**PHY 141 -- University Physics I 4 Units Fall 2015**

**Professor**: Dr. Heide Doss
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**Office Hours:** T Th 11:30-1:00 PM, MWF 9:30-10:30 (RS 209), or by appointment

**Regular meeting times Sep 1, 2015 – Dec 11, 2014**
**Lecture:** MWF 10:55 am – 12:05 pm (LA 101)
**Labs:**
Section 1: M 2:45 – 4:35 (RS 213) Dr. Schmelzenbach (Dr. S)
Section 2: T 10:00 – 11:55 (RS 213) Dr. Schmelzenbach (Dr. S)
Section 3: Th 10:00 – 11:55 (RS 213) Dr. Schmelzenbach (Dr. S)
**Final Exam: Monday, Dec 14 10:30 AM to 1:00 PM**

**Textbook:** Physics by Douglas Giancoli, 7th edition, Prentice Hall 2014
Access to Mastering Physics, Course ID: MPDOSS68308, Course Name: PHY 141 Fall 2015

**Course Description:** General Physics I is the first part of a one-year introductory course designed for the student with a moderate mathematical background. The main topics covered in this semester include: kinematics (motion of objects), dynamics (force, momentum), work and energy, statics, fluids, waves, sound, and thermodynamics.

**Student Learning Outcomes:** In this course there are a number of specific goals for you to meet from each chapter. These smaller goals 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; and
6. gather and interpret data in a lab setting.

**Labs:** Weekly lab meetings will provide you the opportunity for hands-on experience of topics from class meetings, improve lab technique, and data analysis. Labs will be preformed in small groups, but each individual is responsible for submitting their own results. Labs are due at the end of the lab period. Labs are worth 20% of your overall grade with the additional requirement that *you must pass the lab portion of the class to pass the class*.

**Pre-class Assignments:** Reading and pre-class questions are due by 9:30 AM, except for the first class. The pre-class questions are in Mastering Physics at www.masteringphysics.com. These usually consist of 3 items (questions and simple problems) based on the reading assignment. Late submissions will not be accepted. Pre-class assignments are 5% 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. The end-of-chapter problems are 15% of your overall grade and are due by 9:30 AM on the due date listed in the syllabus. Points earned during class and class projects that might come up during the semester will also be included in the homework grade.

**Tests:** There will be five in-class tests during the semester (each worth 9% of your overall grade) and one comprehensive final exam (worth 15% of your overall grade). Partial credit for non-multiple choice problems 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, Monday December 14, 2014, 10:30 AM – 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 | 5% |
| Homework | 15% |
| Lab | 20% |
| Tests (5) | 45% (equally weighted) |
| Final Exam | 15% |

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. Some activities through this course occur only during class time and cannot be made-up. Let me know in advance if you must miss class. Attendance is one factor used in determining borderline grades. If absences become excessive, you will be required to meet with me and the situation will be dealt with on a case-by-case basis.

**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 (M, T, Th)** |
|---|---|---|---|
| 9/1/15<br>T =<br>**Monday schedule** | The nature of science, physics and its relationship to other fields, models, theories, and laws, measurement and uncertainty, significant figures | 1.1-1.4<br>pre-class 1 due 9/2/14<br>MP ch 1<br>HW Intro to Mastering Physics due 9/5 | M Lab 1 (9/1/15): Measurements and Estimation |
| 9/2/15<br>W | Units, standards, SI system, converting units, order of magnitude, estimating, dimensions and dimensional analysis. Reference Frames and Displacement, average velocity, instantaneous velocity | 1.5-1.8, 2.1-2.3<br>pre-class1 & 2 due<br>MP ch 1<br>MP ch 2 | Th Lab 1 (9/3/15): Measurements and Estimation |
| 9/4/15<br>F | Acceleration, motion at constant acceleration, solving problems, freely falling objects | 2.4-2.7<br>pre-class 3 due<br>MP ch 1 due<br>MP ch 2 | |
| 9/7/15<br>M | **NO CLASSES – LABOR DAY** | HW Intro to Mastering Physics due 9/5 | T Lab 1 (9/8/15): Measurements & Estimation |
| 9/9/15<br>W | Graphical analysis of linear motion. Vectors and scalars, addition of vectors, graphical methods, subtraction of vectors, and multiplication of a vector by a scalar, adding vectors by components | 2.8, 3.1-4<br>pre-class 4 due<br>MP ch 2 due<br>MP ch 3 | Th Lab 2 (9/10/15): Introduction to Motion |
| 9/11/15<br>F | Projectile motion, solving projectile motion problems, projectile motion is parabolic, relative velocity. | 3.5-3.8<br>pre-class 5 due<br>MP ch 3 | |
| 9/14/15<br>M | Force, Newton's first law of motion, mass.<br>Test 1 Review Chapters 1-3. | 4.1-4.3<br>pre-class 6 due<br>MP ch 3 due<br>STUDY FOR TEST 1 | M,T Lab 2: Introduction to Motion |
| 9/16/15<br>W | **TEST 1 Chapters 1, 2, 3** | pre-class 7 due<br>MP 4 | Th: Lab 3: Freefall and Intro to Vectors |
| 9/18/15<br>F | Newton's second law, Newton's third law, force of gravity, normal force, solving problems, free body diagrams | 4.4-4.7<br>pre-class 8 due<br>MP ch 4 | |
| 9/21/15<br>M | Problems involving friction and inclines.<br>Uniform circular motion, banked and unbanked curves, nonuniform circular motion. | 4.8, 5.1-5.4<br>pre-class 9 due<br>MP ch 4<br>MP ch 5 | M, T Lab 3: Freefall and Intro to Vectors |
| 9/23/15<br>W | Newton's law of universal gravitation, gravity near Earth's surface, satellites, weightlessness, planets, Kepler's laws, Newton's synthesis | 5.5-5.8<br>pre-class 10 due<br>MP ch 4 due<br>MP Ch 5 | Th Lab 4: Basic Forces |

