PHY 242 -- University Physics II 4 Units Fall 2015

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Office Hours: T Th 11:30-1:00 PM, MWF 9:30-10:30 (RS 209), or by appointment

Meeting times:
Lecture: MWF 12:15 – 1:20 pm (RLC 104)
Labs: T 12:30 – 2:25 pm (RS 213) Dr. Schmelzenbach (Dr. S)
Final Exam: Wednesday Dec 16, 10:30-1:00 PM

Textbook: *Physics for Scientists and Engineers* by Giancoli Vol 2, 4th Ed.
Access to Mastering Physics, Course ID: MPDOSS00060 (If you were in PHY241 in Spring 2015 your access code from last semester should still work.)

Course Description: University Physics II is the second part of a one-year calculus based introductory course appropriate for science and engineering majors. The emphasis of the course is on electricity and magnetism, electromagnetic interactions, and optics.

Student Learning Outcomes: Through the class there are a number of specific objectives on various subjects in introductory physics, which fit into the following overall course learning objectives. Once you complete this course, you should be able to:

1. translate the description of physics problems into the mathematical equations required to solve them using relevant physical principles.
2. calculate solutions to physics problems once appropriate equations or techniques are identified.
3. predict reasonable answers in appropriate problems, and assess the reasonableness of calculated answers.
4. explain the physical meaning of the parameters in introductory physics equations.
5. create and interpret graphical representations of physical quantities (fields, circuit diagrams, graphs etc.).
6. gather and interpret data in a lab setting.

These support the department learning outcomes to develop an understanding of the fundamental principles of physics and of engineering; to apply physical principles, mathematical reasoning, and computational techniques to solve real-world problems; to design and conduct experiments as well as analyze and interpret data; and to effectively collaborate in teams.

Labs: Weekly lab meetings will provide you with an opportunity to have hands-on experience on lecture topics, to improve your lab technique and data analysis, and to collaborate in groups. Labs will be performed in small groups, but each individual is responsible for submitting his or her own results. You are expected to attend all the laboratory sessions. Any excused schedule conflict needs to be communicated prior to the lab meetings and a lab make-up should be scheduled. According to the university policy, absence for more than 20% of the time may result in de-enrollment without prior notice. For the lab course, missing 3 labs without prior communication with the instructor may result in de-enrollment without notice.

Pre-class Assignments: Reading and pre-class questions are due before class starts, by 9:30 AM, except for the first class. The pre-class questions are in Mastering Physics at www.masteringphysics.com. These consist questions and simple problems based on the reading assignment. Late submissions will not be accepted. Pre-class assignments are 10% of the overall grade. Some pre-class assignments have extra-credit points.

Homework: Weekly homework assignments include reading, pre-class questions found in Mastering Physics at www.masteringphysics.com, and end-of-chapter problems in Mastering Physics at www.masteringphysics.com. Your access code from last semester should still work for this semester. Homework assignments are due by 9:30 am on the due date shown on the syllabus. No late assignments will be accepted.

Tests: There will be three in-class tests during the semester and one comprehensive final exam The comprehensive final exam is scheduled Wednesday Dec 16, 10:30-1:00 PM. 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. 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.

Final Exam Policy: Successful completion of this class requires taking the final examination **on its scheduled day, Wednesday Dec 16, 10:30-1:00 PM**. The final examination schedule is posted on the Class Schedules site. **No requests for early examinations or alternative days will be approved**.

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

Component	**Weight**
Pre-Class	10%
Homework	20%
Lab	20%
Tests (3)	30% (10% each)
Final Exam	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≥ 91.5	91.5 >S≥ 89.5	89.5 >S≥ 86.5	86.5 >S≥ 82.5	82.5 >S≥ 79.5	79.5 >S≥ 76.5	76.5 >S≥ 72.5	72.5 >S≥ 69.5	69.5 >S≥ 66.5	66.5 >S≥ 62.5	62.5 >S≥ 59.5

Attendance and Participation: Regular and punctual attendance at all classes is considered essential.

Academic Integrity and Honesty: All students are expected to uphold the highest standards of honesty and integrity in their academic work. Cheating or plagiarism may result at a minimum in failure on the assignment and may result in an automatic failure in this course. Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. As explained in the university catalog, 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. Violations of university academic honesty include cheating, plagiarism, falsification, aiding the academic dishonesty of others, or malicious misuse of university resources. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for a) that particular assignment or examination, and/or b) the course following the procedure in the university catalog. Students may appeal also using the procedure in the university catalog. See the university catalog, Academic Policies for further information.

Academic Accommodations: While all students are expected to meet the minimum academic standards for completion of this course as established by the instructor, students with disabilities may require academic accommodations. At Point Loma Nazarene University, students requesting academic accommodations must file documentation with the Disability Resource Center (DRC), located in the Bond Academic Center. Once the student files documentation, the Disability Resource Center will contact the student's instructors and provide written recommendations for reasonable and appropriate accommodations to meet the individual needs of the student. See Academic Policies in the undergraduate academic catalog. This policy assists the university in its commitment to full compliance with Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities (ADA) Act of 1990, and ADA Amendments Act of 2008, all of which prohibit discrimination against students with disabilities and guarantees all qualified students equal access to and benefits of PLNU programs and activities.

