

Department of Physics and Engineering, Point Loma Nazarene University
PHY 475 -- Senior Laboratory and Student Project -- 2 Units

Spring 2018

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Office Hours: M/W/TH: 3:00 – 4:00 PM and by appointment

Class Meeting Times: T 2-4:30 (RS219) January 9 – April 27, 2018

Lab: R 10:00 – 11:55; or R 12:30 – 2:25 (RS213)

Final Exam: N/A

Course Materials: Access to a computer with LaTeX, Excel, and MATLAB.

Course Description: 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.

Learning Outcomes: This course supports the overall learning objectives of the physics and engineering programs to: design and conduct experiments or complete engineering design projects as well as analyze and interpret data and effectively communicate complicated technical information. Within these broader outcomes, in this course you will

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.

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 and Participation: 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.

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.

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 and the PLNU catalog for additional information. Students with learning disabilities who may need accommodations should discuss options with the instructor during the first two weeks of class. For more details see the PLNU catalog:

<http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#AcademicAccommodations>

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) will result in a grade of F on the official transcript.

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 4-unit class delivered over 16 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Final Exam: There is no final exam for this class. However, final presentations of student projects will be given during the final week of classes, April 23-27.

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.

Information Sharing: All lecture notes, lab handouts, grades, and relevant course materials will be posted on Canvas.

Assessment and Grading: The points you receive during the course are weighted accordingly:

Initial Ideas	5 %
Proposal and Timeline	10 %
Progress Report	10 %
Progress Presentation	15 %
Physics Exam	10 %
Final Software/Hardware Evaluation	10 %
Final Written Manuscript	20 %
Final Oral Presentation	20 %

The grade you earn in this course is based on the following scale:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-
S \geq 91.0	91.0 >S \geq 89.5	89.5 >S \geq 87.0	87.0 >S \geq 81.0	81.0 >S \geq 79.5	79.5 >S \geq 77.0	77.0 >S \geq 71.0	71.0 >S \geq 69.5	69.5 >S \geq 67.0	67.0 >S \geq 61.0	61.0 >S \geq 55.0

A final grade will be given ONLY AFTER you remove and clean up your setup in the building!

PHY475: Senior Laboratory and Student Project (Spring 2017)

(Tentative Course Calendar, Subject to Updates)

Date	In Class	Items Due	Project
(Wk 1 – No class)			
T 01/16/17	Introductions		Initial Thoughts
T 01/23/17	Discuss Initial Ideas	Initial Ideas	Think/Develop/Discuss Talk with Professors
T 01/30/17	Present Proposal and Timeline/ Peer Review Proposal	Draft of Proposal and Timeline Due	Gather Supplies and Construct Project
T 02/06/17	Work on Project / Discuss with Professors and Peers	Briefly Discuss Progress and Challenge	Work on Project
T 02/13/17	Work on Project/Discuss with Professors	Briefly Discuss Progress and Challenge	Work on Project
T 02/20/17	Peer Review Progress Report	Progress Report Due	Work on Project
T 02/27/17	Progress Talk / Show & Tell / Peer Review	Show Project & Discuss Progress	Work on Project
T 03/06/17	<i>No Class (Spring Break)</i>		

T 03/13/17	Review Topics		Work on Project
T 03/20/17	Senior Test (PLNU)		Work on Project
T 03/27/17	Senior Test (Physics/Engineering)		Work on Project
T 04/03/17	Peer Review the Papers	Submit Paper Draft	Finalize Project & Paper
T 04/10/17	Practice Talk I		Finalize Project & Paper Work on Presentation
T 04/17/17	Practice Talk II	Final Paper Due	Work on Presentation
T 04/24/17	10 minute talks and Celebrate!		
T 05/01/17	Final Exam Week		

More Guidelines

You must work in groups of 2-3 students.

Suggestions for ideas:

- Consider approaching professors you might want to work with, and see if they have a particular research area they would like to explore.
- Consider a project in an area you hope to work in after graduation.
- Ensure that your plans are both do-able, and fun!

Guideline for Initial Idea (Due Tuesday 01/24/17)

Choice 1: Either list 3 different ideas with a little less detail, or if you have begun to narrow down on topic, provide 3 different possible aspects/directions of the exploration. Submit them on Canvas and come to class with either a hard copy, or bring a computer along so that we can share and consider them in class next time.

Guideline for a draft of proposal (Due Tuesday 01/31/17)

- A proposal statement – What are you planning on doing (A few sentences up to a paragraph).
- Introduction and Background – The why and an overview/background – demonstrate that you know what you are doing. (Include sources).
- Timeline – a list per week of what you are going to accomplish.
- (Cost if desired, \$50).
- Results – What will be the final outcome/product of the project.