Department of Physics and Engineering, Point Loma Nazarene University **Spring 2017**

PHY 475 – Senior Laboratory and Student Project -- 2 Units

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Office Hours: M/F: 11:55 – 12:55 & 2:35 – 3:05;
W: 11:55 – 12:25; R: 2:35 – 4:00; and by appointment

Class Meeting: T 2:00 – 4:30 (RS 219) January 10 – April 28, 2017

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.

PLNU Mission: To Teach ~ To Shape ~ To Send. As with all courses at PLNU, this course supports the cause to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life. Within this broader 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.

Department Mission: Within this broader 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 Christiaan 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 _rst 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 for additional information. For more details see the PLNU catalog. 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) may easily 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: 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.

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.

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

Initial Ideas	10 %
Proposal and Timeline	10 %
Progress Report	15 %
Progress Presentation	15 %
Physics Exam	10 %
Final Manuscript	20 %
Final 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≥ 91.0	91.0 >S≥ 89.5	89.5 >S≥ 87.0	87.0 >S≥ 81.0	81.0 >S≥ 79.5	79.5 >S≥ 77.0	77.0 >S≥ 71.0	71.0 >S≥ 69.5	69.5 >S≥ 67.0	67.0 >S≥ 61.0	61.0 >S≥ 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 02 T 01/17/17	Introductions		Initial Thoughts
Wk 03 T 01/24/17	Discuss Initial Ideas	Initial Ideas	Think/Develop/Discuss Talk with Professors
Wk 04 T 01/31/17	Present Proposal and Timeline/ Peer Review Proposal	Draft of Proposal and Timeline Due	Gather Supplies and Construct Project
Wk 05 T 02/07/17	Work on Project / Discuss with Professors and Peers	Briefly Discuss Progress and Challenge	Work on Project
Wk 06 T 02/14/17	Work on Project/Discuss with Professors	Briefly Discuss Progress and Challenge	Work on Project
Wk 07 T 02/21/17	Peer Review Progress Report	Progress Report Due	Work on Project
Wk 08 T 02/28/17	Progress Talk / Show & Tell / Peer Review	Show Project & Discuss Progress	Work on Project
Wk 09 T 03/07/17	***No Class (Spring Break)***		
Wk 10 T 03/14/17	Review Topics		Work on Project
Wk 11 T 03/21/17	Senior Test (PLNU)		Work on Project
Wk 12 T 03/28/17	Senior Test (Physics/Engineering)		Work on Project
Wk 13 T 04/04/17	Peer Review the Papers	Submit Paper Draft	Finalize Project & Paper
Wk 14 T 04/11/17	Practice Talk I		Finalize Project & Paper Work on Presentation
Wk 15 T 04/18/17	Practice Talk II	Final Paper Due	Work on Presentation
Wk 16 T 04/25/17	10 minute talks and Celebrate!	Chapter 3	
Wk 17 T 05/02/17	Final Exam Week		

More Guidelines

You may choose to work by yourself or to pair up with one other person.

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.