FERPA Policy: In compliance with federal law, neither PLNU student ID nor social security number should be used in publicly posted grades or returned sets of assignments without student written permission. This class will meet the federal requirements by distributing grades and papers individually. Also, in compliance with FERPA, you will be the only person given information about your progress in this class unless you have designated others to receive it in the "Information Release" section of the student portal. See Policy Statements in the undergrad academic catalog.

Tentative Syllabus – subject to updates
Pre-class assignments due by 9:30 AM on day of class. Mastering physics assignments due by 9:30 AM

Date	**Topics**	**Assignments**	**Labs (Tuesdays)**
9/1/15 T = **Monday schedule**	Static electricity, electric charge, insulators and conductors, induced charge, Coulomb's Law	21.1-21.5 pre-class 1 due on 9/2 MP ch 21	
9/2/15 W	Electric field, calculation of E field, filed lines, E fields and conductors, motion of charge in E field, dipoles	21.6-21.10 pre-class 1& 2 due MP ch 21	
9/4/15 F	Electric flux, Gauss's Law, applications of Gauss's Law, experimental basis of Gauss's and Coulomb's Laws	22.1-22.4 pre-class 3 due MP ch 21 due 9/5 MP ch 22	
9/7/15 M	**NO CLASSES – LABOR DAY**		Lab 1: Operation of an Oscilloscope 9/8/15
9/9/15 W	Electric potential energy & electric potential difference, relation between electric potential and electric field, potential due to point charge,	23.1-23.3 pre-class 4 due MP ch 22 & ch 23	
9/11/15 F	Potential due to any charge distribution, Equipotential surfaces, electric dipole potential, E field determined from potential, electrostatic potential energy & electron volts	23.4-23.8 pre-class 5 due MP ch 22 due MP ch 23	
9/14/15 M	Capacitors, determination of capacitance, capacitors in series & parallel	24.1-24.3 pre-class 6 due MP ch 23 due MP ch 24	Lab 2: Equipotential Mapping 9/15/15
9/16/15 W	Electric energy storage, dielectrics, the electric battery	24.4-24.5, 25.1 pre-class 7 due MP ch 24 & ch 25	
9/18/15 F	Electric current, Ohm's Law, resistance and resistors, resistivity	25. 2-25.4 pre-class 8 due MP ch 24 due MP ch 25	
9/21/15 M	Electric power, power in household circuits, alternating current, microscopic view of electric current: current density and drift velocity	25.5-25.8 pre-class 9 due MP ch 25	Lab 3: Ohmic and Non-Ohmic Devices 9/22/15
9/23/15 W	EMF and terminal voltage, resistors in series and parallel, Kirchhoff's rules	26.1-26.3 pre-class 10 due MP ch 25 & 26	
9/25/15 F	Series and parallel EMFs: battery charging, RC circuits, electric hazards, ammeters & voltmeters	26.4-26.7 pre-class 11 due MP ch 25 due MP ch 26	

Date	Topics	Assignments	Labs (Tuesdays)
9/28/15 M	Catch up & Review ch 21-26 *Test questions are not on *sections unless specifically stated in class*	Study ch 21-26 pre-class 12 due MP ch 26 due	Lab 4: Circuits and Internal Resistance 9/29/15
9/30/15 W	**TEST 1 Chapters 21-26** *Test questions are not on *sections unless specifically stated in class*	Study ch 21-26 Pre-class 13 due	
10/2/15 F	Magnets & magnetic fields, electric currents produce magnetic fields, force on an electric current in a magnetic field; definition of $\vec{B}$	27.1-27.3 pre-class 14 due MP ch 27	
10/5/15 M	Force on q moving in a B field, torque on a current loop; magnetic dipole moment, applications: motors, loudspeakers, galvanometers	27.4-27.6 pre-class 15 due MP Ch 27	Lab 5: RC circuits 10/6/15
10/7/15 W	Discovery and properties of the electron, the Hall effect, mass spec	27.8-27.9 pre-class 16 due MP Ch 27	
10/9/15 F	Magnetic field due to a straight wire, force between two parallel wires, definitions of the Ampere and the Coulomb, Ampere's Law	28.1-28.4 pre-class 17 due MP ch 27 due MP ch 28	
10/12/15 M	B field of a solenoid and toroid, Biot-Savart Law, magnetic materials – ferromagnetism, electromagnets & solenoids – applications, B fields in magnetic materials; hysteresis, paramagnetism and diamagnetism	28.5-28.10 pre-class 18 due MP ch 28	Lab 6: Magnetic Fields, Currents, and a Solenoid 10/13/15
10/14/15 W	Induced EMF, Faraday's Law of induction; Lenz's Law	29.1-29.2 pre-class 19 due MP ch 28 due MP ch 29	
10/16/15 F	EMF induced in a moving conductor, electric generators, EMF and counter torque; eddy currents, transformers & transmission of power, changing magnetic flux produces an E field, applications of induction	29.3-29.8 pre-class 20 due MP ch 29	
10/19/15 M	Mutual inductance, self-inductance, energy stored in Bfield, LR circuits	30.1-30.4 pre-class 21 due MP ch 29 due MP ch 30	Lab 7: Electric Motor 10/20/15
10/21/15 W	LC circuits & EM oscillations, LRC circuits, AC circuits with AC source, LRC series AC circuit, Resonance in AC circuits	30.5-30.9 pre-class 22 due MP ch 30	

