POINT 1902 LOMA
NAZARENE UNIVERSITY

Department of Physics and Engineering

EGR 4082-1 – Senior Project II

2 Units

Spring 2025

Meeting days/times: Wednesdays, 6:00-7:50 PM

Meeting location: Rohr Science (RS) 365

Final Exam: TBD[1]

Instructor title and name:	Professor Jon Viducich, P.E.
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Office location and hours:	Via Zoom, by appt. (Please email the instructor to schedule.)

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.

Physics and Engineering 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.

[1] Please note that the final exam will *not* take place during the university-scheduled final exam date/time for this course, due to the need to facilitate program requirements for faculty and community member attendance. I will confirm a substitute date/time with students and faculty during the first week of class and an updated version of this syllabus with the final date/time and location will be posted in Canvas.

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Course Description

This course provides students (teams) with the opportunity to hone and finish building the project design initiated in EGR 4072. The students will prepare a scientific paper about their project and give an oral presentation of their findings. This course will normally be completed in a student's senior year.

Program and Course Learning Outcomes

The Program Learning Outcomes (PLOs) assessed in this course are:

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (CC: CT)
- 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
- An ability to communicate effectively with a range of audiences (CC: OC, WC, IL)
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (CC: QR)
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The methods for assessing these PLOs are:

1. **Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (CC: CT)**

Outcome Assessed	Assessment Method
Students will demonstrate an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (all)	Faculty/Review Team Assessment of Final Project
Student reflection on preparation to solve problems using engineering, science and mathematics (all)	Senior Survey (Indirect Method)

2. **Students will demonstrate 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.**

Outcome Assessed	Assessment Method
Student design teams will be able to construct a prototype of their solution and evaluate is effectiveness (all)	Faculty/Review Team Assessment of Final Project
Student reflection on preparation to design engineering solutions (all)	Senior Survey (Indirect Method)

3. **Students will demonstrate an ability to communicate effectively with a range of audiences**

Outcome Assessed	Assessment Method
Students will be able to speak about their work with precision, clarity and organization (all)	Faculty Team Assessment of Final Project Presentation
Students will be able to write about their work with precision, clarity and organization (all)	Faculty Team Assessment of Final Project Report
Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand (all)	Faculty Team Assessment of Final Project Report
Student reflection on preparation to communicate effectively (all)	Senior Survey (Indirect Method)

4. **Students will demonstrate an ability to recognize ethical and professional responsibilities and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts**

Outcome Assessed	Assessment Method
Students will be able to describe the role of engineering ethics, professional responsibility and the impact of contexts in their project (all)	Faculty/Review Team Assessment of Final Project
Student reflection on preparation to recognize ethical and professional responsibilities and make informed judgements (all)	Senior Survey (Indirect Method)

5. **Students will demonstrate an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives**

Outcome Assessed	Assessment Method
Students will demonstrate an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives (all)	Homework Assignment to Complete Evaluation of Each Team Member
Student reflection on preparation to be part of a team (all)	Senior Survey (Indirect Method)

6. **Students will demonstrate an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (CC: QR)**

Outcome Assessed	Assessment Method
Student reflection on preparation to conduct experiments and interpret data (all)	Senior Survey (Indirect Method)

7. **Students will demonstrate an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.**

Outcome Assessed	Assessment Method
Student reflection on preparation to acquire and apply new knowledge (all)	Senior Survey (Indirect Method)

Assessment and Grading

This course seeks to prepare students for their engineering careers through self-directed, project-based learning, with an emphasis on professionalism. By completing an engineering design project with limited faculty oversight, students will continue to develop the skills they will need to be successful in a professional setting. As such, assigned grades will reflect the approximate quality, completeness, and timeliness of deliverables expected of an entry-level, junior engineer. Graded project deliverables include the following:

