



PHYS 245: College Physics II

Fall 2022

Prof. Dreyfus

Instructors' Contact Info:

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Intended Audience: This is the second semester in a two-semester, non-calculus physics course intended primarily for students majoring in biology or other sciences, and/or applying to professional school in the health professions. It will not meet the requirements for physics, math, or engineering majors.

Overview: The main topics in this semester will be motion, forces, energy, momentum, fluids, and thermodynamics. But this course is about more than just physics content; it is about scientific thinking, including developing models, mathematical sense-making, coordinating multiple representations, making interdisciplinary connections, and scientific communication. That's what should stick with you even if you forget all the physics.

This course meets the requirements for **Mason Core Natural Science**. As such, the outcomes of the course include that students will:

- 1) Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding:
 - a. evolves based on new evidence
 - b. differs from personal and cultural beliefs
- 2) Recognize the scope and limits of science.
- 3) Recognize and articulate the relationship between the natural sciences and society and the application of science to societal challenges
- 4) Evaluate scientific information

Prerequisite: PHYS243 or equivalent. This course will continue to build on concepts from the first semester (including motion, forces, energy, and oscillations), and will require a similar level of mathematics.

Format and Course Meeting Times:

The “lecture” portion of this course is online and asynchronous. The lectures are videos that you can watch at any time, and the assignments will also be online. You can expect to spend about 8-10 hours per week total on this course.

We will be meeting in person once a week for group activities in recitation sections:

- PHYS245-302: Mondays 1:30-2:45 pm, Horizon 2016, Dr. Dreyfus
- PHYS245-302: Wednesdays 1:30-2:45 pm, Horizon 2016, Dr. Keady

The midterm exams (see dates below) will also take place **in person** during recitation sections. Recitation sections will **not** meet the week of Labor Day (Sept 5/7) or the week of Thanksgiving (Nov 21/23). The Monday section will not meet on October 10 (fall break), and will meet instead on **Tuesday**, October 11 (which will be a Monday schedule).

In addition, the lab is a separate course (PHYS246), which you may or may not need to take, depending on your major’s requirements. If you are registered for the lab, you will hear separately from your lab instructor about lab meeting times.

Access to MyMason and GMU email are required to participate successfully in this course. Please make sure to update your computer and prepare yourself to begin using the online format **BEFORE** the first day of class. Check the [IT Support Center website](#) for help and information about Blackboard.

Exam Dates:

Exams will take place **in person**, during your recitation time.

Midterm 1: **Monday, September 26** or **Wednesday, September 28**

Midterm 2: **Monday, October 31** or **Wednesday, November 2**

FINAL EXAM: (TENTATIVE) **Wednesday, December 7, 1:30 pm**

Recitations

The recitations will take place in an active learning classroom, equipped with whiteboards and screens all around the room, and you’ll get to work with a group and share your work with the rest of the class. If possible, please bring a laptop, a dry-erase marker (or several if you want to draw in different colors), and something to erase with (this can be as simple as an old sock).

Recitations are an integral part of the course, as the one time each week when we are all interacting in real time. Participation is required (and is part of your grade). I understand that there may be some weeks when you are unable to attend for various reasons (including but not limited to isolation and quarantine related to COVID). If this happens, please contact your recitation instructor, and we can make arrangements for you to make up the work on your own. However, this should be the exception rather than the rule, and if you are enrolled in the course, you should not make other commitments that conflict with attending your recitation section.

COVID-19:

The COVID pandemic still continues. At the time of this writing (August 2022), nationwide case numbers are **higher** than one year ago. COVID has killed more than 1 million people in the United States (including more than 20,000 in Virginia). We have made the educational decision to teach the recitation component of this course in person, because we believe that in-person interaction is the most effective way to learn. But we also recognize that this decision comes with risks, and therefore we are seeking to minimize those risks.

Recitations are subject to all university COVID policies. The most current policies (which may change during the semester) can be found at <https://www.gmu.edu/safe-return-campus> . However, the university requirements should be seen as a floor rather than a ceiling. Science in the 21st century is not a solitary endeavor, but is about being part of a community. As members of a community, we each want to take responsibility not only for our own safety but for the safety of others. Even if some of us may feel that we are not personally at significant risk from COVID, we can also be aware of how our actions impact others, including students who are at higher risk due to various conditions, or students who live with older relatives, or students who work in health-care settings and come into contact with patients. The university strongly encourages all students to get vaccinated against COVID (including all available boosters), and you can schedule a vaccine appointment at vaccine.gmu.edu . The university also encourages wearing a mask indoors, and I will be wearing a mask to class every time. If you have any symptoms, **please stay home** (and we will make sure you have a way to make up what you missed). If you have any symptoms or think you may have been exposed, please get tested (which you can do for free on campus).

