# Physics I (PHY 170-01)

Spring 2017

**DESCRIPTION:**

This first semester calculus based physics course, is an introduction to the mathematical modeling and analysis of phenomena from mechanics, kinetic theory, waves, heat, and thermodynamics. A laboratory component of the course provides hands-on experience of the phenomena under study, introduces basic measurement techniques, and introduces error-analysis. *Note: this is also a science general education course in the sciences (see statement below).*

**PREREQUISITES:**

MAT161 (Calculus I)

**MEETING TIME AND PLACE:**

| Course Section | Meeting Time | Location |
|---|---|---|
| 170-01 (lecture)<br>(recitation) | M/W/F 11:00-11:50 am<br>Th 2:00-2:55 pm | Merion 112 |

**INSTRUCTOR CONTACT INFORMATION:**

Dr. Shawn H. Pfeil
e-mail: spfeil@wcupa.edu (please include section number on subject line)
phone: (610) 430-4084
office: Schmucker Science South 229 (2nd floor of the "chemistry building")

**Office Hours:**

| Monday | Tuesday | Thursday | Friday |
|---|---|---|---|
| 3-4 pm | 9 am-10 am | 9 am – 11 am | 2-3 pm |

My scheduled office hours as of the first day of class are listed below. I reserve the right to adjust this schedule to reflect unforeseen circumstances. Please note homework assignments are **due (mostly) on Fridays at 5 pm**. ***Office hours are available by appointment for students with an ongoing conflict with my scheduled hours.***

**REQUIRED COURSE MATERIALS:**

- *Fundamentals of Physics (10th edition),* **by Halliday, Resnick, and Walker** (John Wiley & Sons), Volume 1 (Ch. 1-20). *Note you will need volume 2 for PHY 180, so you probably want to get the combined version.*
- You will need a copy of the text (electronic or print) that comes with a Wiley-Plus access code.
- Laboratory notebook (see lab syllabus).
- *Introduction to Error* Analysis (2nd edition), **by John R. Taylor**
- PHY 170 lab manual

**COURSE OBJECTIVES:**

This is both a science general education course, a service course for allied majors, and the introductory physics sequence for majors. The course satisfies a number of overlapping goals.

**As a course for majors** PHY 170 addresses the following physics program student learning outcomes:

**A. Knowledge and understanding of the concepts and principles of physics:** The particular concepts and principles of physics we aim to understand in this course are:

- **a.** Understanding kinematics sufficiently to solve 2D projectile motion problems.
- **b.** Understanding circular motion.
- **c.** Understanding the application of Newton's laws to translational motion.
- **d.** Conservation of Energy for Translational Motion
- **e.** Conservation of energy for rotational motion.
- **f.** Conservation of momentum for rotational motion.
- **g.** Understanding simple harmonic motion.
- **h.** Understanding how simple harmonic motion naturally arises in systems with a stable equilibrium position.
- **i.** Movement and superposition of harmonic waves (with applications to sound.)
- **j.** The $0^{th}$, $1^{st}$, and $2^{nd}$ laws of thermodynamics.
- **k.** Kinetic Theory

**B. Research skills:** This student learning objective is met in the laboratory portion of the course. Please see the lab syllabus for details.

**C. Effective Communicators:** Two types of communication are worked on in this course.

- **a.** Written communication through the specialized media of problem set solutions.

*Achievements of the program learning outcomes are assessed through exams and problem sets.*

**As an approved general education course in the sciences** (see pg. 39 of the undergraduate catalog) PHY 170 satisfies the following general education student learning outcomes.

***General Education Goal #2: Ability to employ quantitative concepts and mathematical methods.*** **(Secondary Goal of Science General Education Courses)**

Students will apply quantitative and mathematical methods to solve problems from introductory mechanics and thermodynamics.

*Virtually every topic discussed in the class will have a quantitative aspect that will require algebraic reasoning. These methods will be employed during class examples, midterm exams, and laboratory sessions.*

***General Education Goal #3: Ability to think critically and analytically.*** **(Primary Goal of Science General Education Courses)**

Students will analyze physical situations and identify what aspects are fundamental to physical modeling.

