

# University of Pittsburgh

**Spring Term 2023-2024**

Course title: *Introduction to Physics 2*

Meetings: *Mon/Wed/Fri 12:00–12:50 pm* in 343 Alumni Hall

Instructor: Dr. Matteo Broccio, 'mbroccio[at]pitt.edu', 100F Allen Hall.

Teaching assistants: *Subhayan Sinha; Shreyas Asodekar.*

## Course description and goals

This is the second half of our algebra-based sequence that presents all the fundamentals of classical physics and a few elements of modern physics. The distinctive character of physics is that a small set of principles allows us to make predictions on a wide range of natural phenomena that happen around us. Even processes inside the human body must obey physical principles, and most medical technology completely relies on physics-based techniques. The topics that we will discuss in depth in this course include: laws of thermodynamics, electrostatics, currents and circuits; magnetism; electromagnetic induction; electromagnetic waves; basic optics; rudimentary atomic physics.

A primary learning goal is to identify and apply physics principles in various real-life situations and on occasion, in the context of other disciplines. A secondary goal is the development or refinement of competencies useful for problem solving. Initially, you are expected to be equipped with basic algebra and geometry. Basic trigonometry and vector algebra will be introduced during the term, focusing on their application. Beware that this is a relatively fast paced course.

The course is managed on [Canvas](#), which you can access using your Pitt credentials (help desk: 412-624-4357). You are expected to check Canvas daily. You will find videos, study tips, feedback, and grade entries (except for individual homework grades, which show on the homework platform).

## Video minilectures and checkpoints

Before class meetings, you are required to watch a few video minilectures (linked from [Canvas](#)) and answer the embedded conceptual questions (checkpoints). You will be able to pause, rewind, scan, and replay the videos as many times as you want. You are recommended to take brief notes and reflect on what you just watched before attempting these checkpoints. Some tips on how to make the best out of the viewership are found at the Modules page on Canvas. You will have a single attempt, but receive a generous 90% partial credit for viewership of the corresponding video (viewership is accurately tracked and logged by Panopto).

The purpose of pre-class questions is to prime you for various in-class (and recitation) activities, in which you will be asked to compare, contrast, apply, and combine concepts introduced in my videos. These checkpoints will represent only a first instrument for you to verify your basic understanding of the material – they are not meant to be representative of exam questions. Other learning resources will be used for that purpose, such as problems solved in class and collaborative worksheets in recitations.

## Textbook usage

A complementary resource to my video mini-lectures is the OpenStax College Physics electronic book, downloadable for free from [OpenStax](#). Extra examples and practice problems can be found there. We will cover mainly Chapters 14, 15, and 18–29, although the material will not be necessarily presented in the same style as this book. You will not need to purchase the print book.

## Our class meetings

The face time we have together will be largely devoted to your active learning, after I give a brief review of the ideas – assuming you all watched the assigned mini-lectures well before we meet. I will demonstrate or simulate physical processes and elicit discussions about them. Also, I will extensively model how to combine different concepts and train you to effectively check your own work. The goal is to gradually turn you into independent problem solvers by means of coaching and timely feedback. I will put emphasis on conceptual relationships and sense making of the equations, which goes well beyond the execution of “cookbook recipes”. This sense-making is paramount to your learning and will be reflected in your exam performance, by design. Any questions I will ask in class will be for the purpose of elicit active participation and questions, but will not count toward your grade. To ensure the free and open discussion of ideas, students may not independently record classroom lectures without the advance written permission of the instructor. I will make notes with my hand annotations available to you within 18-24 hours from the end of each meeting.

## Recitations

Our recitations comprise a collaborative worksheet in which you will combine concepts from the previous week and a graded synchronous quiz, which also serves as a formative assessment. Your teaching assistant will ensure to give you enough feedback on what you have learned up to that point that you should be conceptually equipped for the synchronous quiz. For clarity, recitation is a safe place for questions about physics content: questions about class logistics or schedule should be asked through our [Canvas](#) Discussion tool – and there is a strong chance that another student will be able to answer your question even before a TA does! We are unable to either process medical excuses or give makeup quizzes. At the end of the term, I will drop your two lowest recitation scores (which include a zero for every absence). If you anticipate an exceptional schedule conflict, please write to your teaching assistant, copying me, and we may be able to offer you to attend another recitation taught by the same instructor, although we cannot guarantee we will find a solution for every situation, given the many constraints.

## Homework

You will be assigned homework via the Achieve online platform by Macmillan Learning every week, unless announced otherwise directly by the instructor. To sign up for it, use the directions given the first day of class, and follow the screen prompts. You are required to register using your full name as it appears in the class roster (no nicknames, in the interest of clarity!). Any duplicate accounts or unauthorized accounts will be automatically removed, and I decline any responsibility for resulting losses of work or credit after a removal. Homework will count for a significant fraction of your grade.

Homework allows to independently verify your conceptual understanding and practice problem solving. Your collaboration with other classmates is not discouraged, but eventually you will need to genuinely know (not think you know) how to set up and solve a problem of that same kind completely on your own. Just copying other students' homework answers typically results in abysmally low performances on exams, which overall weigh more than each homework set itself. Multiple tutoring resources are available to you, and you are warmly encouraged to make use of them. For extensions, every assignment will be automatically left open for 6 additional days past the regular due date, with a small deduction for late submission – you do not need to send any email with an extension request within that time frame. Extension requests made after the 'late due date' will be altogether ignored. At the end, *your two lowest scores* will be dropped.