We realize that we are not living in normal times. We understand that this continues to be a stressful time for many of you for a number of reasons, and we can't predict exactly how things will develop over the coming months. We all seek to support one another during this difficult time. The assignments in this class have due dates, in order to help keep you on track so that you don't leave everything to the very end. However, we recognize that life circumstances may not make it possible to keep to this schedule. If at any point you need to complete assignments on a modified schedule, please contact me and we can make other arrangements.

Communication:

If you have a physics question, the best place to turn first is the "Questions and Answers" forum (in our Blackboard course, in the Discussion Board). You may find that other students have already asked the same question. If not, ask your question, and you may get replies from other students, or from the Learning Assistants, or from me. You may also see unanswered questions from other students that you know the answer to; if you do, please help them out – thank you!

If you email me, I will generally respond within 24 hours. Also, **I am completely away from email every week from Friday evening to Saturday evening**, so if you email during that time, I will not respond until later. I will also be completely away from email on the following days (starting from the evening before): **Mon Sept 26, Tue Sept 27, Wed Oct 5, Mon Oct 10, Mon Oct 17.**

If you want to discuss something in real time and can't make it to office hours, just let me know, and we'll set up another time to meet (either online or on campus).

Required materials:

- Textbook: Giancoli, *Physics: Principles with Applications*, 7th edition
- MasteringPhysics access code
- Scientific calculator (or software that does the same thing)
- Access to a computer with Internet and speakers (or headphones)

Textbook: If you took PHYS243 in the spring, you should already have the book, and don't have to buy anything new (and you can ignore the rest of this paragraph). Otherwise, the textbook is available (new and used) from the university bookstore and other sources. You can get it as a physical book or as an e-book. You can buy the book with a MasteringPhysics access code, or you can buy MasteringPhysics separately.

MasteringPhysics: We will be using the MasteringPhysics system for online homework, and accessing it through Blackboard (so you don't need to go to the MasteringPhysics website). If you have used MasteringPhysics through Blackboard (with this textbook) in the past, then your account should still work and you don't have to do anything else to set it up. If you haven't used MasteringPhysics (or if you have used it with a different textbook), then you'll need to purchase MasteringPhysics access for this textbook. You can do this when you buy the book, or you can buy it online through Blackboard (just click on one of the MasteringPhysics links from the PHYS245 Blackboard course), or you can buy it separately elsewhere. If you buy it separately, make sure you are getting **Modified** MasteringPhysics (this is the version that works with Blackboard), and make sure you're getting it for the correct textbook.

Components of the course:

Reading assignments: Your first exposure to each topic will be from reading about it in the textbook. The textbook also includes lots of example problems. You might have questions from your reading; feel free to ask them!

Interactive lectures: Each week includes several "lecture" videos that you can watch on your own time. During each video, there are places where I'll tell you to pause to solve something on your own, and there will also be places where you'll be given multiple-choice questions (similar to clicker questions that you may have done in previous classes). These questions will be graded, but don't stress about this: I'll tell you the correct answer afterwards, and then you can go back and change your answer. So you can think of this as more of a participation grade.

Assignments: Each week there will be several assignments to do. Some of these will be submitted through Blackboard, some will involve discussion board posts, and some will send you to MasteringPhysics. Some will involve running simulations. Students are encouraged to work in groups, but what you submit should represent your own work.

Group activities: Most weeks there will be a group activity during recitation (see page 2 for the times). You'll get to work with different groups of students, and the instructors will be walking around to visit all the groups. These activities will help you think through challenging concepts together.

Exams: There will be two midterm exams during the semester, and a comprehensive final exam. The final exam will include relatively more material from the last third of the semester, but it will still cover the entire semester. All three exams will count toward your final grade, but the exam that you do best on will count for more.

The dates of the exams are on page 2. If you have an unavoidable conflict with any of the exam dates, please contact me immediately to make alternate arrangements. If there is an unanticipated emergency that causes you to miss an exam, contact me as soon as possible.

The exams will take place in person. You may use a scientific calculator for exams (but **not** a programmable calculator), and a 3×5 index card with anything you want written on it (on both sides) **in your own handwriting**. You will need to put your name on the index card and hand it in with your exam.

While we will strive to minimize this, there is a possibility that there may be some mistakes in the exam grading, or that the grader misunderstands what you're trying to say. If this happens, you may request a regrade **in writing**. To do this, write (or type) a clear explanation **on a separate piece of paper** of why you think you should have more points, and hand it in along with your exam. (Simply asking to "please take another look" will be returned without evaluation, and challenges to the grading scheme itself will not be considered.) In addition to grading error, if you can make a case that you made an early error, but correctly carried out later parts that depended on that error, you can request consistency points. Again, you will have to explain your argument carefully in writing. Be sure **not to write on your exam itself** or alter it in any way; **if you alter a graded exam and request a regrade, it will be automatically reported to the Office of Academic Integrity**.