- **Project Proposal:** At the start of the term, each team will prepare a proposal for the Spring Semester scope of work. In addition to documenting any remaining work required to complete the detailed prototype, the proposal must explain how data will be collected and analyzed to inform design optimization (i.e., detailed testing protocols and specific analyses planned) and include plans for documenting and presenting the final design. The proposal must include a schedule with at least three major milestones and weekly tasks assigned to each team member, designed to reach each milestone on time. The draft proposal will be peer-reviewed during class time and feedback from peers, the instructor, the faculty mentor, and the client must be incorporated in the final version. By formally defining the testing plan and other tasks, this document will help students set appropriate goals and ensure the timely delivery of prototype designs to the client. Grading for the assignment will be based on the completeness, quality, and on-time submittal of both the draft and final versions.
- **Progress Report:** Each project team will prepare a written, formal progress report, due on Week 8 of the term. The progress report will give students an opportunity to formally evaluate and present their progress to the client, practice their technical writing skills, and continue to become familiar with a tool frequently used in industry. Detailed feedback was provided on the progress reports submitted during the Fall Semester; these comments should be incorporated to reflect learning and improvement. Grading for the assignment will be based on the completeness, quality, and on-time submittal of the reports.
- **Technical Manual:** Each project team will develop a manual documenting the design, construction, and use of their work product. This documentation will allow the client to construct, operate, and continue optimizing the designs in the future. Grading for the assignment will be based on the completeness, quality, and on-time submittal of both the draft and final versions.
- **Final Report:** The class will prepare a publication-quality report, due on the last day of the regular term, describing the work completed over the course of the year. Each project team will be responsible for drafting one or more sections. The draft-final report sections will be peer-reviewed during class time and the final version of the combined report will be submitted together with formal responses to the comments. Grading for the assignment will be based on the completeness, quality, and on-time submittal of both the draft and final versions and the comment responses.
- **Final Presentation:** The class will present the work completed over the course of the year during the final exam session. (Please carefully note the date and time for the final presentations.) Each

project team will be responsible for presenting their work as part of the presentation and each student must present. Students will have an opportunity to practice the final presentation in class during the last week of the regular term and receive feedback, though only the final presentation will be graded. The presentations will be open to PLNU students, faculty, and professional community members to attend. Grading for the assignment will be based on formal evaluation of both the presentation visuals (e.g., slides) and oral delivery, including appropriate responses to audience questions.

- **Weekly Performance Evaluations:** For ten weeks following completion of the proposal (Weeks 5-8 and 10-15; 10 weeks total), each student's performance will be evaluated based on their work on that week's assigned tasks, as defined in the proposal. Student performance will be evaluated by the faculty mentor during a weekly meeting with each team. Grading will be based on the completeness, quality, and on-time completion of assigned tasks.
- **Course Participation:** At the end of the term, each student will receive a single course participation grade reflecting their individual contributions to both the group learning environment and written group deliverables submitted throughout the term. Grades will be determined based on peer evaluations, a faculty mentor evaluation, a professor evaluation, and an individual technical writing evaluation.

The assignment grading distribution will be as follows:

Graded Component	Base Points Possible
Project Proposal	10
Progress Report	5
Technical Manual	15
Final Report	15
Final Presentation	15
Weekly Performance Evaluations (10)	30 (3 Each)
Course Participation	10
Total	**100**

Project deliverables will be submitted and graded on a group basis, meaning that students will receive the same score for group assignments. This is intended to reflect the realities of both industry and

academia. However, each student is expected to make their expected contribution to all deliverables; note that students cannot pass the course based on group deliverables alone.

Students are expected to arrive on time and prepared for class sessions and planned team meetings outside of class. Most weeks, class sessions will include a brief, informal oral progress report by each project team to describe progress made and to solicit feedback from the instructor and peers. Some weeks, class time will be dedicated to peer review of draft documents (e.g., proposals, report sections, etc.). Students are expected to support each other in the learning process by asking thoughtful questions and providing constructive and respectful written and oral feedback during class sessions. Outside of class, teams are expected to meet weekly with the Faculty Mentor, Dr. José Manjarrés, who is available as a resource to provide project management and technical support. Teams are expected to develop and commit to a team contract outlining expectations for all members, then honor those commitments throughout the semester. Please note that all activities contributing to the Course Participation grade are designed to directly benefit students by supporting them in the on-time delivery of excellent projects.

