Introduction

Welcome to Physics 1211: Introductory Physics for Science & Engineering I. This course, the first half of a two-semester sequence will focus on Mechanics, the study of motion. Understanding the motions of objects and their interactions is one of the principal goals of physics. The fundamental laws of mechanics, first enunciated by Isaac Newton in the 17th century, can be applied to an enormous range of phenomena on scales as diverse as dust grains and galaxies, and from the esoteric to the everyday.

Objectives

The primary objective of this course is to engage you in a process that is central to physics: Modeling physical phenomena by applying a small set of fundamental principles. The modeling process encompasses explaining and predicting diverse physical behaviors; making appropriate approximations and simplifications for complicated physical systems; and communicating results through mathematical and numerical expressions, diagrams and visualizations, graphs, and even “plain English.”

In this semester you’ll learn about the concepts associated with the study of motion, including velocity, acceleration, inertia, force, energy, momentum, and more. You will see how these concepts are related to each other through the laws of Mechanics—Newton’s Laws of Motion and their corollaries, the conservation laws of energy, linear momentum, and angular momentum. Along the way we will apply these basic laws and concepts to different kinds of motion: constant-acceleration motion, uniform circular motion, statics (lack of motion), impulsive motion (collisions and explosions), rotations, and oscillations.

If you are a prospective physics or astrophysics major, you might consider taking PHYS 1311 in the Spring instead of this course. Please contact the instructor for that course, Dr. Craig Wiegert, or the major advisor: Dr. Cooley (physics) or Dr. Caillault (astrophysics).

Prerequisites

Some differential and integral calculus will be used in this course. It is important that you be registered for the first semester of the calculus sequence (MATH 2250 or equivalent) if you haven’t already taken it. In order to do well in this course, you should also have a comfortable working knowledge of college algebra, trigonometry, and plane geometry. A prior high school physics course is useful, but not required.

Basic Information

**Instructor:** Dr. Steven Lewis  
**Email:** lewis@physast.uga.edu  
**Office:** 307A Physics Building  
**Phone:** 706-542-0158

**Class:** MWF Period 4 (11:15-12:05 PM), 221 Physics Building  
**Final Exam:** Thursday, December 12, 7:00-10:00 PM, 221 Physics Building  
**Office hours:** To be determined
Course Resources

Required Materials

- **Textbook** (choose *either one* you wish)
  - The official textbook for PHYS 1211 and 1212 is *Physics for Scientists and Engineers: A Strategic Approach, 4th Edition*, by Randall D. Knight (Pearson, 2017). It can be purchased either as a large, single volume suitable for both courses, or split into two volumes: Volume I for PHYS 1211 and Volume II for PHYS 1212. The hardcover, single-volume version costs $230 new on Amazon.com.
  - As a more affordable option, you are welcome to use the *free* electronic textbook *University Physics, Volume 1*, by William Moebus, Samuel J. Ling, and Jeff Sanney. It is published by the *openstax* open educational resources project and is available for free in various electronic formats: online, PDF, iBooks, and Kindle. You can also order a print version for $48.50, if you prefer that format. For more details, go to: [https://openstax.org/details/books/university-physics-volume-1](https://openstax.org/details/books/university-physics-volume-1).
- **Student in-class response system** (“clicker”): We will be using Turning Point, *not* Top Hat. You may use either a stand-alone clicker device or your own smart phone or tablet (you’ll need the Turning Point Mobile app). Either way, there is a subscription fee. For further information, go to [http://ctl.uga.edu/student-response](http://ctl.uga.edu/student-response).
- **Scientific calculator**: A simple calculator such as the TI-30X series will do just fine, but a fancier graphing calculator is also acceptable. The use of calculator graphing, algebra-solving, information-storage, or programming functions will *not* be permitted for any exam, nor will PDAs, cellphones, etc.

Online Resources

- Weekly problem sets will be carried out online using the LON-CAPA system at [https://spock.physast.uga.edu/](https://spock.physast.uga.edu/).
- You will be subscribed to a low-volume email announcement list. It is essential that you check your email regularly (at least daily), or else you may miss important class announcements. Missing an announcement because you failed to read your email is not considered an acceptable excuse for not knowing the content of the announcement.
- The [eLearningCommons](https://elearningcommons.uga.edu/) will serve as a repository of course information: homework and exam solutions, handouts, worked examples, grades, etc.