## Exams (summative assessments)

There will be **three 48-minute summative assessments** (i. e. exams) during the semester, each covering approximately three modules of physics material. Your assessments will include free-response problems and word questions involving concepts and quantitative procedures, whose average difficulty will be comparable to the harder problems from your homework, the model problems solved by the TA at recitation, and the in-class examples. Your lowest exam score will be dropped at the end of the term.

Please understand that the main focus of my evaluation is to assess your conceptual and procedural understanding of Physics, not to test mathematical prowess. Students are expected to take all three summative assessments.

I will be **unable to offer 'makeup' assessments after a scheduled assessment was missed, for whichever reason**. The following policy applies regarding absences. a) Every unsubmitted exam packet will *by default* receive a zero score. b) If a personal medical emergency occurs the day of the exam, the student must communicate that via email to the instructor as soon as humanly possible. c) Only in exceptional qualifying cases, to be carefully reviewed, the excused student will be entitled to additional grading accommodation beyond the fact that the zero exam score will be already dropped per grading policy. In all other cases (the vast majority), the subtotal on exams will be determined as the arithmetic mean of the available exam scores. Under any circumstance, a student cannot miss *two* exams, lest receiving an incomplete grade for the course. If you have any questions, please do not hesitate to contact me (sooner rather than later). The date of the cumulative final exam will be announced later in the term.

## Your self-assessment

In Physics, each new concept builds on earlier ones and this is a relatively fast-paced course, so it is crucial to keep current with the material. Frequently checking one's reasoning is crucial to the development of conceptual understanding and problem solving skills, and in class you will receive many stimuli in those directions. Effective study tips are posted on Canvas; other instruments for self-assessment will be made available by the instructor during the semester. Exploring areas out of one's current comfort zone is a normal part of learning, so it should never be viewed as threatening. Also, your comfort zone can be gradually expanded, because through regular exercise brain can grow, much like a muscle does through physical workout.

An honest self-assessment has many advantages. You can: a) realistically monitor your progress; b) be in a better position to discuss with peer tutors or teaching assistants, and get the most out of their feedback when you seek their help; c) mentally separate genuinely conceptual issues from procedural difficulties or lacking math prerequisites, which is very helpful. Please read the study tips on Canvas and reach out if you have serious doubts on how to apply them to your situation.

## Our help resources

You surely are not alone in your learning process, but you will need to be proactive in seeking help. Consider all the following help resources available (at no additional cost):

- Instructor's weekly office hours, to help you check your conceptual understanding, provide unconditional support, and help you determine where you are currently positioned along an ideal 'learning progress bar' for the course. Details on Canvas.
- Teaching assistants's weekly office hours to help you check your conceptual understanding, provide constant coaching and support, along with additional practice opportunities, and help you catch up with the material. Details on Canvas.
- Study Lab. At Pitt's [Study Lab](#), undergraduate tutors are able Mon–Fri to virtually help you with concept checking, problem solving, and mathematical prerequisite review. You will need to schedule an appointment directly with the Study Lab staff. Details on Canvas.

## Special accommodations

If you have a disability requiring special testing accommodations or other classroom modifications, you need to notify both the instructor and Disability Resources and Services no later than two weeks into the semester. You will be asked to provide documentation of your disability to determine the appropriateness of accommodations, which will not be shared with your instructor – your instructor will be notified of the assessment outcomes in terms of practical accommodations. To notify Disability Resources and Services, either call (412) 648-7890 or send a direct email to [drsrecep@pitt.edu](mailto:drsrecep@pitt.edu) to schedule an appointment. The Disability Resources and Services office is located in 140 William Pitt Union on the Oakland campus. Feel free to reach out to me with an email if you have doubts or concerns in this area. I will be happy to help.

## Calculation of your grade

Your numerical grade will be calculated using the percentage weights shown in the following table. In summary, 52% of your grade comes from individual performance on timed in-class assessments.

| Item in course gradebook  | Weight     |
|---|------------|
| Pre-class mini-lectures ( <i>your two lowest scores will be dropped</i> ) | 12%        |
| Mandatory recitations ( <i>your two lowest scores will be dropped</i> )   | 16%        |
| After-class homework ( <i>your two lowest scores will be dropped</i> )    | 18%        |
| Midterm Exams ( <i>your lowest score will be dropped</i> )                | 30%        |
| <b><i>Cumulative final exam</i></b>                                       | <b>24%</b> |

To give you an approximate idea, a total score of ~ 93% should be converted to an A; a total score of ~ 83% to a B; a total score of ~ 71% to a C. This may undergo small adjustments, typically not to exceed 1% in either direction, and the cutoffs for “+” and “-” grades will be determined accordingly. The official letter grade cutoffs will be posted on Canvas a couple of days after the final exam. Unless a manual entry error in the grade book or a miscalculation was made by me or my teaching assistants, your final letter grade is not subject to appeal.

## Academic integrity policy

All students 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 term will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity, publicly available at:

<http://www.provost.pitt.edu/info/acguidelinespdf.pdf>.

For online assessments, every student will be required to sign a honor code before starting the assessment, and to strictly follow all the instructor’s directions. Violations of integrity guidelines will result in the opening of an independent verification process, and once confirmed, serious consequences ranging from a zero score on that entire assessment to a failing grade for the course, depending on the type of the offense.

## Updates and policy changes

Updates to any of the information contained in this document will have to be *announced* directly by *me* (course instructor) both in the classroom and through [Canvas](#) to be in effect. For questions or doubts about policies, please ask me directly (course instructor), not your recitation instructor, to avoid any confusion or misunderstandings. Thanks.