

PHYSICS 0175: Basic Physics for Science and Engineering II

Spring 2022

Lecture: Tues/Thurs 11:00AM-12:40PM, Thaw 102

Recitations: As scheduled, with TA

Contact Information:

Instructor: Dr. Melanie L. Good

Office Hour: Tuesdays 10:00AM-11:00AM, 321 Allen Hall (Conference Room)

Virtual Office Hour: Wednesdays 11:00AM-12:00PM, <https://pitt.zoom.us/j/99273627245>

Email: mlgood@pitt.edu

Textbook:

- **Required:** *Fundamentals of Physics* by Halliday, Resnick, and Walker, 11th edition, ISBN 9781119455608
- **Suggested:** *University Physics, Volume 1* by OpenStax
<https://openstax.org/details/books/university-physics-volume-2>

Other materials: Scientific calculator, face mask, computer or tablet recommended

COVID-19 Information: By University policy, during the first two weeks of classes, a remote option must be made available, after which time, all classes are to be held in person. Because a remote option is required, your instructor will deliver the first two weeks of classes via zoom. As per University guidance, you are welcome to log into our zoom sessions from the physical classroom or any location of your choice. Once we begin holding classes in person (**ON JAN. 27**), certain safeguards against COVID-19 are also mandated. **Face masks must be worn at all times during class, regardless of vaccination status. You will be asked to leave if you are not wearing a well-fitting mask properly, covering your mouth and your nose.** Your professor is vaccinated against COVID-19 and will be wearing a mask, and expects you to do the same. She will have zero tolerance for any lack of compliance with any of the health and safety policies of the University. Refusal to properly wear a mask or to leave the room if you refuse to properly wear a mask will result in a University Health and Safety Conduct Referral. **Class will not be conducted if anyone present refuses to properly wear a mask.**

If you have any symptoms of COVID-19, please do not come to class. Your absence will be excused. In the meantime, promptly contact Student Health Service (SHS) at 412-383-1800 for further advice. If you have had any exposure to someone with COVID-19, you may need to isolate. Please inform your instructor if this is the case.

If you have not been vaccinated for COVID-19, your professor urges you to please consider getting vaccinated. For further information on COVID-19, vaccinations, University policy, and to learn about any important COVID-19 updates, please visit <https://www.coronavirus.pitt.edu>. You are responsible for knowing about any updates or revisions to University policy regarding COVID-19.

Should the University change its policy regarding in-person instruction, a revised syllabus will be created and shared as promptly as possible. Most aspects of the course were designed with this contingency in mind, so it is unlikely that there will be major changes to the material or assessments. However, the method of delivery and other class policy changes may be revised, if necessary, should we be required to move away from in-person instruction.

Email and Canvas Announcements and Messaging: The main means of communication from your professor will be through Canvas Announcements. You are responsible for assuring that you receive all pertinent Announcements given through Canvas. Please be sure your Canvas notifications are set in such a way to alert you to the fact that an Announcement has been made. Questions that have already been answered in an Announcement may not receive a response. *Please follow this order of communication:* If you have questions for your professor that are not covered in the Syllabus, FAQ, or recent Announcements, you should ask them in class and/or during office hours. If this cannot be done, you should direct your question to the TA, either during recitation, TA office hours, or via email with your TA. If this fails to resolve the question, then you can reach out to your professor via email at mlgood@pitt.edu, including the response you received from your TA in your email. Following this order of communication helps you most efficiently receive an answer to your question and avoids email backlogs which can slow down response time. Only email that includes a previous TA response or reference to an earlier conversation with the professor or TA about the matter can be expected to elicit a response.

Videos and Social Media: Video recordings of past and/or current lectures may be made accessible to you to enhance the learning process, and allow you to review previous material. Please discuss any concerns you may have regarding privacy and the sharing of recorded lectures with your professor. Recordings should not be edited, shared, taken out of context, or otherwise misused on social media or other outlets.