| Date | Topics | Assignments | Labs (M, T, Th) |
|---|---|---|---|
| 9/25/15<br>F | Moon rises, types of forces in nature<br><br>Work done by constant and varying force | 5.9-5.10, 6.1-6.2<br>pre-class 11 due<br>MP ch 5<br>MP ch 6 | |
| 9/28/15<br>M | KE and the work energy principle, potential energy, conservative and nonconservative forces, mechanical energy and its conservation, problem solving using conservation of mechanical energy | 6.3-6.7<br>Pre-class 12 due<br>MP ch 5 due<br>MP ch 6 | M, T Lab 4: Basic Forces |
| 9/30/15<br>W | Other forms of energy and energy transformations; the law of conservation of energy, energy conservation with dissipative forces: solving problems. Review | 6.8-6.10<br>pre-class 13 due<br>MP ch 6<br>STUDY for test 2 | Th Lab 5: Circular Motion |
| 10/2/15<br>F | Review Chapters 4, 5, 6 | pre-class 14 due<br>MP ch 6 due<br>STUDY for test 2 | |
| **10/5/15<br>M** | **Test 2 Chapters 4, 5, 6** | pre-class 15 due<br>MP Ch 7 | M, T Lab 5: Circular Motion |
| 10/7/15<br>W | Momentum and its relation to force, conservation of momentum, collisions and impulse, conservation of energy and momentum in collisions | 7.1-7.4<br>pre-class 16 due<br>MP ch 7 | Th Lab 6: Energy |
| 10/9/15<br>F | Elastic collisions in 1D, inelastic collisions, collisions in 2D, center of mass, center of mass for humans, cm and translational motion | 7.5-7.10<br>pre-class 17 due<br>MP ch 7 | |
| 10/12/15<br>M | Angular quantities, constant angular acceleration, rolling motion (no slipping) | 8.1-8.3<br>pre-class 18 due<br>MP ch 7 due<br>MP ch 8 | M, T Lab 6: Energy |
| 10/14/15<br>W | Torque, rotational dynamics; torque and rotational inertia, solving problems in rotational dynamics | 8.4-8.6<br>pre-class 19 due<br>MP ch 8 | Th Lab 7: Momentum |
| 10/16/15<br>F | Rotational KE, angular momentum and its conservation, vector nature of angular quantities | 8.7-8.9<br>pre-class 20 due<br>MP ch 8 | |
| 10/19/15<br>M | Equilibrium, statics, muscles and joints, stability and balance | 9.1-9.4<br>pre-class 21 due<br>MP ch 8 due<br>MP ch 9 | M, T Lab 7: Momentum |