Other Resources

- Office hours are your chance to get one-on-one or small group help with homework assignments or with understanding topics from class. Please make use of this time; I can’t address your questions if you don’t ask!
- If you cannot come to my regular office hours, or need additional help, please set up an appointment (by email, by phone, or in person) to see me outside of class.
- Tutors are available either through the [UGA Academic Resource Center](https://www.academicresourcecenter.uga.edu/) (no cost), or through the [Department of Physics and Astronomy](https://physics.uga.edu/) (for hire).
Grading Policy

Grade components: Your overall grade will be determined from your course performance, as measured by your semester average, which will be computed as follows:

- 25% Cumulative final exam
- 45% Three in-class exams (20% for highest, 15% for middle, 10% for lowest)
- 15% Laboratory grade
- 12% Homework average
- 3% Participation (in-class activities, clicker questions, etc.)

Letter grades: Ranges for letter grades will be no worse for you than the following:


Here a square bracket means the end point is included in the range, and a round bracket (parenthesis) means the end point is not included in the range. Actual grade ranges may end up having lower cutoffs, depending on the overall level of performance.

Final exam grade boost: The comprehensive final exam is your opportunity to demonstrate that you have broadly and coherently mastered the course material. This is, after all, the main goal of the course. Therefore, I will give a grade boost for getting a higher grade on the final than for the semester as a whole, provided you haven’t neglected the course during the semester. Here’s how the boost works. At the end of the semester, I will calculate two letter grades for each student: one based on the formula given above (“formula-based grade”) and one based only on the final exam (“final-exam grade”). If you meet all four of the following criteria, then the course grade I assign you will be one grade step higher than your formula-based grade (e.g., B+ → A−); otherwise, your course grade will be your formula-based grade. The criteria for the grade boost are:

(a) you have not missed any regular exams,
(b) your regular-exam average is 65% or higher,
(c) your homework average is 65% or higher, and
(d) your final-exam grade is higher than your formula-based grade.

Regrade requests: Any requests for a regrade of an assignment or an exam must be made no later than one week after the item is returned. Any regrade requests made after this one-week window will be declined without further review. Keep in mind that a regrade may end up raising or lowering your score. Correcting arithmetic errors made in totaling up points does not count as a regrade and is not subject to the above time limitations.

Extra credit and lobbying: There is no extra credit in this class. Requests for extra credit assignments or activities will be ignored. Repeated requests will be met with a vexed look and a cross word. Furthermore, I will not tolerate lobbying for a better grade. Your grade will be based exclusively on the grade components described above. Factors like needing a certain grade to get into a particular major or to maintain your scholarship are not valid considerations in determining the grade you get in this course.
Withdrawals/Incompletes: The Undergraduate Bulletin and the website of the Office of the Registrar describe University policies regarding withdrawals and incompletes. Make sure you are familiar with them. The withdrawal deadline for this semester is Monday, October 21. Any student showing serious neglect for this course (e.g., routinely failing to turn in homework, rarely attending class, etc.) may be asked to withdraw. Any student missing 3 consecutive classes or failing to turn in 2 consecutive homework assignments, without adequate prior explanation, will be considered eligible for an instructor-initiated withdrawal from the course.

If you are considering withdrawing from the course, you should discuss your choice with me beforehand. In many cases, students are doing better in the course than they think.

A grade of Incomplete is intended for a student who has completed a substantial part of the course, but, for non-academic reasons beyond their control, was unable to complete all of the course. An Incomplete is not appropriate for a student who has missed a large portion of the course assessments, regardless of the reason. Nor is an Incomplete appropriate for a student who is unhappy with their performance in the course and wants to avoid getting a low grade. In both of these cases, withdrawal from the course is the appropriate action.

Exams

Number, dates, and rules: There will be three in-class midterm exams and a cumulative final exam. They will all be closed-book and closed-notes. You may use a scientific calculator on exams for arithmetic only, not algebra, calculus, graphing, or information storage; all programs and memory registers must be cleared. Unless told otherwise, you must show work on each exam problem in order to receive full credit. Partial credit is awarded (based on your work) for incomplete or incorrect answers, so it is usually in your best interest to attempt every problem. Detailed solutions will be posted to eLC after each exam.

- Monday, September 16: In-class midterm exam #1
- Friday, October 18: In-class midterm exam #2
- Friday, November 22: In-class midterm exam #3
- Thursday, December 12: Final exam (7:00-10:00 PM)
- Friday, December 6: Alternate final exam (12:00-3:00 PM)

Formula sheets: I will provide you with a formula sheet on each exam, and will post a copy to eLC before the exam. Its purpose is to focus your studying on understanding rather than memorization. If you need an equation that’s not on the sheet, don’t memorize it; learn how to derive it from the equations that are given.

