University of Pittsburgh

Fall **Term 2024-2025**

Course title: *Introduction to Physics **1***
Meetings: *Mon/Wed/Fri 1:00-1:50 pm* in 343 Alumni Hall
Instructor: Matteo Broccio, 'mbroccio[at]pitt.edu', 100F Allen Hall.
Teaching assistants: *Nathalie Chicoine, Wenhai Gao.*

Course description and goals

This course is the first half of an 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 almost completely relies on physics-based techniques. The topics that we will discuss in depth in this course include: dimensional analysis, object translations, rotations, and oscillations; simple collisions; fluid statics and flow; heat and temperature concepts; waves and Doppler effect.

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 applications. Beware that this is a very 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 content **every other day** You will find videos, study tips, important communication and recommendations, and grade entries (including your homework grades, on a regular basis).

Video minilectures and embedded checkpoints

Before class meetings, you are required to watch a few video minilectures (linked from Canvas) and try your best to 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. You will have a single attempt on the question, but will receive credit for the complete viewership of the corresponding video (viewership is accurately tracked and logged by Panopto for each user).

The purpose of these checkpoints is to 'prime' you for in-class (and recitation) activities, in which you will be asked to compare, contrast, apply, and combine the concepts introduced in my videos. Those questions are not meant to be representative of exam questions. Other resources serve that purpose, including problems solved in class and collaborative worksheets in recitations.

Textbook usage

A good complementary resource to my mini-lectures is the (**free**) OpenStax ***College Physics*** book, downloadable from https://openstax.org/details/books/college-physics. Extra examples and practice problems can be found there. We will cover mainly Chapters 1-17, although the material will not be necessarily presented in the same style as the book. You will not need to purchase the print version. You will also have access to the book within your homework system.

Our class meetings

The time we spend together will be mostly devoted to your *active learning*, after I give a brief review of the key ideas – assuming you watched the assigned mini-lectures well before we meet. I will demonstrate or simulate physical processes, and elicit lively discussion. Also, I will extensively *model* how you are supposed to combine different concepts and train you to effectively check your own work. I hope to turn all of you into independent problem solvers by means of coaching and timely (and frequent) feedback. I will place a lot of emphasis on *conceptual* relationships between observables and *sense making of mathematical equations*, which must go well beyond the execution of "cookbook recipes". This genuine sense making of the math is paramount for your learning, and will be necessarily reflected in your performance, by exam 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, typically a few hours after the end of each class meeting.

Recitations

Our recitations comprise a collaborative problem for which you will combine concepts from the previous week and a synchronous individual quiz, which is first and foremost 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 quiz. Recitation is always a safe place for *questions about physics concepts:* questions about class logistics or schedule should instead 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* process medical excuses and give makeup quizzes.
I will drop your three lowest scores (which include an automatic zero for each absence).

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 com-pletely 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 single lowest score will be dropped**.

Partial exams **(non-cumulative assessments)**

There will be **three 48-minute in-class assessments** (exams) during the semester, each of which covering approximately three modules of physics material. Your in-class 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**. Please understand that the main focus of my evaluation is to fairly assess your conceptual and procedural understanding of *Physics* , not mathematical prowess. Students are normally expected to take all three summative assessments. I will be **unable to offer 'makeup' tests after a scheduled in-class assessment was missed**, *for whichever reason* it may have been missed. The following policy applies about missed tests. (a) Every unsubmitted exam packet will *by default* receive a zero score. (b) If a personal or medical emergency occurs the day of the exam, the student is expected to communicate that via email to the instructor as soon as humanly possible. (c) *Only in exceptional qualifying* cases, to be reviewed by the course instructor, a student might possibly receive further grading accommodations beyond dropping the zero exam score will be dropped per standard policy. no student can miss two partial exams, lest receiving an incomplete grade for the entire course.

Final Exam (cumulative assessment)

The date of the final exam will be announced later in the term, as it has not been set yet.

Your own *self*-assessment

In Physics, each new concept builds on earlier ones and this is a relatively fast-paced corse, 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 numerous advantages. You can: a) realistically *monitor* your progress; b) know when to seek help; c) be in a position to *discuss* with peer tutors or teaching assistants, and fully take advantage of their *feedback*; d) mentally separate conceptual issues from procedural difficulties or lacking math prerequisites, which is very helpful to inform you about the mental workload ahead. Please read the practical study tips on Canvas and reach out if you have doubts on how to personally apply them.

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):

- *Course 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 in case you fell behind. Details on Canvas.
- Study Lab. At Pitt's Study Lab, undergraduate tutors are available Mon–Fri, to virtually help you with concept checking, problem solving, and mathematical issues. You will need to schedule an appointment directly with the Study Lab staff. Details will be 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 one week 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, call (412) 648-7890 or send an email to *drsrecep@pitt.edu* to schedule an appointment. The Disability Resources and Services office is located in 140 William Pitt Union on the Oakland campus." Please email me if you have doubts or concerns in this area: I am happy to help.

Calculation of your grade

Your numerical grade will be calculated using the weights shown in the table below. In summary, 55% of your grade comes from your individual performance on synchronous assessments.

Item in master course gradebook	Weight, %
Pre-class minilectures (*two lowest scores will be dropped*)	12%
Recitation quizzes (*three lowest scores will be dropped*)	15%
Online homework (*single lowest scores will be dropped*)	18%
Partial exams (*single lowest score will be dropped*)	30%
Cumulative final exam	**25**%

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 ~ 72% to a C. This may undergo adjustments, typically not larger than 1% in either direction: the cutoffs for "+" and "-" grades will be determined after said adjustment. The official letter grade cutoffs will be posted on Canvas a couple of days after the final exam. Unless a material error is made in a gradebook entry or a miscalculation is made in our records by either me or my teaching assistants, your final grade is not subject to appeal.

Academic integrity policy

All students in this course are 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, available at this link: *http://www.provost.pitt.edu/info/acguidelinespdf.pdf.*
For assessments, every student is expected to strictly follow the instructor's directions, so any claims of being unaware of directions will not be accepted. Violations of integrity guidelines will result in the opening of an independent verification process, and if confirmed, serious consequences that may range from a zero score on that assessment to a failing grade for the entire course, depending on the type of the offense.

About potential updates

Updates to any of the information contained in this document must be *announced* directly *by me* (course instructor) both in the classroom and through Canvas to be in effect.
In the event of doubts about course policy, you should directly ask me, and not your recitation instructor, to avoid any confusion or misunderstanding. Thanks.