Introduction to Physics 1

PHYS 0110, section **10515**, **Fall 2018** (2191)

Meeting times: **Mon/Wed/Fri 12:00-12:50 pm**
Lecture hall: **343 Alumni Hall**
Instructor: **Dr. Matteo Broccio**
Office location: 217 Allen Hall (or 219 Allen Hall, for larger meetings)
Office hours: Thursdays 1–2 pm (or by appointment)
Email: `mbroccio@pitt.edu` (recommended means of contact)
Phone: 412-624-2755 (to be used only in case of emergency)

Description and learning goals

This *3-credit* course is the first half of a two-term algebra-based sequence that presents the fundamentals of classical physics and some elements of modern physics. The most distinctive character of Physics is that a small set of principles allows to make predictions on a wide range of natural phenomena. Physiological and biological processes also obey physical principles, and current medical technology is rooted in techniques from various branches of Physics. The phenomena that you will explore in this course include: translations, rotations, collisions, vibrations, mechanical waves including sound, properties of fluids, temperature and heat transfers.
A primary learning goal is to identify and correctly apply Physics principles in real-life situations as well as in the context of other disciplines. A secondary goal is the acquisition 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. This is a fast paced course, so issues with any of the mathematical prerequisites will have to be addressed immediately.

Course portal

The management website and portal for all materials is `http://courseweb.pitt.edu/`, accessible using your Pitt username and password (if you forgot either, contact help desk at 412-624-4357). You are expected to check Courseweb announcements and classroom material pages approximately every other day, and the recitations page once a week. You will find links to learning materials, study tips, and course policies.

Reference book

The material released on Courseweb is designed to be as self-contained as possible. That said, an essential reference book for this course is OpenStax *College Physics*. We will tentatively cover Chapters 1-N, although the material will not always be presented in the same style as the textbook and there might be a couple integrations to the textbook content. Additional practice problems in preparation for midterm exams will also be assigned from this book.

Pre-class activities

Before each class meeting, you will *watch some video minilectures* (linked from Courseweb) and answer the corresponding conceptual **checkpoints**, which are hosted on your homework platform (also linked from Courseweb). As for the videos, you will be able to pause, rewind, scan, and replay the videos at will. You are encouraged to *take brief notes* and *reflect* on what you just watched before attempting the checkpoints. The homework system hosting them will give you four total attempts. Full credit will be given to a correct answer at the first attempt, and successive 20% point deductions for each incorrect attempt – that is the reason why careful reflection is required before attempting. Your average pre-class checkpoints score will count for 9% of your total grade.
Purpose. The main purpose of doing the pre-class activities is to prepare yourself for the in-class activities where you will be asked to compare and contrast, apply, and combine concepts. The checkpoints that I assign before we meet in class are designed *not* to be especially difficult, but merely as an instrument for you to verify your basic understanding of the material after a first exposure to it. Their difficulty is not representative of exam questions (the harder problems in homework sets and the recitation problems are good gauges in that respect).

In-class activities

Although you are asked to watch videos, this is definitely *not* an oline course. The time we spend together in the classroom will be entirely devoted to *active learning*, after a very brief review of the main ideas. When I demonstrate physical processes, I will always elicit *discussions amongst you* about the observations and their possible explanations. After I model how to combine physics concepts in worked examples, I will give you many opportunities for practicing *independent problem solving*. In problem solving, a definite emphasis will be given to conceptual understanding and logical sense making rather than the execution of fixed "protocols". (For example, when necessary we might call like quantities with different symbols or using different subscripts to help reasoning.) You will be stimulated to cooperate with classmates sitting near you. I will guide you pointers to resources throughout the problem solving process and give you feedback as needed. To participate, you will be assigned a unique numbered radio transmitter (*clicker*) to submit answers, make predictions, or respond to opinion polls. Your *participation* will count for 1% of your total grade.