In an ever-connected world, it is important to maintain boundaries between personal social media and academic/professional life. Unfortunately, this has not always been the experience of your professor, and you may come across a satirical social media post from a personal account that was made years ago. At the time, this post was shared with less than 5 people, and meant purely as self-deprecating satire to amuse close family and friends; however, it was discovered and misinterpreted by some students. The post was immediately deleted and student concerns were promptly addressed. Yet, each semester, this post resurfaces and is misinterpreted once more. To avoid misinterpretation that could lead to unpleasant feelings, please let this serve as pre-emptive clarification that, should you find this long-deleted post, it was meant as satire and that, in all seriousness, your professor considers herself an ally in your learning. No priority is higher to your professor than the education of her students.

Course Description: Physics 0175 is the second 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 covers electricity, magnetism, circuits, electromagnetic theory and optics. Students planning to major in physics are urged to take the equivalent honors course (Physics 0476)

Prerequisites: A "C" or greater in PHYS0174 and MATH 0235

Corequisites: Math 0230 (if MATH 0235 is not complete)

Course Topics:

- I. Electric Charges and Fields
- II. Gauss' Law
- III. Electric Potential
- IV. Capacitance
- V. Current and Resistance
- VI. Direct-Current Circuits
- VII. Magnetic Forces and Fields
- VIII. Sources of Magnetic Fields
- IX. Electromagnetic Induction
- X. Inductance
- XI. Alternating-Current Circuits
- XII. Electromagnetic Waves
- XIII. Images and Interference
- XIV. Diffraction

Course Objectives:

The department has clearly-defined Learning Objectives for the course available online: https://www.physicsandastronomy.pitt.edu/sites/default/files/PHYS_0175_Learning_Objectives_2017.pdf :

Course Structure: The structure of this class is designed to optimize for flexibility and fairness, while maintaining departmental standards, centered around the learning objectives for the course (see above):

–Fairness: Many of your graded components have been designed by departmental committee to be equivalent in difficulty, grading, problem topic, and structure across sections, so that you can rest assured that your work on these assessments (recitations, homeworks, exams) is being measured by uniform departmental standards.

–Flexibility: You will be given options regarding some days of class attendance, ample opportunities to drop different graded items, and many chances to earn bonus credit. The level of flexibility is designed partly to address the uncertainty of future evolution of the pandemic, and partly to address the fact that different students may learn in different ways. See the Attendance Policies and Grading Scheme sections below for details, and visit the FAQ on Canvas for more on the possibilities offered by this flexible approach.

Attendance Policies: Historically, students with poor attendance rarely do well in Basic Physics, and often struggle to obtain a passing grade. The course covers a large amount of content, and it is very easy to fall behind if you do not attend class and recitation. That being said, some students prefer to be able to watch recorded lectures when it is convenient for them, pause when they need to, replay as needed, and then come to class ready to engage in questions and problem-solving exercises. This is what a “flipped” format would afford. On the other hand, some students need the accountability of going to class in person, or they prefer to be able to ask questions in real-time, or simply find that the time management aspect of watching videos outside of class can be a challenge. These are just a few of the reasons students may prefer a traditional in-person format to their classes. Though the evidence suggests that a “flipped” format can be highly conducive to learning, it is a polarizing issue for many students—eliciting strong feelings of “love it” or “hate it.” In recognition of this dichotomy, I intend to walk a middle ground. Every class will be recorded and made available on Panopto, so that students can opt to watch the content on their own time. **But make no mistake, if you do not at least keep up with watching the lecture recordings, you are almost certain to fall behind, and your grade is likely to suffer..** On the other hand, those who prefer to always attend in person will always be able to do so (unless the pandemic forces the University to adopt a remote instructional model). Bear in mind that a “flipped” class is not the same as a fully online class, so you are expected, at minimum, to at least attend on days in which there will be a problem-solving attendance grade. If you do not attend during these sessions, you will not be able to obtain your attendance points without an approved excusal. Also, there will be in-class quizzes given in many classes that must be taken in person. On the class sessions that have quizzes, the quiz will always take place during the last half hour, so if you are a fan of watching the lecture video outside of class as you would for a “flipped” approach, you are welcome to skip the lecture portion of the class and show up only for the quiz. (Note that this will not necessarily be true on problem-solving days—the problems will be interspersed throughout the class period—you can’t reliably show up only for a predictable part of the class—you must attend the entire class in order to earn the participation points for problem-solving days). Or, since many grades are dropped, you can, at your own risk, elect to skip the quizzes altogether

Grading Scheme:

- 10% Participation (guided group problem-solving activities in class)
- 40% Homework, Quizzes, and Recitation Work (lowest 9 of 21 grades in this category are dropped)
- 30% Midterms (3 exams worth 100 points each plus 4 bonus survey opportunities worth 5 extra credit points each)
- 20% Final Exam (plus departmental survey for extra credit)

See below for description of each grading component.