Final grades will be assigned based on the number of points accumulated throughout the course as a percentage of the total points possible. The percentage ranges 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	

Final Examination Policy

Successful completion of this class requires taking the final examination on its scheduled day. 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. Given the need to facilitate faculty and community member attendance for program requirements, any students with concerns about the scheduled final examination time must contact the instructor during the first week of the term. Unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

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Content Warning

I acknowledge that each of you comes to PLNU with your own unique life experiences. This contributes to the way you perceive various types of information. In Senior Project II, all the class content, including that which may be intellectually or emotionally challenging, has been intentionally curated to achieve the learning goals for this course. The decision to include such material is not taken lightly. If you encounter a topic or assignment that is intellectually or emotionally challenging for you, it can manifest in feelings of discomfort and upset. In response, I encourage you to come talk to me or your friends or family about it. Class topics are discussed for the sole purpose of expanding your intellectual and professional engagement, and I will support you throughout your learning in this course.

Incompletes and Late Assignments

All assignments are to be submitted by the due dates. Assignments will be considered late if submitted after the indicated due date and time. Late assignments will receive a grade of 0, except in extremely unusual circumstances and at the instructor's discretion. Note: If, due to extreme circumstances, students foresee that they will not be able to submit an assignment on time, they must inform the instructor and discuss options as early as possible. Extensions will not be considered when failure to meet a deadline is coupled with poor communication.

Artificial Intelligence (AI) Policy

You are allowed to use Artificial Intelligence (AI) tools (e.g., ChatGPT, Gemini Pro 1.5, GrammarlyGo, Perplexity, etc) to generate ideas, but you are not allowed to use AI tools to generate content (text, video, audio, images) that will end up in any work submitted to be graded for this course. If you have any doubts about using AI, please gain permission from the instructor.

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 or 619-849-2486). 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. The EAC makes accommodations available to professors at the student's request.

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.

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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 special accommodations.

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/18i1pUoY0iCfB8w7JKxVvACQW309X-JRB/edit?usp=sharing&ouid=116164865489739533893&rtpof=true&sd=true

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Tentative Course Schedule

Please note the schedule is subject to minor changes throughout the semester; refer to the Canvas course home page for the updated schedule.

Week	Date	In Class	Mini-lecture Topic	Items Due	Milestone
1	1/15/2025	Discuss syllabus, class plan, and proposal assignment, finalize prototypes	Experimental Design (Don & Kirsten)	Entrance survey	
2	1/22/2025	Work on proposal/discuss with professor and peers, finalize prototypes		Team contracts	
3	1/29/2025	Peer review proposals	Captions and Cross Referencing	Draft proposals (before class)	Draft proposals submitted to AgInno for feedback
4	2/5/2025	Data collection and analysis, optimize design		Proposal (before class)	
5	2/12/2025	Data collection and analysis, optimize design			
6	2/19/2025	Data collection and analysis, optimize design			
7	2/26/2025	Data collection and analysis, optimize design			
8	3/5/2025	Data collection and analysis, optimize design			
9	3/12/2025	Spring Break (No Class)			
10	3/19/2025	Present progress reports, discuss manual sections	Technical Manuals	Progress report (before class)	
11	3/26/2025	Finalize designs and parts lists, work on manuals	Faith and Engineering		
12	4/2/2025	Clean up lab space/equipment, work on manuals	*Prof. Viducich out of town; can meet virtually if needed*		
13	4/9/2025	Peer review manuals	Professional Relationships	Draft-final technical manual	Final manuals submitted to AgInno
14	4/16/2025	Senior survey, teamwork evaluations, work on final report/presentation	Formal Peer-review Process	Final technical manual (before class), senior survey and teamwork evals (end of class)	
15	4/23/2025	Peer review report sections (formal)		Draft-final report and comment sheets	
16	4/30/2025	Practice presentation with peer feedback		Final report and comment responses (end of week)	Final report submitted to AgInno
17	TBD	Final presentation (final exam session) - Time and place TBD		Presentation slides (end of class)	Final presentation files submitted to AgInno
Summer Break – Trip to Chisec to Deploy Dryer?					