Introduction to Physics for Science and Engineering I (Honors Physics 1)

PHYS 0475, Fall 2025

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Class Website:	Canvas (canvas.pitt.edu)
Textbook:	*Physics, 5th edition* (Inclusive Access)

Course Description

Physics 0475 is the first term of a two-term honors introductory lecture-demonstration sequence in physics primarily for students intending to major in a field of science or engineering. It is the honors version of Physics 0174. Familiarity with introductory calculus is essential. This course fulfills one Dietrich School of Arts and Sciences Natural Science General Education Requirement.

Topics covered in Physics 0475 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, waves, and special relativity. You will also learn how to write simple computer programs to solve numerical physics problems.

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 the mathematical statements required to solve a problem.
- Apply mathematical concepts and methods as necessary to analyze and solve problems.

Requirements

1. **Phones and all other electronic devices must be silenced.** Laptops, tablets, phones, etc. are welcome to be used for note taking or other academic 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: You will get the most out of this class if you actively participate. To that end, there will be graded assignments that require you to be present in class. I realize that some absences are unavoidable, so I will drop your six lowest days (two weeks worth) of regular in-class work, no questions asked. If there are reasonable circumstances causing you to miss more assignments than I drop, accommodations will be made on a case-by-case basis.

Electronic Communication: Students are expected to regularly check their pitt.edu email and to regularly sign on to Canvas. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of communications.

Statement on Classroom Recording: Lectures will be recorded for students to view later. Students may not distribute these recordings to anyone outside of the class, nor may they create their own recordings of the 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.

Academic Integrity: Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the Academic Integrity Guide for an overview of the topic. For hands-on practice, complete the Academic Integrity Modules.

Disability Services: If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Grade Scale

Grades may be curved up a percentage point or two, depending on average checkpoint scores. Grades will never be curved down. It is possible for everyone to earn an A, although grades of A+ are limited to the top few students. 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
65%	C-
55%	D-

Grading

Assignment	%	Notes
Top Hat Questions	10%	lowest 6 dropped
Homework	20%	
Checkpoints	60%	
Rube Goldberg Project	10%	

Top Hat Questions

During most classes, there will be several questions posed for you to answer using Top Hat. You can access Top Hat through Canvas or using their mobile app. The University is already paying for Top Hat, so you don't need to pay anything extra. Grading will be 80% credit for participation, and 20% credit for correctness. As detailed under "Attendance" above, your lowest six days are dropped.

Homework

Homework will be posted weekly, and is due at 11:59pm on Tuesdays. Solutions will be posted on Wednesdays so that you can check your work. Grading is based on completion (work showing a serious attempt) rather than correctness. Homework maybe submitted up to one week after the deadline at a 50% penalty.

Checkpoints

In place of exams, the bulk of your grade will come from 10 checkpoints. Each will consist of four related questions from the previous week's unit, with each question probing a different type of learning objective:

1. Retrieval. Examples: definitions, plug and chug problems, core concepts
2. Comprehension. Examples: graphs, sketches, conceptual problems
3. Analysis. Examples: multi-step problems, making predictions, identifying different cases
4. Knowledge Utilization. Examples: problems with multiple concepts, problems that require making assumptions, explaining conclusions

Your grade is based on the number of questions that are correct:

Number of Questions Correct	Score
0	0%
1	50%
2	70%
3	90%
4	100%

Answers that are correct up to a trivial error count as fully correct. An answer is marked wrong if it includes one or more non-trivial mistakes.

Each unit's checkpoint may be attempted two or three times (with new questions). The second attempt is offered one week after the first. Third attempts are offered during the last week of the class. Only your highest score counts, so there is no risk in trying again.

Stand-alone calculators are permitted (no apps), as is a single 3×5 index card of notes. Students may not share any materials, including calculators during the administration of a checkpoint.

Missed Checkpoints Checkpoints can be made up in cases of documented emergency (medical or personal), or if arrangements are made in advance (for sports, etc.). Otherwise, unexcused absences reduce the number of the attempts available to you.

Rube Goldberg Project

In the second-to-last week of class, you will design a single step for a class-wide Rube Goldberg machine. Although we don't have the time or equipment to build the machine in class, your plans must be detailed, and your understanding of the physics involved must be deep enough that construction of a working machine would be possible if it were ever attempted.

Recitation

Recitations will meet on Tuesday and Thursday. Tuesday recitation will be used for question-and-answer and practice. Checkpoints will be administered during the Thursday recitation. Up to two checkpoints will be available at a time (see the schedule on Canvas). You may divide your time between them however you like.

Extra Credit Opportunities

Typo Bounty (+1 point per homework)

If you find one or more mistakes in the homework solutions and show me why it's a mistake, you will earn 1 point extra credit on that assignment. (Only available until I post a correction.)

Surveys (+0.5% course grade)

At the beginning and end of the semester, surveys will be administered on behalf of the Physics department. The results of these surveys are used to help us improve Physics education.