Date	Topics	Assignments	Labs (Tuesdays)
10/23/15 F	**NO CLASSES (Fall break)**		
10/26/15 M	Changing E fields produce B fields; Ampere's Law and displacement current, Gauss's Law for magnetism, Maxwell's Equations, production of EM waves, EM waves and their speed, derived from Maxwell's Equations	31.1-31.5 pre-class 23 MP ch 30 due MP ch 31	Lab 8: RLC circuit 10/27/15
10/28/15 W	Light as an EM wave and the EM spectrum, measuring the speed of light, energy in EM waves and the Poynting vector, radiation pressure, radio and TV wireless communication	31.6-31.10 pre-class 24 MP ch 31	
10/30/15 F	Catch-up & Review ch 27-31 *Test questions are not on *sections unless specifically stated in class*	Study ch 27-31 pre-class 25 MP ch 31 due	
11/2/15 M	**TEST 2 Ch 27-31** *Test questions are not on *sections unless specifically stated in class*	Study ch 27-31 Pre-class 26	Lab 9: Measuring the Speed of Light 11/3/15
11/4/15 W	The ray model of light, reflection; image formation by a plane mirror, formation of images by spherical mirrors	32.1-32.3 pre-class 27 MP ch 32	
11/6/15 F	Index of refraction, refraction and Snell's Law, visible spectrum and dispersion, total internal reflection, fiber optics, refraction at a spherical surface	32.4-32.8 pre-class 28 MP ch 32	
11/9/15 M	Thin lenses & ray tracing, thin lens equation & magnification, combination of lenses, lensmaker's equation	33.1-33.4 pre-class 29 MP ch 32 due MP ch 33	Lab 10: Lenses 11/10/15
11/11/15 W	Cameras, human eye &corrective lenses, magnifying glass, telescope, compound microscope, aberrations	33.5-33.10 pre-class 30 MP ch 33	
11/13/15 F	Waves vs particles, Huygen's principle & diffraction, Huygen's principle and the law of refraction, interference & Young's double-slit experiment, intensity in the double-slit interference pattern	34.1-34.4 pre-class 31 MP ch 33 due MP ch 34	
11/16/15 M	Interference in thin films, Michelson interferometer, luminous intensity	34.5-34.7 pre-class 32 MP ch 34	Lab 11: Interference 11/17/15

Date	Topics	Assignments	Labs (Tuesdays)
11/18/15 W	Diffraction by a single slit or disk, intensity in single-slit diffraction pattern, diffraction in the double-slit experiment	35.1-35.3 pre-class 33 MP ch 34 due MP ch 35	
11/20/15 F	Limits of resolution circular aperture, resolution of telescopes and microscopes – wavelength limit, resolution of human eye & magnification	35.4-35.6 pre-class 34 MP ch 35	
11/23/15 M	Diffraction grating, spectrometer and spectroscopy, peak widths and resolving power for a diffraction grating,	35.7-35.9 pre-class 35 MP Ch 35	No Lab Meeting
11/25/15 W	**NO CLASSES** **Thanksgiving Recess**		
11/27/15 F	**NO CLASSES** **Thanksgiving Recess**		
11/30/15 M	X-rays and X-ray diffraction, polarization, liquid crystal displays, scattering of light by the atmosphere	35.10-35.13 pre-class 36 MP ch 35	Lab 12: Polarization 12/1/15
12/2/15 W	Catch Up & Review Ch 32-35 *Test questions are not on *sections unless specifically stated in class*	Study ch 32-35 Pre-class 37 MP ch 35 due	
12/4/15 **F**	**TEST 3 ch 32-35** *Test questions are not on *sections unless specifically stated in class*	Study ch 32-35 Pre-class 38	
12/7/15 M	Course Review Ch 21-26	Review packet part 1 Pre-class 39 MP Review	No Lab Meeting
12/9/15 W	Course Review Ch 27-31	Review packet part 2 Pre-class 40 MP Review	
12/11/15 F	Course Review Ch 32-35 and more LAST CLASS	Review packet part 3 Pre-class 41	
12/16/15 **W**	**Final Exam** **10:30-1:00 PM**		
	Grades turned in by Dec 27		