*Mechanics and thermodynamics, the primary subject matter of this course, involve the complex interplay of such concepts as force, momentum, and potential energy. Critical and analytical thinking are essential for applying these concepts to efficiently solve homework and exam problems. One of the many examples might be making assumptions and inferences necessary to analyze the collision of a projectile with a hanging block.*

**TIME COMMITMENT AND WORK FLOW:**

The life of a college student is not easy. A full time student can expect to spend about 50+ hours per week on coursework. The typical PHY 170 student needs to commit ~13-14 hours/week to this course to excel.

| Activity | Time Commitment |
|---|---|
| Reading Prior to Class | 3 hrs/week |
| Class | 3.5 hrs/week |
| Homework and Post-Lecture Study | 4 hrs/week |
| Reading Prior to Lab | 0.25 hrs/ week |
| In Lab Time | 2 hrs/week |
| Post Lab Write-Up | 1 hrs/week |
| | |
| Total Time Spent | 13.75 hrs/week |

**ASSESSMENT:**

Due to the large amount of material covered, we are taking the approach of frequent lower stakes assessments.

- **Quizzes** (50%, 6 kept at 8.33% each): We will have 7 quizzes over the course of the semester. Quizzes will be given during recitation (with the exception of the last quiz.) **I will drop your lowest quiz score**. **No makeup quizzes will be given except for University Sanctioned events.**

  ***Policies:***

  **Makeup Quizzes:** If you miss a quiz for a *University Sanctioned Event (see below)* I will work with you to schedule a make-up quiz. However, to receive this accommodation you must inform me in advance so that it may be planned.

  **OSD letters:** If you need a reasonable accommodation, as discussed below, it is your responsibility to present me with an OSD letter as early as possible in the semester. It is also your responsibility to **make appropriate arrangements for alternative testing at least one week in advance.**

- **Laboratory** (15%): Please see laboratory syllabus for details.
- **Homework** (10%): Homework will be assigned on WileyPlus. It is your responsibility to check for it and complete it in a timely manner. ***You should try to complete the problems assigned with each lecture before the next lecture.***
- **Final Exam** (25%): We have a cumulative final exam. You must take the final. No exceptions.The dates and times of the final exams for this course (as set by the registrar) are listed below. **You should plan to be available for the entire finals week.** We have in past semesters had to reschedule finals due to weather related events. *Our final is currently scheduled for* ***Monday 5/8/2017 from 10:30 am-12:30 pm.***

***Grading:***

I will be using the official WCU scale for grades, see p.48 in the undergraduate catalog. However, I reserve the right to adjust the weights of individual components, or the scale to account for unforeseen circumstances.

In terms of the WCU standard and the courses point system grades are as follows. Please note that the scale has a one percentage point gap between letter grades. I will round your final score to the closest percentage.

| Letter | Grade Points | Percentage | |
|---|---|---|---|
| **A** | 4.000 | 93 - 100 | Excellent |
| **A-** | 3.670 | 90 - 92 | |
| **B+** | 3.330 | 87 - 89 | Superior |
| **B** | 3.000 | 83 - 86 | |
| **B-** | 2.670 | 80 - 82 | |
| **C+** | 2.330 | 77 - 79 | Average |
| **C** | 2.000 | 73 - 76 | |
| **C-** | 1.670 | 70 - 72 | |
| **D+** | 1.330 | 67 - 69 | Below Average |
| **D** | 1.000 | 63 - 66 | |
| **D-** | 0.670 | 60 - 62 | |
| **F** | 0.000 | 59 or lower | Failure |

We will be using the D2L grade-book feature to post course grades. Please check it periodically.

**ELECTRONIC DEVICE POLICY:**

The pace of the course is such that your undivided attention will be required for the entire lecture and lab period. Please set all electronics to silent or "vibrate mode" and put them away. Both you and your neighbors will be able to concentrate on the material at hand. ***If you plan on recording any lecture please see the intellectual property statement.***

**D2L/WILEYPLUS:**

We will be using two online platforms for this course WileyPlus, the publisher's homework system, and D2L. Homework assignments are to be performed on WileyPlus. To allow for *structured note taking* I will post my lecture slides prior to class. These slides intentionally leave some information, such as example solutions out, and provide space to fill that material in during lecture. **It is your responsibility to check these resources periodically for any updates and announcements. You may want to set D2L to notify you when new content is posted.**

The WileyPlus Course ID for our section is **555550**

**ATTENDANCE POLICY:**

Attendance is taken is taken for this course. Attending lecture, while highly correlated with success in this course is not graded.

