Basic Physics for Science and Engineering I
PHYS 0174, Fall 2018

Instructor:	Dr. David Nero
Office:	221B Allen Hall
Office Hours:	Wednesday 1:30–3:00pm and 5:00-6:30pm Other times by appointment.
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Class Website:	CourseWeb (courseweb.pitt.edu)
Textbook:	*Fundamentals of Physics, 11th edition* by Halliday, Resnick, and Walker (Other recent editions are also usable.)
Homework:	Sapling Learning (linked to from CourseWeb) Cost is $38.

Course Description

Physics 0174 is the first term of a two-term calculus-based introductory lecture-demonstration sequence in physics primarily for students intending to major in a field of science or engineering. Calculus is used as needed, and should be taken at least concurrently. This course fulfills one Dietrich School of Arts and Sciences Natural Science General Education Requirement

Topics covered in Physics 0174 include: kinematics, Newton's laws of motion, work, kinetic and potential energy, conservation of energy, linear momentum, conservation of linear momentum, rotational kinematics and dynamics, rigid body motion, conservation of angular momentum, gravitation, simple harmonic motion, and waves.

Credit will not be given for both the Physics 0174/0175 sequence and the Physics 0110/0111 sequence. Students intending to major in physics are recommended to take Physics 0475/0476, the honors introductory sequence. The laboratory course associated with Physics 0174/0175, Physics 0219, should be taken *after* Physics 0174.

This section will be held in a flipped format. Students will be expected to spend approximately two hours each week watching recorded lectures on CourseWeb. The other two hours each week will be spent in the classroom with a focus on problem solving and conceptual understanding of demonstrations.

Course Learning Objectives

- Demonstrate conceptual understanding of the concepts, principles and laws of physics covered in this course, as listed in the course description.
- Describe a physical situation, as necessary, using multiple representations such as written conceptual statements, mathematical equations, diagrams, and graphs, and be able to translate from one representation to another.
- Perform a conceptual analysis of a problem and identify physical principles required for its solution.
- Translate physical principles to formulate necessary mathematical statements required to solve a problem.
- Apply mathematical concepts and methods such as algebra, differentiation, integration, trigonometry, and vector analysis as necessary to analyze and solve problems.

Requirements

1. **Cell phones and all other electronic devices must be silenced.** In addition, students are expected to refrain from excessive electronic communication during class. Laptops, tablets, and smart phones may be used for note taking or reference purposes. Watching videos, playing games, and/or browsing the Internet is not appropriate during lecture.

2. **Be courteous to your neighbors.** Carrying on a conversation, habitually coming in late or leaving early, or misusing technology (as detailed above), are all disruptive to the class. Students who fail to show common courtesy will be asked to leave the classroom.

Policies

Attendance Policy: Attendance will be recorded, but not graded.

Missed Assignments/Exams: By default, missed assignments (including exams) earn a zero grade. The one exception is that homework will be accepted late at a 20% penalty per day.

If you are aware of an impending conflict with the scheduled time of an exam or other in-class assignment, you should let me know as early in the semester as possible. In these cases, accommodations will be provided as long as the circumstances are reasonable and you can provide appropriate documentation. In cases where prior arrangements have not been made, missed exams can only be made up in cases of **documented emergency**, and only if you contact me within **48 hours** of the missed exam.

Academic Integrity: All students are expected to adhere to the standards of academic integrity. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty will be subject to disciplinary action. Any student suspected of violating this obligation for any reason during the semester will be subject to the process outlined in the University Guidelines on Academic Integrity (http://www.cfo.pitt.edu/policies/policy/02/02-03-02.html).

Disability Services: If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and Disability Resources and Services no later than the second week of the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. To notify Disability Resources and Services, call (412) 648-7890 (Voice or TTD) to schedule an appointment. The Disability Resources and Services office is located in 140 William Pitt Union on the Oakland campus.

Statement on Classroom Recording: To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Grade Scale

In order to keep grading consistent between different sections and instructors, grades will be curved up if needed (but never down). If you achieve the following final grade percentages in the course, you will receive at least:

Percentage	Minimum Grade
90%	A-
80%	B-
70%	C-
60%	D-

Grade bins will not necessarily remain the same size as each other. Regardless of the scale, only the top few students will have the potential to earn an A+. At the other extreme, no score below 50% will pass. Although the final grade bins will not be fixed until the end of the course, an estimate of your letter grade will be maintained on CourseWeb, with updates occurring after each exam.

Grading

		%	Points
13	Homework	12.8%	128 (5–13 ea.)
24	Concept Quizzes (lowest dropped)	9.2%	92 (4 ea.)
11	Recitation Quizzes (lowest dropped)	8%	80 (8 ea.)
3	Midterm Exams	45%	450 (150 ea.)
1	Final Exam	25%	250
	Total:	**100%**	**1000**

Online Homework

Homework will be posted on the online homework system Sapling Learning. You will be prompted to create an account when you first access the homework. The cost is $38, but you will have the option to begin a free trial for the first two weeks of the course. Unlike other assignments, homework may be completed late for reduced credit (20% penalty per day).

