

# University of Pennsylvania

School of Arts and Sciences  
Department of Physics and Astronomy

## Physics 0150/0140 – Fall 2024

for up-to-date Section 404 (Ashmanskas) info, please see  
<https://www.hep.upenn.edu/wja/0150/>

### Course Overview

This class provides all students with a solid foundation in physics, which they can build on in future classes in Science and Engineering. This class also equips students with quantitative problem-solving skills. Content includes classical laws of motion; interactions between particles; conservation laws and symmetry principles; particle and rigid body motion; gravitation, and simple harmonic motion. Four key techniques are Newton's Laws of Force, conservation of energy, conservation of momentum, and conservation of angular momentum. It is impressive that Classical Mechanics allows the prediction of the motion of baseballs, planets, wheels, springs, swings, and even violin strings. Critical thinking skills developed during this course are explanation, analysis, and evaluation. Students in PHYS 0150/0140 should already have taken [MATH 1400](#) or the equivalent or be taking it simultaneously with PHYS 0150.

### Textbook

The required textbook is **University Physics With Modern Physics**

Authors: H. Young, R. Freedman.

Publisher : PEARSON

ISBN 13 : 9780135159552

We will use Volume 1 of the 15<sup>th</sup> edition, but the 14<sup>th</sup> and 13<sup>th</sup> editions are fine too. Inexpensive copies of the 14<sup>th</sup> edition, which is nearly identical to the 15<sup>th</sup> edition, can be purchased online. The textbook is available in the Penn Bookstore. Note Physics 0151/0141 uses Volume 2. You are not required to purchase additional materials such as Mastering Physics.

### Canvas

Announcements, assignments, problem solutions, and grades will be available on Canvas. You will have access to two different “course sites”, one for your “section” alone and one for all sections combined. All announcements of interest to all sections will be posted on the combined site. Students taking 150 will also have access to an undergraduate lab site.

### Class times

Section 401 Professor Paul Angiolillo	MW 8:30am-9:59am (8/27 to 12/9) F 8:30am-9:29am (8/27 to 12/9)
Section 402 Professor Dylan Rankin	TR 8:30am-9:59am (8/27 to 12/9) W 12pm-12:59pm (8/27 to 12/9)
Section 404 Professor Bill Ashmanskas	TR 10:15am-11:44am (8/27 to 12/9) W 10:15am-11:14am (8/27 to 12/9)
Section 405 Professor Evelyn Thomson	MW 10:15am-11:44am (8/27 to 12/9) F 10:15am-11:14am (8/27 to 12/9)

Each individual section may organize its hours of class differently: some sections will use some of the hours for active learning. **For the time on Tuesdays at 5:15PM, this will be used during the semester for the two mid-term exams.** The only dates when all students are required to be available for the Tuesday hour are the dates for the two midterms. *This time may also be used for review sessions, make-up lectures or supplemental problem-solving sessions, so you should keep it as “open” as possible.* We understand that some students have classes that conflict with this time, and that these students have had to request special permission to enroll with this time conflict. These students should rest assured that attendance in any additional lectures is optional.

## Office hours

Office hours of all professors are open to all students and will be posted on the combined site. This is a challenging class! Since the pandemic, we've noticed that students don't seem to be taking advantage of office hours like in previous years. So it's worth explaining that office hours are where you can get answers from us to your questions about the concepts or specific problems on homework assignments. You are very welcome to attend the office hours of any of the professors teaching PHYS 150/140.

## Exams, Quizzes, Homework

There are two required midterms and one required final exam:

Midterm 1	Tuesday September 24 <sup>th</sup>	from 5:15-6:15 PM (on Ch. 1 – 5)
Midterm 2	Tuesday October 29 <sup>th</sup>	from 5:15–6:15 PM (on Ch. 5 – 9)
Final Exam	TBD during Dec 12-19 <sup>th</sup> final exam period (cumulative, emphasis on Ch 9-14)	

Exams will take place simultaneously for all sections in separate lecture halls. You will be assigned to a lecture hall based on your section and/or last name. Your assigned exam room will be announced a few days prior to each exam. You must go to your assigned room. **During all exams and quizzes, the use of cell-phones – even just as calculators – is forbidden.** Bring an actual calculator with no communication or note storage capability! A formula sheet will be provided with the exam and will be posted in advance on Canvas. Although exams may emphasize more recent material, all exams are cumulative – they may have problems that require knowledge of all of the course material covered up to that point in the exam.

Regrade requests must be submitted on separate sheet of paper. Do not write on the exam. You must include a worked solution of the problem and a brief explanation of your regrade request. Requests must be made within a week of the exams having been returned.

**There will be no make-up exams for the midterms for any reason.** Please inform your professor during the first week of the semester if you have a conflict with the midterm dates. *If you are ill or have a serious family emergency before the midterm, then please inform your professor **before** the midterm exam and see the instructions below on registration of absences.* In the event of an excused absence, the course grade will be based on the remaining exams and quizzes. If you fail to take a mid-term exam and the absence is not excused, you will receive a score of zero for that exam. **There is a make-up in January 2025 for the final exam.** You may choose to take this make-up exam only if you have three final exams on the same calendar day as the Physics 140/150 final exam *and* the Physics exam is the middle exam. You must inform your instructor one month *in advance* of the final exam if you wish to exercise this option. If you are ill or have a serious family emergency that prevents you from taking the final exam, again you must inform your instructor **before** the final exam, and if your absence is excused, you must make up the final exam in the first week of classes in January 2025.