**INTELLECTUAL PROPERTY STATEMENT:**

I, the instructor, utilize copyrighted materials under the "Freedom and Innovation Revitalizing the United States Entrepreneurship Act of 2007" (Fair Use Act). Apart from such copyrighted materials, all other intellectual property associated with this course is owned and copyrighted by the instructor, including, but not limited to, lectures, course discussions, course notes, slides, assessment instruments such as exams, and supplementary materials posted or provided to students authored by the instructor. No recording, copying, storage in a retrieval system, or dissemination in any form by any means of the intellectual property of the instructor, in whole or in part, is permitted without prior written permission of the instructor. When such permission is granted, it must specify the utilization of the intellectual property and all such permissions and waivers shall terminate on the last day of finals of the semester in which this course is held.

**ACADEMIC & PERSONAL INTEGRITY**

It is the responsibility of each student to adhere to the university's standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another's work and/or using ideas of another and presenting them as one's own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Undergraduate Handbook, the Undergraduate Catalog, the *Ram's Eye View*, and the University website at www.wcupa.edu.

**STUDENTS WITH DISABILITIES**

If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University's Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. The OSSD hours of Operation are Monday – Friday, 8:30 a.m. – 4:30 p.m. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is ossd@wcupa.edu, and their website is at www.wcupa.edu/ussss/ossd.

**EXCUSED ABSENCES POLICY FOR UNIVERSITY-SANCTIONED EVENTS**

Students are advised to carefully read and comply with the excused absences policy for university-sanctioned events contained in the WCU Undergraduate Catalog. In particular, please note that the "responsibility for meeting academic requirements rests with the student," that this policy does not excuse students from completing required academic work, and that professors can require a "fair alternative" to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

**REPORTING INCIDENTS OF SEXUAL VIOLENCE**

West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator, Ms. Lynn Klingensmith. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University protection of minors policy. Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at the webpage for the Office of Social Equity at http://www.wcupa.edu/_admin/social.equity/.

**EMERGENCY PREPAREDNESS**

All students are encouraged to sign up for the University's free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

**ELECTRONIC MAIL POLICY**

It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.

**ALL OTHER ACADEMIC POLICIES**

For any university wide academic policy not explicitly covered in this document, such as No Grade policies. Please consult your major advising handbook, the Undergraduate Catalog, the Ram's Eye View, or the University Website.

**COURSE SCHEDULE:** (next 2 pages): A tentative schedule for the course follows. Although I will endeavor to stick closely to the schedule as posted below, I reserve the right to modify it as needed over the course of the semester.

