Point Loma Nazarene University
Department of Physics and Engineering
Fall 2025
EGR 3062/PHY 3062 - Electricity, Magnetism & Waves I (2 units)
Class Meetings: MW 8:30 AM – 9:25 AM (RS 265)
Final Exam Monday, December 15 at 7:30 am

Instructor: Dr. Paul D. Schmelzenbach
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Office hours: F 8:30-9:45 am; T 10-12; MWF 1:30-2:30 pm in RS258

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: Classical electromagnetism including topics in electrostatics, magnetostatics, fields in matter, electromagnetic induction, and Maxwell's equations.

Course Learning Outcomes
After completing this course, students can

1. Translate a physical description of a junior-level E&M problem to a math equation necessary to solve it.
2. Explain the physical meaning of the mathematical formulation
3. Articulate the big ideas from each section
4. Justify and explain your thinking and approach to a problem or physical situation in written or oral form
5. When appropriate for a given problem you should be able to predict your expectations of a problem (such as the direction of a field or dependence on distance) and evaluate the reasonableness of a solution.

6. Be able to sketch the physical parameters of a system (such as the E or B field)
7. Apply computational techniques to help in solving E&M problems
8. Correctly apply problem solving techniques such as approximations, symmetries, integration and superposition

Required Texts and Materials
D. J. Griffiths, *Introduction to Electrodynamics*, 5th ed. (Cambridge University Press, Cambridge, 2023). Access to Python, MATLAB or similar program. Calculator.

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 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:

(20%) Homework: Approximately weekly written homework is a very important piece of building your skills in solving physics problems.

(15%) Quizzes: Short quizzes on various skills or ideas closely related to homework. Quizzes are taken in class and cannot be made-up, and the lowest two scores will be dropped.

(35%) Exams (2): Two exams will be given during the semester. Exams will include both multiple-choice or short answer conceptual questions, and problems to solve. Exams will be closed book, but a sheet of formulas will be provided. Partial credit will be given for correct reasoning at any step of a problem, but only if it is communicated clearly enough for me to understand.

(30%) Final exam: The final examination will be comprehensive. There is both a written and oral component to the exam.

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:

A	**B**	**C**	**D**	**F**
92–100 (A)	**87–89** (B+)	**77–79** (C+)	**67–69** (D+)	< 59
90–91 (A–)	**83–86** (B)	**73–76** (C)	**63–66** (D)	
	80–82 (B–)	**70–72** (C–)	**60–62** (D–)	

Late Assignments: Homework problems not submitted on time will receive a deduction of 5% for the first day, then 20% per day after this. Make sure to communicate as soon as possible with the professor for any necessary arrangements.

Exams and Missing Exam Policy:
Examinations and the Final Examination will include problems and questions over material assigned in the text, explored in homework, as well as material presented in class. Distributed specific learning outcomes for the section, or for the entire class will provide a good means of study. A score of zero will be assigned for an examination that is missed without prior consent or a well-documented emergency beyond your control. If such an event arises, please ensure that you communicate with the professor as soon as possible so other arrangements can be made.

Final Exam
Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the Class Schedules site. 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. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

Incomplete grade assginement: A grade of incomplete will only be assigned in extremely unusual circumstances. If you believe that your parituclar circumstances qualify be in clear communication with the professor as soon as you are able.

Artificial Intelligence (AI) Policy: You are allowed to use Large Language Models (like ChatGPT, NotebookLM, Claude, etc.) as a study tool, but not on any exams. Work that utilizes AI-based tools should be identified as such including the tool used. Specific use cases will be clarified in class.

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 619-849-2533). 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. Professors are able to view a student's approved accommodations through Accommodate.

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.

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 accommodations.

Additional Course Information:

Additional PLNU policies and practices that apply to this course can be found at this link: https://docs.google.com/document/d/11BgAANLOJ9tjt837d24EZ181ukM2qzHF/edit

Lomabooks Instructions for Students: This course is part of our course material delivery program, LomaBooks. The bookstore will provide each student with a convenient package containing all required physical materials; all digitally delivered materials will be integrated into Canvas.

You should have received an email from the bookstore confirming the list of materials that will be provided for each of your courses and asking you to select how you would like to receive any printed components (in-store pick up or home delivery). If you have not done so already, please confirm your fulfillment preference so the bookstore can prepare your materials.

For more information about LomaBooks, please go: here

Course Calendar:

Date	Topic	Reading
W 9/03	Introductions and Vector Algebra	1.1
M 9/08	Differential Calculus	1.2
W 9/10	Integral Calculus	1.3
M 9/15	Curvilinear Coordinates	1.4
W 9/17	Delta Function and Vector Fields	1.5-1.6
M 9/22	The Electric Field	2.1
W 9/24	Divergence and Curl of Electrostatic Fields	2.2
M 9/29	Electric Potential I	2.3
W 10/01	Energy and Conductors	2.4-2.5
M 10/06	Wrap up Conductors/Laplace's Equation	3.1
W 10/08	Method of Images	3.2
M 10/13	Exam #1	
W 10/15	Separation of Variables I	3.3
M 10/20	Separation of Variables II	3.3
W 10/22	Multipole Expansion	3.4
M 10/27	Polarization	4.1-4.2
W 10/29	D linear dielectrics	4.3-4.4.3
M 11/03	The Lorentz Force	5.1
W 11/05	Biot-Savart Law	5.2
M 11/10	Divergence and Curl of B	5.3

Date	Topic	Reading
W 11/12	Magnetic Vector Potential	5.4
M 11/17	Magnetization	6.1-6.2
W 11/19	H and Materials	6.3-6.4
M 11/24	Exam #2	
M 12/01	EMF and Ohm	7.1
W 12/03	Electromagnetic Induction	7.2
M 12/08	Maxwell's equations	7.3
W 12/10	Maxwell's equations	7.3
M 12/15	Final Exam	