Missed midterm exams: There will be no make-up midterm exams. If you need to miss a midterm exam for a serious, documentable reason, your final exam grade will be substituted for the missed exam, making your final exam worth 35-45% of your overall grade (depending on how this grade compares to your other midterm exam grades). This policy is designed to handle unavoidable situations like medical or family emergencies, or previously scheduled academic or athletic events. You must contact me as soon as you know of the conflict (before the exam if at all possible), and you must provide sufficient documentation in a timely fashion. (An example of unacceptable documentation is a note stating only that you visited the health center, with no indication of the severity of your illness.) Do not
presume that your situation or documentation merits an excused absence; that determination is not your prerogative. *Unexcused exam absences will result in a grade of zero.*

**Alternate final exam schedule:** An alternate date and time (December 6, 12:00-3:00 PM) has been set for those who are, for one reason or another, unable to take the final exam on the regularly scheduled day and time (December 12, 7:00-10:00 PM) for the final exam for this class. You will need to let me know by **Monday, December 2**, if you wish to take the final exam on the alternate day. If you do not, then I will assume you will take the final exam on the regularly scheduled day. No other scheduling arrangements for the final will be permitted. The alternate final exam will be different from, but comparable to, the regularly scheduled final exam.

**Homework**

**Rationale:** Imagine trying to learn to play basketball just by reading books about it and watching other people play. Sure, you’ll learn some useful stuff that way, but you won’t get very good at playing. You need to get out on the court to practice skills and play some games. So too with physics. Coming to class, reading the textbook, and observing others work problems are all helpful, but the single most important thing you can do to learn and become proficient at physics is to get regular, personal practice doing physics problems. Struggling through practice problems until you really get it—not just getting the right answers, but understanding *why* what you did gave the right answers—is where true learning comes from and how mental “muscle memory” is built. That’s why you will have regular homework assignments (aka problem sets).

**Logistics:** Assignments will be posted online through LON-CAPA, and most problems will require you to submit your answers online. However, a few problem sets may also have a handwritten component. All problem sets (except Problem Set #0) will be equally weighted in your homework average, unless otherwise specified. Detailed solutions to each problem set will be posted to eLC after the due date.

**Deadlines:** The due date for each problem set will be listed on the assignment itself. *Late homework will not be accepted or excused.* However, even if you miss the deadline to submit homework for credit, you should still make every effort to work through all problems on every assignment, in order to master the topics covered. You will likely do very poorly on exams if you don’t work through each problem set in its entirety.

**Dropping lowest two:** If you complete the online student evaluation for this course during the official period at the end of the semester when the evaluations website is up, then I will drop your lowest two homework scores when calculating your homework average for semester grades. If you do not complete the evaluation, then all homework scores will be included in your homework average. This policy serves two functions: (a) it gives you an incentive to submit a course evaluation, and (b) it compensates for unavoidable circumstances that may prevent you from submitting homework on time (e.g., illness, scheduled event, emergency, etc.). *Caveat:* Problem Set #0 is exempt from this policy; it will count for all students and will not be dropped.
**Teamwork vs. plagiarism:** Teamwork can be a very good way of learning, so I encourage you to interact with your classmates on homework. However, do not mistake teamwork for plagiarism, which is a serious violation of the academic honesty policy. It is unacceptable, for example, to divvy up the problems on a problem set and then swap solutions. It is also unacceptable to solve homework problems by searching online or elsewhere for existing solutions, even if you’re just “looking for hints” rather than copying outright. The work you submit must be your own. Since you can’t collaborate on exams, homework is your best opportunity to develop your own problem-solving skills. Remember, the only way you’ll really learn physics is by sweating through problems yourself.

**Labs**

Even though your final lab score gets factored into your grade in this course, the lab part of this course functions as if it were a separate course in which I have no involvement. It has its own syllabus, policies, and structure. At the end of the semester, I am provided with a lab score for each student, and this value gets weighted in your final semester average, as described in the Grading Policy section above. If you have questions or concerns about lab, you should address them to your lab TA(s). If they are not able to resolve your questions or concerns satisfactorily, contact the Laboratory Supervisor, Mr. Tom Barnello, in Room 310, Physics Building.

**In-Class Activities**

You will often be asked in class to answer conceptual and quantitative questions, both individually and in small groups, using the Turning Point student response system (i.e., “clickers”). You are expected to bring your clicker to every class. Your responses will be graded primarily on participation. These activities allow you to demonstrate your sincere effort and active class engagement. Extensive research in the area of science education shows that these kinds of in-class activities strongly enhance the learning environment.

