 4</a>	due by 11:59pm	

Mon Sep 14, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 5: Overview</a>	to do: 11:59pm	
Fri Sep 18, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 5</a>	due by 11:59pm	
Assignment <a href="#">Task 5</a>	due by 11:59pm	
Assignment <a href="#">VQ 5</a>	due by 11:59pm	
Mon Sep 21, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 6: Overview</a>	to do: 11:59pm	
Fri Sep 25, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 6</a>	due by 11:59pm	
Assignment <a href="#">Task 6</a>	due by 11:59pm	
Assignment <a href="#">VQ 6</a>	due by 11:59pm	
Mon Sep 28, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 7: Overview</a>	to do: 11:59pm	
Fri Oct 2, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">Boss Talk</a>	due by 11:59pm	
Assignment <a href="#">NB 7</a>	due by 11:59pm	
Assignment <a href="#">Task 7</a>	due by 11:59pm	
Assignment <a href="#">VQ 7</a>	due by 11:59pm	
Mon Oct 5, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 8: Overview</a>	to do: 11:59pm	
Fri Oct 9, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm

Assignment <a href="#">NB 8</a>	due by 11:59pm	
Assignment <a href="#">Task 8</a>	due by 11:59pm	
Assignment <a href="#">VQ 8</a>	due by 11:59pm	
Mon Oct 12, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 9: Overview</a>	to do: 11:59pm	
Fri Oct 16, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 9</a>	due by 11:59pm	
Assignment <a href="#">Peer Talk</a>	due by 11:59pm	
Assignment <a href="#">Proposal</a>	due by 11:59pm	
Assignment <a href="#">Task 9</a>	due by 11:59pm	
Assignment <a href="#">VQ 9</a>	due by 11:59pm	
Mon Oct 19, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 10: Overview</a>	to do: 11:59pm	
Fri Oct 23, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 10</a>	due by 11:59pm	
Assignment <a href="#">Task 10</a>	due by 11:59pm	
Assignment <a href="#">VQ 10</a>	due by 11:59pm	
Mon Oct 26, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 11: Overview</a>	to do: 11:59pm	
Fri Oct 30, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 11</a>	due by 11:59pm	
Assignment <a href="#">Task 11</a>	due by 11:59pm	



Assignment <a href="#">VQ 11</a>	due by 11:59pm	
Mon Nov 2, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 12: Overview</a>	to do: 11:59pm	
Fri Nov 6, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 12</a>	due by 11:59pm	
Assignment <a href="#">Task 12</a>	due by 11:59pm	
Assignment <a href="#">VQ 12</a>	due by 11:59pm	
Mon Nov 9, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 13: Overview</a>	to do: 11:59pm	
Fri Nov 13, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 13</a>	due by 11:59pm	
Assignment <a href="#">Task 13</a>	due by 11:59pm	
Assignment <a href="#">VQ 13</a>	due by 11:59pm	
Mon Nov 16, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 14: Overview</a>	to do: 11:59pm	
Assignment <a href="#">Draft Paper</a>	due by 11:59pm	
Fri Nov 20, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Assignment <a href="#">NB 14</a>	due by 11:59pm	
Assignment <a href="#">Task 14</a>	due by 11:59pm	
Assignment <a href="#">VQ 14</a>	due by 11:59pm	
Mon Nov 23, 2020	Calendar Event <a href="#">EGR4072-1 FA20 - Senior Project I (12:15)</a>	12pm to 1:15pm
Page <a href="#">Week 15: Overview - Finals and Thanksgiving</a>	to do: 11:59pm	

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Mon Nov 30, 2020

Assignment [Final Talk](#)

due by  
10:30am

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Page [Week 16: Overview - Wrap Up Week](#)

to do: 11:59pm

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Tue Dec 1, 2020

Assignment [Final Paper](#)

due by  
11:59pm