**Absences:** Students may send absence notices notifying their instructors when they need to miss class due to extenuating circumstances. Submitting an absence notice does not excuse students from their course obligations. Students access Course Action Notices through a link on [Path@Penn](mailto:Path@Penn).

**Important dates:** The first day of classes is 27 August 2024 and the last day of classes is 9 December 2024. Add period ends September 10th. Drop period ends October 7th. Withdraw period ends November 4<sup>th</sup>. Final exam period is December 12-19th.

**Homework will be assigned each week with a due date, usually Monday evenings by midnight.** Whether homework is collected/graded will be section-dependent. (A common alternative to collecting homework is to have quiz questions that closely resemble recent homework problems.) After the due date, worked solutions will be posted and any material that has been covered in the homework may be covered on an exam. Students should **complete all of the homework at a minimum** in order to do well on the exams.

**Quizzes:** Depending on which section you are in, there may be about 6 quizzes during the semester. For sections taking quizzes, a calculator may be required and you are expected to bring a calculator for every quiz. No cell phones may be used during quizzes even as a calculator. The quizzes will be held during class at a time announced by your instructor. **The lowest quiz score will be dropped in determining the final quiz average;** you cannot be excused from additional quizzes due to illness, athletic events etc. If you miss a quiz, you will receive a score of zero for that quiz. Each section will have different quizzes. Each section may also have other components that enter the “in-class” grade, such as active learning scores, etc.

**Section-specific learning incentives:** The instructors for all four sections strongly believe that learning physics requires you to **do** physics, by consistently putting in the time each week to learn the concepts, to assimilate the ideas by applying them in solving physics problems, and to build your problem-solving skill through frequent practice. As we note below under “Study Advice,” this process is similar to building your skill with a musical instrument or a sport: consistent practice is essential. Each section will have its own way to motivate you to stay on track week-by-week. Some sections will have weekly or biweekly quizzes. Some sections will collect and grade weekly homework. Some sections will require you to read before class. Some sections will require you to come to class and participate by working through and discussing examples with classmates. In some sections, you will solve active-learning worksheets in small groups at round tables. The section-specific portion of each section’s syllabus will indicate how these week-to-week activities contribute to your grade. In all cases, our goal is to motivate you to do the learning well in advance of the exams!

## Physics 150 Labs

**Labs begin the week of Tuesday, September 3rd**, in fall 2024. **The rooms in which the experiments will be performed change from week to week, check the bulletin boards in the corridor on the third floor North and West corridors, these are located outside DRLB 3W5 and 3N18.** The laboratory experiments are intended to supplement the lectures in the course by providing concrete demonstrations of the specific physical principals and by giving some insight into how those principles operate in practice. See [here](#) and the Lab Canvas page for more information.

## Grading Rubric

Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	30%
In-class work (quizzes, HW, reading, participation, active learning, etc.)	30%

Each section may break up the in-class grading fraction differently, please see your instructor’s section site for details. **Please note we expect much better performance (90%) on in-class work** than on closed-notes exams (whose mean scores are typically in the 70% to 80% range).

To pass Physics 150, you must also complete all the labs and obtain a passing grade in the labs.

## Academic Integrity

All students in Physics 0140 and 0150 are expected to adhere to the University of Pennsylvania's [Code of Academic Integrity](#).

## Study Advice

Physics is best learned by trying to solve problems by working through them step by step. Forming a study group with a few other students in the class is highly recommended. If you're stumped, make a note of the question and ask about it at office hours.

One approach to getting the most out of both lectures and textbook is to take 15 minutes at the start of each week to skim through the assigned textbook chapter so you can see what to expect in class. It is recommended that you read through your lecture notes on the same day as the lecture and try some of the assigned homework problems. The lectures will cover the important points of the material and will work through detailed examples. The textbook provides additional worked examples and more information on each topic.

Just like learning to play a musical instrument or a sport, repeated practice is essential to build skills and to improve the long-term retention of those skills. Repeated practice will develop the critical thinking skills that you need to understand and solve problems on classical mechanics. During active learning sessions you will solve problems with your peers in a small group, and you are encouraged to study outside of class with a small group of your peers on the homework. You are welcome to attend the office hours of any professor teaching the class to find answers to your questions.

Warnings: Don't cram the night before a quiz/exam as then you're doubly missing out on both the gain from repeated practice and the opportunity to find answers to your questions at office hours. Don't try to learn physics by only reading the worked-out homework solutions as that is like trying to learn to play the violin by only reading about it! It won't lead to good grades when confronted with a blank sheet of paper for a quiz or an exam! Consult worked solutions for the homework only after you have tried the problems.

## Syllabus -2024

We will cover approximately one chapter per week. The course is fast moving so be careful not to fall behind!  
We omit chapter 12.

### TENTATIVE SCHEDULE

Week	Chapter(s)
1	Chapters 1 & 2 – Vectors and 1D Motion
2	Chapter 3 – 2D Motion – projectile motion and uniform circular motion
3	Chapter 4 – Newton's Laws
4	Chapter 5 – Applications of Newton's Laws
5	Chapter 6 – Work and Kinetic Energy
6	Chapter 7 – Energy Conservation
7	Chapter 8 – Momentum
8	Chapter 9 – Rotational Motion of Rigid Bodies
9	Chapter 9 - Rotational Motion of Rigid Bodies (continued)
10	Chapter 10 – Torque sections 1,2,3
11	Chapter 10 – Angular Momentum
12	Chapter 11 – Static Equilibrium
13	Chapter 13 - Gravitation
14	Chapter 14 – Periodic Motion
15	Chapter 14 – Periodic Motion (continued)
16	Review