Your accumulated grade on these (and perhaps other) in-class participation activities will constitute the “Participation” portion of your semester average, as described in the Grading Policy section above. To compensate for the occasional absence, clicker malfunction, or similar issue, I will drop ~20% of the items that enter into the participation portion of your grade. I will not accept a written record of your responses as a clicker substitute, or otherwise excuse any absence from class. If you have read this far in the syllabus, please draw a mouse in the upper left corner of the Agreements form before handing it in.

**University Policies and Student Resources**

**Academic Honesty**

UGA has a comprehensive academic honesty policy called *A Culture of Honesty*, which is available from the Office of Instruction at [https://honesty.uga.edu](https://honesty.uga.edu). This policy not only describes required and prohibited conduct, as it pertains to academic honesty, but also provides a detailed procedure for resolving matters of alleged academic dishonesty, including a description of consequences for honesty violations.
As a UGA student, you are responsible for knowing, understanding, and abiding by this policy. If you have any questions about the appropriateness of your work in this course, you are obligated to ask me for clarification.

I take the issue of academic honesty very seriously, and it is my responsibility to uphold the University’s policy. This means, among other things, that I will not hesitate to report evidence of academic dishonesty to the Office of Instruction. Typical consequences for academic honesty violations on homework, labs, or exams range from receiving a zero on the item in question, to failing the course, to being suspended from UGA.

Disability Accommodations

I will make every reasonable effort to accommodate students with documented disabilities. Students seeking accommodations must provide documentation from Disability Resource Center during the first two weeks of class (or within two weeks of DRC certification.)

Student Distress

If your course performance is significantly affected by issues beyond your control, I urge you to let me know and to seek assistance promptly from Student Care and Outreach. It is always easier to address exceptional circumstances when you raise these concerns as early as possible. Waiting until the end of the semester to take action may limit my ability to provide appropriate support.

Student Responsibilities and Other Matters

Courtesy: You have the right to expect courtesy from your fellow students, and the same will be asked of you. Courtesy includes the expectation that everyone will come to class ready and willing to learn and to interact, and able to ask or answer questions freely. Courtesy also implies that you arrive on time and stay until the end of class and that you don’t engage in distracting behavior in class (e.g., conversing with classmates, reading a newspaper, doing a crossword puzzle, etc.)

Attendance: You are expected to attend class regularly. I strive to make each class a valuable experience that enhances learning and complements other components of the course. Attending class keeps you well connected to the course and to your peers. If your schedule makes it difficult to attend class regularly and on-time, then you shouldn’t take this course. The most common causes of missed classes are lack of sleep and time pressure from other obligations. If this happens to you, you need to seek out advice on how to set priorities and manage your time effectively. If you do miss class, it is your responsibility to find out what you missed.

Electronic Devices: Laptop computers may not be used in class (unless specifically required due to a documented disability). Given the extent to which physics instruction incorporates equations, diagrams, graphs, and data tables, it is impractical to take notes through keyboard entry. Laptop computers end up being a distraction, not only for their owners, but also for other students in the class and for the instructor. You may use a tablet computer (e.g., iPad) with a stylus for taking notes, if you wish, but if you are found to be
using it for purposes unrelated to class, you may lose that privilege. I understand that it is very difficult for many people to refrain from texting and interacting with social media for an entire 50-minute class. I’d rather you not, but if you must do so, please keep it to a minimum and please be discreet.

**Preparation:** You are expected to come to class prepared to learn and to interact with the material. In part, that means completing that day’s readings. Class time is valuable and limited. Using that time effectively and getting the most out of it requires that you’ve had some exposure to the necessary concepts, so that you have some pre-existing context to make sense of class material, rather than having to create new understanding in real time against a “blank canvas”. Ample research evidence confirms the large effect on learning when students spend a bit of time before class preparing.

**Communication:** I cannot effectively help you learn unless you are open with me on what you do and don’t understand. It is very likely that if you don’t understand a concept or technique, plenty of your classmates don’t understand it either. Silent confusion benefits no one, so ask questions when there’s something you don’t understand or need clarification on. Ask in class, ask at office hours, ask by email … Just ask! I want to help.

**Homework:** At the risk of being repetitive: I cannot emphasize enough the importance of taking homework seriously! As with learning any new skill, your physics problem-solving skills will improve only by practicing regularly and conscientiously. You’ll get very little value out of homework if you routinely procrastinate or if you depend on the efforts of others. If you start to get behind, get help early, before the problem gets worse!

**Disclaimer**

Unexpected circumstances and concurrent course assessment may require changes to the rules and information contained in this syllabus. If so, such changes will be done as fairly as possible, and you will be kept informed of the changes and their causes.