Participation: Participation will take place through Canvas. The problem statements themselves will be asked during class, so your attendance in class will be essential in order to know how to answer these questions (i.e., the problem statements will not appear in Canvas). You will be allowed to work in groups through these problems but each person must enter their own answer on Canvas during class.

Homework: Homework assignments will be completed through the online system called Achieve. Students will be expected to note the due dates and complete their assignments on time.

Midterm Exams: Midterm exams will take place in person. There is no option to take Midterm exams remotely unless the entire University switches to remote instruction. If you are ill when an exam is scheduled to take place and communicate this to your instructor, you may request to take the exam as a makeup in the testing center. It has been observed that the number of makeup exam requests has increased this year due to the prevalence of COVID-19. Because the testing center is small and serves the entire University, this raises

concern about the possibility of there being more makeup exam requests than the testing center can handle if students use this service frivolously. Your instructor reserves the right to deny your request to make up an exam if there is not a compelling enough reason for such a makeup. Bear in mind that delaying an exam rarely significantly changes the outcome and can risk diverting focus on current material which could put you behind, so you should not consider requesting a makeup without a serious reason for doing so.

Midterm 1 will primarily cover I. through III. in the Course Topics above. Midterm 2 will primarily cover IV. through VI. , and Midterm 3 will cover VII. through XI. However, this does not mean that earlier material is irrelevant or could not be included in some way. You will be expected to retain some understanding of all preceding Units, as we build upon prior knowledge.

Midterm exams could include multiple choice and/or open-ended questions, but will be mainly open-ended. There is no one-size-fits-all recipe to follow which will guarantee a good score on the exams; however, to best prepare for midterm exams, you should focus on achieving the following goals: 1). ability to solve relevant problems **independently** and efficiently, and 2). ability to identify underlying physics principles and apply them appropriately. Solving vast quantities of problems will not help you prepare, if, when solving problems, you rely on solutions to get you through and/or if you do not develop a good grasp of what physics principle(s) underlie a problem and how to identify these principles in a different problem. Two problems which use the same principle may appear superficially to be very different—identifying how they are the same is a key step in developing physics understanding. Many students have found that creating and giving themselves mock exams can help test their understanding, practice transferring their knowledge of underlying concepts effectively to a diverse set of problems, and simulate the pressure one might feel during an exam in order to improve their ability to work under pressure.

In addition, reading your textbook and going through textbook examples is an important step in building understanding. According to recent research, 80% of students do not read their textbook, but you cannot expect to perform well on exams if you skip this step. It is a necessary (though not sufficient) part of studying. Thus it is recommended that you read as you go, rather than putting off reading for when you are preparing for an exam. Because textbooks and departmental curriculum do not always evolve in sync with each other, material in the textbook may not flow in the same exact order as what is covered in class. The best way of ensuring that you have read the relevant material is to make use of the index and/or table of contents to match the topics in the book to the learning objectives .

Finally, lecture slides, homework, and recitation problems should be reviewed when preparing for an exam, but remember that you have more time and resources to draw upon when solving homework and recitation problems, and that these problems are often easier to understand after you have already solved them, so, in reviewing them, they may not “feel” as hard. Furthermore, most students will have extremely high scores on homework and recitation problems, as these can best be seen as “warm up” activities compared with exams, rather than predictors of exam performance. Recitation and homework scores are usually 95% or higher; whereas, exam averages, department-wide, are typically around 60 %. Remember, however, that your letter grade is determined by a composite of all graded components, as well as any extra credit points you earn (of which there are many!). The end result is typically that at least half of students receive As and Bs. So try to remember the big picture if you tend to find yourself feeling stressed about exams.

A helpful resource for preparing for exams is the Pitt Study Lab:<https://www.asundergrad.pitt.edu/study-lab>. In addition, the Physics Department maintains a list of free and for-hire resources and tutors: <https://www.physicsandastronomy.pitt.edu/resources-current-students>.

