Department of Physics and Engineering, Point Loma Nazarene University

PHY 362 – Electricity, Magnetism and Waves -- 3 Units

Spring 2018

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

Lecture: MWF 11:00 – 11:55 (RS219) January 9 – April 27, 2018
Final Exam: 10:30 pm - 1:00 pm on Friday, May 4, 2018

Textbook: Introduction to Electrodynamics by David Griffiths, 4th Edition, 1999.

Course Description: Electrodynamics with an emphasis on application of Maxwell's equations particularly to electromagnetic radiation.

Learning Outcomes: This course supports the overall learning objectives of the physics and engineering programs to develop an understanding of the fundamental principles of physics and apply physical principles, mathematical reasoning, and computational techniques to solve real-world problems

Within these broader outcomes, in this course you will

1. Translate a physical description of an E&M problem to a mathematical model, and use the model to predict the performance of the physical system.
2. Explain the physical meaning of the mathematical formulation
3. Articulate the major concepts 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, be able to predict your expectations of a problem (such as the direction of a field or dependence on distance) and in all cases 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

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: The Final Exam will be taken on May 4th from 10:30-1:00 PM. 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.

Pre-Class: To come prepared for each class there is a reading assignment, as listed in the course calendar in this syllabus. From time to time a quiz will be given at the beginning of class, covering the assigned reading. These quizzes will account for 5% of the grade.

Homework: Weekly homework assignments will be announced on Canvas. You are allowed to work together on homework, but it is important to understand that completion and understanding of these problems are critical to your success in the class. Late work receives a 20% reduction in possible value per day. ***It is critical that you understand completely*** how the homework problems are solved, if you wish to do well in this course.

Project: There will be one assigned project for this class involving a computer simulation or an actual build of a device. Details will be provided in class, and the project will be worth 10% of your overall grade.

Tests: There will be four tests during the semester in this class. A comprehensive final exam is scheduled at 10:30 – 1 pm on Friday May 4th during finals week. All of the tests and the final exam are closed book. Partial credit will be given for correct reasoning at any step of a problem, but only if it is communicated clearly enough for the instructor to understand. For problems that call for solution or explanation, no credit will be given for an answer alone; the method or reasoning must also be shown. No make-up exams are allowed except for warranted circumstances. You must take ALL the exams in order to pass the class.

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

Final Grade: The points you receive during the course are weighted as follows:

Component	**Weight**
Quizzes	5 %
Homework	25 %
Project	10 %
Tests (4)	40 % (10% each)
Final Exam	20 %

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

A	A-	B+	B	B-	C+	C	C-	D+	D	D-
100 – 92.5	92.4 – 89.5	89.4 – 87.5	87.4 – 82.5	82.4 – 79.5	79.4 – 77.5	77.4 – 72.5	72.4 – 69.5	69.4 – 67.5	67.4 – 60.0	59.9 – 56.0

PHY362: Electricity, Magnetism and Waves II (Spring 2018)

(Tentative Course Calendar, Subject to Updates)

Date	**Topic**	Reading (BEFORE class)	Due
T 01/09/18	Introductions, Review of surface and line integrals		
W 01/10/18	Review of volume integrals	1.3	Review 1
F 01/12/18	Charge and Poynting vector	8.1	Review 2
M 01/15/18	**No Class (Martin Luther King Jr. Day)**		
W 01/17/18	Maxwell Stress Tensor	8.2.1-8.2.2	Hw 8.1
F 01/19/18	Conservation of Momentum	8.2.3-8.2.4	
M 01/22/18	Wrap up - momentum	8.3	Hw 8.2
W 01/24/18	**Exam #1**		
F 01/26/18	1-D waves	9.1.1-9.1.2	
M 01/29/18	BC and polarization	9.1.3-9.1.4	
W 01/31/18	EM plane waves	9.2.1-9.2.2	Hw 9.1
F 02/02/18	Energy and Momentum in plane waves	9.2.3	
M 02/05/18	EM waves in matter I	9.3.1-9.3.2	Hw 9.2
W 02/07/18	EM waves in matter II	9.3.3	
F 02/09/18	EM waves in conductors I	9.4	
M 02/12/18	EM waves in conductors II	9.4	Hw 9.3
W 02/14/18	Wave guides I	9.5	
F 02/16/18	Wave guides II	9.5	
M 02/19/18	Review		Hw 9.4, 9.5
W 02/21/18	**Exam #2**		
F 02/23/18	Review of potentials	10.1.1	
M 02/26/18	Gauge Transformations	10.1.2-10.1.3	
W 02/28/18	Retarded Potentials	10.2.1	Hw 10.1
F 03/02/18	Jefimenko's equation	10.2.2	
M 03/05/18	***No Class (Spring Break)***		
W 03/07/18	***No Class (Spring Break)***		
F 03/09/18	***No Class (Spring Break)***		

M 03/12/18	Leinard-Wiechert Potentials	10.3.1	Hw 10.2
W 03/14/18	Moving Point Charge	10.3.2	
F 03/16/18	Dipole Radiation I	11.1.1-11.1.2	Hw 10.3
M 03/19/18	Dipole Radiation II	11.1.3-11.1.4	
W 03/21/18	Radiation from a point charge	11.2.1	
F 03/23/18	Radiation reaction	11.2.2-11.2.3	
M 03/26/18	Wrap up, Review		Hw 11
W 03/28/18	**Exam #3**		
F 03/30/18	Easter Break		
M 04/02/18	Easter Break		
W 04/04/18	Antenna Design 1	Handouts	
F 04/06/18	Antenna Design 2	Handouts	
M 04/09/18	Radar Fundamentals	Handouts	
W 04/11/18	Phased Array Radar Systems	Handouts	
F 04/13/18	Synthetic Aperture Radar Systems	Handouts	
M 04/16/18	Antenna/Radar Review		
W 04/18/18	**Exam #4**		
F 04/20/18	Project Presentations		
M 04/23/18	Project Presentations		
W 04/25/18	Review for final		
F 04/27/18	Review for final		
FRIDAY 05/04/18	**Final Exam (1:30 - 4:00 pm)**		