Online Concept Quizzes

In addition to homework problems, Sapling Learning will be used to administer short concept quizzes. The purpose of these quizzes is twofold: 1) They will verify that you are keeping up with the assigned reading and lecture videos. 2) They will provide immediate feedback that I will use to adjust the content of the class. You may treat these quizzes as open book/notes. That said, they are not meant to be difficult—in my opinion, the questions are easier that what I will put on the exams (homework and textbook questions are a much better gauge of exam difficulty). Visit Sapling Learning for a list of specific due dates. Late concept quizzes are not accepted. Instead, your lowest grade is dropped.

Clicker Questions (ungraded)

Several times during each class, I will pose clicker questions. Clicker questions are multiple choice and will be answered by pressing a key on a hand-held radio transmitter or "clicker." You are encouraged to discuss your answer with your neighbor while answering. These questions are not graded, although your participation will be used to record attendance.

Clickers: The lecture hall is equipped with set of clickers for student use. At the beginning of each class, you are to pick up your assigned clicker from the bins at the front of the room. Likewise, you are to return your clicker to the bins at the end of class, since other students in other classes will use the same clicker. Under no circumstances are you to remove the clicker from the classroom or to take a clicker other than the one assigned to you. If your clicker is missing or malfunctioning, then you need to let me know before you leave. Clickers will be checked after each class, and students will be held responsible for replacement costs if their assigned clicker goes missing.

Weekly Recitation Quiz

At the end of most recitations, a short multiple-choice quiz will be administered, with the purpose of providing frequent feedback of your understanding. These quizzes will be open book/notes, and may be completed in groups. If you find that you are frequently relying on group members during these quizzes, you will likely have significant trouble with the exams. Make sure to correct that situation before exam time!

Exams

There will be three midterm exams, each covering about four chapters, and a cumulative final exam. Each of the midterm exams will be all short-calculation questions. The final exam will be all multiple choice. All exams are closed book/notes, but students may prepare a double-sided page of notes for reference. Stand-alone calculators are permitted (no cell phones), but only for calculations—not as a place to store information. Students may not share any materials during exams, including calculators and erasers.

Extra Credit Opportunities

Online Participation (up to +20 points)

We will be using Piazza for online question-and-answer. Follow the instructions on CourseWeb to sign up for a free account. You can then easily comment on each lecture video, with much richer discussion than platforms like YouTube allow. I will use these comments to adjust the content of the class. You will be able to see the comments that your classmates have made, and you are especially encouraged to reply to those comments. As an incentive, I will award +5 points each time we have an exam—including the final—to students who have maintained an average of one post per lecture (where a "post" is a question or answer). Those who spam low-content posts to inflate their average diminish the utility of online discussion, and so will be disqualified from earning this extra credit.

Student Feedback (once at +5 points)

Student feedback is important to me, so I would like to meet with small groups of students for this purpose. A feedback group will consist of six students, and will meet with me for 30 minutes at one of the times posted on CourseWeb in exchange for extra credit. If you wish to apply for one of these groups, sign up on CourseWeb. Groups will be filled on a first come, first served basis, so sign up soon. (These fill up very quickly!)

Surveys (two at +2.5 points each)

At the beginning and end of the semester, multiple choice surveys will be administered in place of recitation as a means to gauge the class's progress, and to compare the degree that learning objectives are reached as compared to other physics sections—both at Pitt, and at other institutions. Let me stress that the results of these surveys will not be used to determine your grade, although an honest attempt is required to earn the extra credit.

Helpful Resources

- Office hours. If you encounter difficulty in this course, the best thing to do is to visit me or one of the TAs at office hours as early in the semester as possible (see CourseWeb for an up-to-date list of office hours). Sadly, we won't be able to help much if you wait until the end of the semester before seeking help.
- Resource Room (304 OEH). The Resource Room is manned primarily by graduate teaching assistants (TAs) along with a few undergraduate teaching assistants (UTAs) throughout the Fall and Spring terms. The TAs and UTAs are available to assist you with your introductory physics and astronomy classes.
- UTA Help Room (108E OEH). Peer assistance is available from undergraduate teaching assistants (UTAs) in the UTA Help Room for the physics introductory courses.
- The Academic Resource Center (G1 Gardner Steel Conference Center—next to Thackeray Hall). ARC offers free hour long tutoring sessions for any student in this course. Hours are 9am–4pm, weekdays. If interested, please call (412) 648-7920 to make an appointment.

List of Topics

Lecture 00 - Introduction
Lecture 01 - Vector Addition
Lecture 02 - Vector Mult., 1-D Motion
Lecture 03 - Kinematics in 1-D and 2-D
Lecture 04 - Projectiles, Relative Motion
Lecture 05 - Newton's Laws
Lecture 06 - Free Body Diagrams
Lecture 07 - Friction
Lecture 08 - Drag Force, Circular Motion
Lecture 09 - Work-Kinetic Energy Theorem
Lecture 10 - Work, Potential Energy
Lecture 11 - Conservation of Energy
Lecture 12 - Center of Mass, Impulse
Lecture 13 - Conservation of Momentum
Lecture 14 - Rotation, Moment of Inertia
Lecture 15 - Torque, Static Equilibrium
Lecture 16 - Rolling
Lecture 17 - Conservation of Ang. Momentum
Lecture 18 - Force of Gravity
Lecture 19 - Gravitational Energy, Orbits
Lecture 20 - Elasticity, Oscillations
Lecture 21 - Springs, Damping, Resonance
Lecture 22 - Pendulums
Lecture 23 - Traveling Waves
Lecture 24 - Sound, Doppler Effect