Once exams are graded, it is helpful to reflect upon what you missed and why, in order to avoid similar mistakes in future exams. Every effort will be made to give you the results of your exam within one week of when the exam was taken.

In-Class Quizzes: There will be a total of 3 quizzes given throughout the semester. The quizzes will take place during class on the Achieve system, so a laptop or tablet capable of using Canvas and Achieve is required. (Students without such a device can request to borrow one from the University here: <https://www.technology.pitt.edu/remotedevices>). The quizzes will consist of two problems, and are individual (not group) efforts. Quizzes will take place during the last half hour of the classes during which they occur,

and will be closely monitored for academic honesty.

Recitation Work: Recitation work will be completed during recitation and graded by your TA. Recitation work should compliment what you are learning in class, and helps reinforce the relevant learning objectives.

Final Exam: The final exam will take place in person. There is no remote option available.

Your Final Exam will be comprehensive and is a departmental Final. The same preparation techniques listed above under Midterm Exams can serve to guide you in preparing for the Final Exam.

Bonus Surveys: There will be four surveys unique to this course (related to a research project students have the opportunity to participate in, should they choose to do so), and two departmental surveys. The research surveys will count as bonus towards the midterm exam category. These surveys will only take 10 minutes of your time, and will be used to gather information about students' experiences in the class. You can be completely honest, too, since I will not see your responses (they will only be seen by other researchers). Each of these surveys will be made available on Canvas for approximately three days for students to take at their convenience. If you do not elect to participate in the research surveys, other bonus opportunities (worth the same amount of extra credit) can be assigned to you only if you explicitly request them (i.e. they are not built in to Canvas, but can be made available upon request). The departmental surveys at the beginning and end of the class are different from the OMET Teaching Evaluations and different from the research surveys—the departmental surveys will count for bonus towards the final exam.

Additional Class Resources: We know that college courses can sometimes be stressful for students. In addition to using instruction that focuses on creating constructive learning opportunities to help students engage, excel, and succeed in the course, I am also providing some pointers to additional class resources. You will have access to some guided audio mindfulness meditations that are intended to help students navigate stresses that might come up in physics. These will be made freely available in Canvas for students to use as they wish. For further departmental and university resources, see the FAQ page on Canvas, which has links to the Physics Department Resource Center and Pitt Study Lab.

Tentative Schedule: X = No Class

Wk	Tues.	Thurs.
1	Jan. 11 (I.)	13. (I.)
2	18 (I.)	20 (I.)
3	25 (II.)	27 (II. Problem-Solving Session)
4	Feb 1 (III. In-Class Quiz1)	Feb. 3 (III., IV. Problem-Solving Session; Bonus Survey1Due)
5	8 (IV. Problem-Solving Session)	10 (Midterm 1)
6	15 (V. In-Class Quiz2)	17 (V. Problem-Solving Session)
7	22 (VI.)	24 (VI. Problem-Solving Session; Bonus Survey2 Due)
8	March 1 (VII. Problem-Solving Session)	3 (Midterm 2)
9	8 X	10 X
10	15 (VIII.)	17 (VIII. Problem-Solving Session; Bonus Survey3 Due)
11	22 (IX. In-Class Quiz3)	24 (IX. Problem-Solving Session)
12	29 (X.)	31 (X. and XI. Problem-Solving Session)
13	April 5 (XI. and XII. Problem-Solving Session)	7 (Midterm 3)
14	12 (XII.)	14 (XIII. Problem-Solving Session; Bonus Survey4 Due)
15	19 (XIII.)	21 (XIV.)
16	Finals week	Date/time of Final TBA by the University

Honor Code:

Students are expected to uphold the University's standard of conduct relating to academic honesty.

Students assume full responsibility for the content and integrity of the academic work they submit.

Students shall be guilty of violating the honor code if they:

1. represent the work of others as their own
2. use or obtain unauthorized assistance in any academic work
3. give unauthorized assistance to other students
4. modify, without instructor approval, an examination, paper, record, or report for the purpose of obtaining additional credit
5. misrepresent the content of submitted work

Any student violating the honor code is subject to receive a failing grade for the course and will be reported to the Vice President of Academic Affairs.

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 to schedule an appointment. The Disability Resources and Services office is located at 140 William Pitt Union, and is open Monday-Friday from 8:30AM to 5:00PM.