Clicker usage policy. You are responsible for using your clicker properly. If you do not find your assigned clicker in its bin, you *will not pick up a different clicker*. Please notify the instructor just before or just after the class meeting, to avoid disruptions. *Before leaving*, you will *return your clicker back to its bin*. Clickers are resources shared among various Physics classes, so your failure to return your clicker by at the latest the end of the day will result in a grade penalty. The malfunction of a clicker is a rare event: if you feel like the battery is low or there is some other problem, the staff will verify the state soon after the meeting but you will have to tell us *straight away*. Claims of malfunctions made on a later day will be respecftully ignored.

Classroom recording policy. To ensure the free and open discussion of ideas, students may *not* record classroom 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.

Recitations

Recitations are designed so that you are an active participant in the learning process. You will be asked to join a *small group*, which will collaborate solving a real-life problem on material that was covered in class the previous week. The teaching assistant will give you guidance and support that should help you consolidate logical reasoning and problem solving skills. You and your group members are expected to all equally contribute to the problem solution – to ensure fairness within the group, you will not be permitted to work on the problem if you get to your recitation more than 12 minutes late. After dropping the lowest two recitation scores (which would be zeros in case of absences), your recitation average will count for 12% of your total grade.

Missed recitation policy. There cannot be any individual makeup assignment *after* a recitation was missed. If you *anticipate* an inevitable schedule conflict with a specific recitation meeting and do not want to miss the practice, write to *your* teaching assistant and instructor *as early as possible* and you will typically be offered to sit at a different recitation meeting that same week.

Homework

You will be assigned weekly homework on Sapling Learning, routinely due Saturday at 11:55 pm, unless announced (exceptionally) otherwise by the instructor. Homework gives you a chance to independently verify your conceptual understanding and practice problem solving. Your problems will be similar, yet not identical to those assigned to another student. Your collaboration with one or more classmates is *not* discouraged, but eventually you are expected to know how to set up and solve every problem individually. Copying other students' answers predictably results in learning very very little and performing poorly on the exams.

Technical notes. To sign up for Sapling Learning, use the Student Class Code given the first day of class, and follow screen prompts. You will register once using your full name (not a nickname). Any duplicate account will be removed, and the instructor declines any responsibility for consequent losses of work or credit. As for extensions, each assignment will be automatically available for 7 additional days past the due date, with a *10% deduction per day late*. Requests for extensions made *after* the extended due date will be ignored; no makeup assignments are possible. The total homework score counts for 12% of your course grade.

Exams

There will be *three midterm exams*, each covering three or four book chapters of material, whose combined scores will count for 39% of your course grade, and a *cumulative final exam* worth 27% of your course grade. Exams will contain a combination of conceptual questions and quantitative problems, whose average difficulty will be comparable to the more difficult problems from your homework sets, book problems, and recitation problems.

Missed exam policy. A missed exam will by default earn a zero score. If a *medical emergency* (or serious condition) occurs on (or persists through) on the date of an exam, the student must *communicate it in writing to the instructor* no more than 24 hours after the exam time. In health-related situations, the student *may* be excused by bringing a signed physician note certifying his or her inability to perform any schoolwork at that time, which must be produced within a week of the missed exam. Other kinds of emergencies will be evaluated on a case-by-case basis.

Makeup exam policy. There will *never* be any makeup exam after an in-class exam was missed. The midterm exam dates are set well in advance, so all students are expected to plan extracurricular activities accordingly. An exception is made for student athletes officially representing Pitt at a competition, who may be excused on that basis. If an inevitable schedule conflict with an exam is anticipated, the student must communicate that to the instructor as early as possible in the term, and reasonable accommodations *may* typically be found. Note however that it is not always possible to find suitable accommodations when schedule conflicts arise. A last minute notice of a schedule conflict will automatically make the student ineligible for accommodations. If there are concerns, you need to bring them up as early as possible in the semester.

Students with disabilities

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 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.

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 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:
`http://www.provost.pitt.edu/info/acguidelinespdf.pdf`.
In particular, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators. Violations of integrity guidelines by a student may result in an immediate zero score for an examination or a failing grade for the entire course, depending on the seriousness of the offense.

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 Courseweb; 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 several practical advantages. It allows you to: a) distinguish conceptual issues from purely mathematical difficulties; b) *realistically* monitor your progress; c) be in a better position to discuss difficult concepts with classmates and undergraduate teaching assistants; d) relate to explanations given by your instructor or graduate teaching assistant at office hours.