| Date | Topics | Assignments | Labs (M, T, Th) |
|---|---|---|---|
| 10/21/15<br>W | Elasticity; stress & strain, fracture, spanning a space: arches and domes | 9.5-9.7<br>pre-class 22 due<br>MP ch 9<br>STUDY | Th Lab 8: Rotation |
| 10/23/15<br>F | **Fall Break Day, No Classes** | MP ch 9<br>STUDY | |
| 10/26/15<br>M | REVIEW 7, 8, 9 | pre-class 23 due<br>MP ch 9 due<br>STUDY | M, T Lab 8: Rotation |
| 10/28/15<br>W | **TEST 3 CH 7, 8, 9** | pre-class 24 due<br>CH 10 | Th Lab 9: Equilibrium |
| 10/30/15<br>F | Phases of matter, density and specific gravity, pressure in fluids, atmospheric pressure and gauge pressure, Pascal's principle | 10.1-10.5<br>pre-class 25 due<br>MP ch 10 | |
| 11/2/15<br>M | Measurement of pressure, buoyancy and Archimedes' principle, fluids in motion; equation of continuity, Bernoulli's equation, applications of Bernoulli's equation | 10.6 – 10.10<br>pre-class 26<br>MP ch 10 | M, T Lab 9: Equilibrium |
| 11/4/15<br>W | Viscosity, flow in tubes, blood flow, surface tension, capillarity, pumps and heart | 10.11 – 10.14<br>pre-class 27<br>MP ch 10 | Th Lab 10: Buoyancy and Fluids |
| 11/6/15<br>F | Simple harmonic motion, energy, period, sinusoidal nature, simple pendulum, damped harmonic motion, forced oscillations and resonance | 11.1-11.6<br>pre-class 28<br>MP ch 10 due<br>MP ch 11 | (Last day to drop classes) |
| 11/9/15<br>M | Wave motion, types of waves, reflection and transmission, interference and superposition principle, standing waves resonance | 11.7-11.12<br>pre-class 29<br>MP ch 11 | M, T Lab 10: Buoyancy and Fluids |
| 11/11/15<br>W | Characteristics of sound, intensity of sound, the ear, sources of sound, quality of sound, noise, superposition | 12.1-12.5<br>pre-class 30<br>MP ch 11 due<br>MP ch 12 | Th Lab 11: Simple Harmonic Oscillator |
| 11/13/15<br>F | Interference, beats, Doppler effect, Shock waves, sonic booms, applications<br>REVIEW | 12.6-12.9<br>pre-class 31<br>MP ch 12<br>STUDY | |
| **11/16/15<br>M** | **TEST 4 CH 10, 11, 12** | pre-class 32<br>MP ch 12 due | M, T Lab 11: Simple Harmonic Oscillator |
| 11/18/15<br>W | Atomic theory of matter, temperature, thermometers, thermal equilibrium, Zeroth law, thermal expansion, gas law, absolute temperature | 13.1-13.5<br>pre-class 33<br>MP ch 13 | Th Lab 12: Straw Music |

| Date | Topics | Assignments | Labs (M, T, Th) |
|---|---|---|---|
| 11/20/15<br>F | Ideal gas law, problems with ideal gas law, Avogadro's number & ideal gas law, kinetic theory and molecular interpretation of temperature, distribution of molecular speeds | 13.6-13.10<br>pre-class 34<br>MP ch 13 | |
| 11/23/15<br>M | Real gases and changes of phase, vapor pressure and humidity, diffusion.<br>Heat as energy transfer, internal energy | 13.11-13.13, 14.1-14.2<br>pre-class 35<br>**MP ch 13 due on 11/25**<br>MP ch 14 | M, T Lab 12: Straw Music. |
| 11/25/15<br>W | **No Classes Thanksgiving recess** | | |
| 11/27/15<br>F | **No Classes Thanksgiving recess** | | |
| 11/30/15<br>M | Specific heat, calorimetry, latent heat, heat transfer: conduction, convection, radiation | 14.3-14.8<br>pre-class 36<br>MP ch 14 | M, T, Th Lab 13: Ideal Gas Law M and T,<br><br>Distribute Lab 14 which is due at the start of class 12/7/15 at 10:55 AM |
| 12/2/15<br>W | First law of thermodynamics, thermodynamic processes and first law, human metabolism and first law | 15.1- 15.3<br>pre-class 37<br>MP ch 14 due<br>MP ch 15 | |
| 12/4/15<br>F | Second law of thermodynamics, heat engines, refrigerators, entropy and second law, order to disorder | 15.4-15.8<br>pre-class 38<br>MP ch 15 | |
| 12/7/15<br>M | Unavailable energy and heat death, statistical interpretation of entropy and 2nd law, thermal pollution, global warming, energy resources<br>REVIEW for test 4B | 15.9-15.11<br>pre-class 39<br>MP ch 15<br>STUDY | Lab 14: Thermo Due at the start of class 12/7/15 |
| 12/9/15<br>W | **TEST 5 CH 13, 14, 15** | pre-class 40<br>MP ch 15 due<br>STUDY | |
| 12/11/15<br>F | Review for final | pre-class 41<br>**STUDY for final** | |
| **12/14/14<br>M** | **FINAL EXAM 10:30 am - 1:00 pm** | | |
| | Grades turned in by Dec 27 | | |