I am also more than happy to meet with you after the exam to discuss any problems that you have questions about, but the purpose of that meeting will be to help you understand the physics, not to change your grade.

Grading: The breakdown of your final grade will be as follows:

Grade component	Points
Exams	450
Recitation participation	100
Other assignments	450
TOTAL	1000

The approximate breakdown for the non-exam (and non-recitation) assignments is 15 weeks × 30 points per week = 450 points total. There will be some variation from week to week, but the point breakdown for a typical week might look like:

Grade component	Points
Interactive lectures	10
MasteringPhysics assignments	10
Simulation and other assignments	10
TOTAL	30

The exams will be weighted differently depending on which exam you get the highest (percentage) grade on, so that your best exam counts for more, as follows:

Your best exam	Points for Exam 1	Points for Exam 2	Points for Final Exam
Exam 1	150	100	200
Exam 2	100	150	200
Final Exam	100	100	250

(However, if any exam grade is changed to a zero due to an academic integrity violation, then that exam, rather than your best exam, will be given the maximum weight.)

The exams are not “curved” – i.e., the number you get on the exam is the number you get. However, the exact grading scale (i.e. what letter grade corresponds to what number of points) will be determined later in the semester, and is likely **not** to be the traditional 90-80-70-60 scale. (Instead, the minimum cutoff for an A is likely to be somewhere in the 80s.)

Frequently asked question about grades:

FAQ: I submitted my homework on MasteringPhysics and got 10/10, but Blackboard says I only got 3/10! What’s wrong? The grades are automatically synced from MasteringPhysics to Blackboard. However, this doesn’t happen instantaneously. Like looking at distant stars through a telescope (where you see the stars as they were many years ago, because it takes time for the light to reach Earth), the grade you see on Blackboard might be a snapshot of what the real grade was at some point in the past (before you had submitted all your answers). So if this happens to you, don’t panic! Just wait a few hours and it should all be fine. (For those of you who took PHYS243 in the spring, I know I said this last time, and then it turned out not to work. But the MasteringPhysics people have assured me that it’s really working this time!)

Academic integrity: You are expected to observe the GMU Honor Code:

To promote a stronger sense of mutual responsibility, trust, and fairness among all members of the Mason community, and with the desire for greater academic and personal achievement, we, the student members of the university community, have set forth this honor code:

Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

Suspected violations of the Honor Code will be referred to the Office of Academic Integrity. For more information, see <http://oai.gmu.edu> .

Specifically for this class,

- During all tests, you must work alone, without communicating with other students or consulting online resources.

- Students are encouraged to form study groups to work on homework assignments and study the course material together. The group is responsible for ensuring that all members take part, learn the material, and understand how to do the assignments and not merely copy the other members' work.
- The secret word is pumpkin.
- Material that is drawn from written or electronic sources must be appropriately cited. Copying and pasting from web sources without citation is considered plagiarism..

Disability support: All students are entitled to reasonable accommodations to enable them to participate in this class. If you have a disability or other condition that requires accommodation, please contact the Office of Disability Services (<https://ds.gmu.edu>) as soon as possible, and then send me the documentation so that you can receive accommodations.

Diversity and Inclusion: As part of the Mason community and the global physics community, we seek to create a learning environment that fosters respect for people across identities. We welcome and value individuals and their differences including race, economic status, gender expression and identity, sex, sexual orientation, ethnicity, national origin, first language, religion, age, and disability.

Student resources: For complete information and links to student support resources on campus, visit <https://stearnscenter.gmu.edu/knowledge-center/knowning-mason-students/student-support-resources-on-campus/>

In particular, please be aware of:

- **Learning Services** (learningservices.gmu.edu)
- **University Libraries** (library.gmu.edu)
- **Writing Center** (writingcenter.gmu.edu)
- **Counseling and Psychological Services** (caps.gmu.edu)
- **Student Support and Advocacy Center** (ssac.gmu.edu)

CLASS SCHEDULE (See the course Blackboard site for a more detailed schedule)

Week #	Dates	Topic(s)	Chapter(s)
1-2	Aug 22 – Sept 4	Waves and sound	11-12
3-5	Sept 5-25	Electrostatics	16-17
6-7	Sept 26 – Oct 9	Electric current and circuits	18-19
8-9	Oct 10-23	Magnetism	20-21
10-12	Oct 24 – Nov 13	Optics	22-25
13	Nov 14-20	Photons and atomic physics	27
14-15	Nov 21 – Dec 4	Nuclear physics	30-31

The “ph” in physics stands for: phun