Help resources

The following help resources are available:

- Instructor's and teaching assistant's office hours, mainly to help you check your conceptual understanding and determine the status of your progress. If you have a class during *my* regular office hours, you may send me an email to schedule an appointment at a different time, otherwise no appointment is needed.
- Undergraduate teaching assistants in our class (who in class act as learning facilitators), at Old Engineering Hall 304. They receive at the hours to be published on Courseweb by the end of Week 1, with the exception of Pitt holidays. No appointment is needed.
- *Physics Help Room* of the Department of Physics and Astronomy, at Thaw Hall 312. There, Mon–Fri 9am-4pm graduate teaching assistants will be able to help you with trickier homework questions or math. Schedule is on Courseweb. No appointment is needed.
- *Academic Resource Center* at the Gardner Steel Center Building, entrance on Thackeray St. There, Mon–Fri 9am-4pm undergraduate tutors will be able to help you with problems. An appointment is needed, because these tutors only give one-on-one help.

Extra credit

In this course, there are many opportunities for extra credit.

- Brief *lab experiments* at the *Physics Exploration Center* (Thaw Hall 311) with the compilation of a lab report. All details are on Courseweb under "Extra-credit Labs". Each complete report is worth 0.4%, in course percentage points.
- *Conceptual surveys* given at the beginning and at the end of the term. Your participation in the pre-instruction conceptual survey earns 0.3% extra credit, your responses to the post-instruction conceptual survey will earn up to 0.5% extra credit based on correctness, with a floor for participation.
- *Attitude surveys* given at the beginning and at the end of the term. Your participation will be worth 0.15% extra credit for each survey, provided you answer all the questions.

Grade calculation

Your course grade will be calculated using the weights shown in the following table.

Component of coursework	**Percentage of grade**
In-class participation	1%
Pre-class checkpoints	9%
Recitations (two lowest scores dropped)	12%
Homework (no scores dropped)	12%
Midterm exams (all three combined)	39%
Final exam	27%

After the final exam is graded, any earned extra credit will be added to your numerical score in course percentage points – that is what we define total score in the following. Detailed letter grade cutoffs will be provided only at the very end of the semester. Just *to give you a* ***rough*** *idea*: a total score of $\approx 92\%$ is a probable cutoff for an A (99% or more for an A+); $\approx 82\%$ for a B; $\approx 67\%$ for a C; $\approx 55\%$ for a D; less than $\approx 48\%$ will be converted to an F. Unless a material grading or calculation error was made, the final letter grade is not subject to appeal.

Schedule

Week start	**Mod**	**Monday**	**Wednesday**	**Friday**
August 27	–	Introduction	math prerequisites	sample practice
September 3	1	*Labor Day*	Module 1 concepts	Module 1 practice
September 10	2	Module 2 concepts	Module 2 examples	Module 2 problems
September 17	3	Module 3 concepts	Module 3 examples	Module 3 problems
September 24	4	Module 4 concepts	**Exam 1** (Sept 24)	Module 4 practice
October 1	5	Module 5 concepts	Module 5 examples	Module 5 problems
October 8	6	Module 6 concepts	Module 6 examples	Module 6 problems
October 15	7	Module 7 concepts	Module 7 practice	**Exam 2** (Oct 19)
October 22	8	Module 8 concepts	Module 8 concepts	Module 8 problems
October 29	9	Module 9 concepts	Module 9 examples	Module 9 problems
November 5	10	Module 10 concepts	Module 10 practice	Module 10 practice
November 12	11	**Exam 3** (Nov 12)	Module 11 concepts	Module 11 practice
November 19	–	(to be determined)	*Thanksgiving*	*Thanksgiving*
November 26	12	Module 12 concepts	Module 12 practice	Module 12 practice
December 3	13	Module 13 concepts	Module 13 practice	Module 13 practice
December 10	13	(to be determined)	(to be determined)	(to be determined)

Update policy

Any updates to formats, policies, or schedule shown in this document will have to be announced by the instructor *both* in the classroom and and electronically on Courseweb to be in effect.