| Date (mm/dd) | Day | # | Topic | HW | Reading | LAB |
|---|---|---|---|---|---|---|
| 01/23 | M | 1 | Introduction to Modeling, Units | | 1.1-1.3 | |
| 01/25 | W | 2 | Position, Displacement, Velocity | | 2.1-2.3 | **Estimating Uncertainties** |
| 01/26 | R | R1 | *Homework #1 Problems* | | | |
| 01/27 | F | 3 | Constant Acceleration | | 2.4-2.6 | |
| 01/30 | M | 4 | Vectors (A review) | | 3.1-3.2 | |
| 02/01 | W | 5 | Kinematics in 2D | | 4.1-4.3 | **Tutorial #1** |
| 02/02 | R | R2 | *Homework #1 Problems* | | | |
| 02/03 | F | 6 | Projectile Motion & Uniform Circular Motion | 1 Due | 4.4-4.5 | |
| 02/06 | M | 7 | Relative Motion in 1D and 2D | | 4.6-4.7 | |
| 02//08 | W | 8 | Force I- Newton's 1st and 2nd laws | | 5.1-5.2 | |
| 02/09 | R | R3 | ***Quiz 1*** | | | **Measuring Acceleration** |
| 02/10 | F | 9 | Force I- Newton's 3rd law | | 5.3 | |
| 02/13 | M | 10 | Force II | | 6.1-6.3 | |
| 02/15 | W | 11 | Kinetic Energy and Work | | 7.1-7.3, 3.3 | **Free-Fall: A Case of Constant** |
| 02/16 | R | R4 | *Homework #2 Problems* | | | |
| 02/17 | F | 12 | Kinetic Energy, Work, and Power | 2 Due | 7.4-7.6 | |
| 02/20 | M | 13 | Work and Potential Energy | | 8.1-8.2 | |
| 02/22 | W | 14 | Work and Potential Energy | | 8.3-8.4 | |
| 02/23 | R | R5 | ***Quiz* 2** | | | **Tutorial** |
| 02/24 | F | **14** | Conservation of Energy | | 8.5 | |
| 02/27 | M | 15 | Center of Mass and Momentum | | 9.1-9.3 | |
| 03/01 | W | 16 | Collisions, Impulse, Cons. of Momentum | | 9.4-9.6 | **Acceleration Free-Fall: Projectile Motion** |
| 03/02 | R | R5 | *Homework #3 Problems* | | | |
| 03/03 | F | 17 | Elastic Collisions, Rocket Motion | 3 Due | 9.7-9.9 | |
| 03/06 | M | 18 | Rotation | | 10.1-10.4 | |
| 03/08 | W | 19 | Moment of Inertia and Torque | | 10.5-10.6 | **Labs meet for Quiz.** |
| 03/09 | R | R6 | ***Quiz 3*** | | | |
| 03/10 | F | 21 | The second law for Rotation | | 10.7-10.8 | |
| 03/13 | M | | **SPRING BREAK** | | | |
| 03/15 | W | | **SPRING BREAK** | | | **NO LAB** |
| 03/17 | F | | **SPRING BREAK** | | | |
| 03/20 | M | 22 | Rolling | | 11.1-11.3, 3.3 | |
| 03/22 | W | 23 | Angular Momentum | | 11.4-11.6 | **Coefficient of Friction on** |
| 03/23 | R | R7 | *Homework #4 Problems* | | | **an Inclined Plane** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 03/24 | F | 24 | Angular Momentum Conservation | 4 Due | 11.7-11.9 | |
| 03/27 | M | 25 | Equilibrium and Elasticity | | 12.1-12.3 | |
| 03/29 | W | 26 | Gravitation | | 13.1-13.5 | **Conservation of** |
| 03/30 | R | R8 | ***Quiz 4*** | | | **Momentum** |
| 03/31 | F | 27 | Gravitation | | 13.6-13.7 | |
| 04/03 | M | 27 | Fluids I | | 14.1-14.4 | |
| 04/05 | W | 28 | Fluids II | | 14.5-14.7 | **Biomechanic** |
| 04/06 | R | R8 | *Homework #5 Problems* | | | |
| 04/07 | F | 29 | Oscillations I | 5 Due | 15.1-15.3 | |
| 04/10 | M | 30 | Oscillations II | | 15.4-15.6 | |
| 04/12 | W | 31 | Waves I | | 16.1-16.3 | **Tutorial** |
| 04/13 | R | R9 | ***Quiz 5*** | | | |
| 04/14 | F | 32 | Waves I | | 16.5-16.7 | |
| 04/17 | M | 33 | Waves II | | 17.1-17.3 | |
| 04/19 | W | 34 | Waves II | | 17.4-17.7 | **Spring Mass Osc** |
| 04/20 | R | R9 | *Homework #6 Problems* | | | |
| 04/21 | F | 35 | Heat | 6 Due | 18.1-18.4 | |
| 04/24 | M | 36 | 1st Law of Thermodynamics | | 18.5-18.6 | |
| 04/26 | W | 37 | Kinetic Theory | | 19.1-19.5 | |
| 04/27 | R | R9 | ***Quiz 6*** | | | **Standing Wav** |
| 04/28 | F | 38 | Kinetic Theory II | | 19.6-19.8 | |
| 05/01 | M | 39 | Entropy and the 2nd Law | | 20.1-20.4 | |
| 05/03 | W | 40 | Snow Makeup Day/ Rview | | | **Uncertainty Analy** |
| 05/04 | R | R10 | *Homework #7 Problems* | 7 Due | | |
| 05/05 | F | | ***Quiz 7*** | | | |