

PHYS 243-001: College Physics I

Spring 2020

Prof. Dreyfus

Intended Audience: This is the first 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 is a flipped class! This means that new material will be introduced outside of class, before you come to class, and then we'll spend our time together doing problem solving and interactive group activities to better understand the material. There are no "lectures". In order to make the most out of our time together, it is essential that you prepare ahead of time.

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: No previous physics experience is required. We will use algebra (and some trig) throughout the course, so you may want to go back and review your math if it has been a while.

Course Meeting Times:

Class: TTh 10:30 am – 12:20 pm, Exploratory Hall L102

Recitation: There is not a separate recitation section for this class; "lecture" and "recitation" are all combined into one.

Lab: The lab is a separate course (PHYS244), which you may or may not need to take, depending on your major's requirements.

Important Dates:

Midterm 1: **Thursday, February 27**

Midterm 2: **Thursday, April 9**

FINAL EXAM: **Tuesday, May 12 (tentative)**. This is the most likely date for the final, but it is not confirmed yet; we will inform you of the date and time when we know for sure. But in the meantime, don't make plans to leave town before May 12!

Instructors' Contact Info:

<p><i>Professor:</i> Dr. Benjamin Dreyfus bdreyfu2@gmu.edu 703-993-1287 Office: Exploratory 1406 Office hours: Weds 1:30-2:30 pm, Fri 10:30-11:30 am (or by appointment)</p>	<p><i>Learning Assistants:</i></p> <p>Syed Abbas sabbas9@gmu.edu Office hours: M 9-10:30 am, W 11:30 am-1:30 pm, EXPL 4102</p> <p>Lucas Kinsey kinsey3@gmu.edu Office hours:</p>
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If you have a physics question, the best place to turn first is the discussion board on Blackboard. 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 – we're all in this together!

If you email me, I'll respond as soon as I can, but it may not be immediate. Also, **I am completely away from email every week from Friday evening to Saturday evening** and only spending limited time on email the rest of the weekend. I will also be completely away from email on the following dates (starting from the evening before): **Thu Apr 9** and **Wed Apr 15**. (You can still email me at those times, but don't expect a response until later.)

Similarly, your Learning Assistants (LAs) are amazingly helpful, but please remember that they are students just like you are, and they are busy with their own classes too, so please respect their boundaries.

If you want to discuss something in person and can't make it to office hours, I'm happy to talk, but **please make an appointment first**, to make sure I'll be there at that time. (During office hours, you don't have to make an appointment – you can just show up.)

Required materials:

- Textbook: Giancoli, *Physics: Principles with Applications*, 7th edition
- MasteringPhysics access code
- Scientific calculator
- iClicker (or a mobile device with the iClicker app)

Textbook: The textbook is available (new and used) from the university bookstore and other sources. You can get it as a hardcover book containing chapters 1-33 (you'll need the second half if you take PHYS245 next semester), or a softcover book containing just chapters 1-15, or as an e-book. Whichever option you choose, make sure it comes with a **Modified** MasteringPhysics access code (this will enable using MasteringPhysics through Blackboard). If you buy the book used, you may have to buy an access code 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).

Calculator: You may use a scientific calculator on exams, but **not** a programmable (or graphing) calculator. Make sure you know how to use it (including when to use degrees vs. radians, how to enter scientific notation, when you need parentheses, etc.).

Clickers: We will be using the iClicker system (which some of you may have used in past classes). You can either buy a physical clicker from the bookstore or use the iClicker app (download from www.iclicker.com) on your phone or laptop. Either way, make sure to bring your clicker (or mobile device) to class every time (so you can get participation credit). **In order to receive participation points for clicker questions, you must register your clicker for this class in Blackboard** (even if you already registered it in a previous class). There is an "iClicker Student Registration" box on the course homepage where you can do this.

If you are using your laptop or smartphone during class, the expectation is that you will only be using it only for clicker questions, physics simulations, and other class activities. This is not the time to browse Facebook or play online poker. Please don't ruin things for your fellow students.

Components of the course:

Readings and prep assignments: In order to make the most of the time we spend together, you will have an assignment ahead of time so that you come in already familiar with the material (though you'll still understand it better after class than before!). Before each class, there will be some sections of the textbook to read (the calendar is on Blackboard), and there will be some short assignments on Blackboard and/or MasteringPhysics, due at the beginning of class.

In-class activities: Attendance at each class is required. We will not be "lecturing" – instead, you'll be working on problems and working through concepts in groups, with the professor and LAs walking around to help facilitate these activities. At the beginning and end of class (and sometimes in the middle), to make sure everyone is on the same page, we'll do some clicker questions, which will count for participation points (and will not be graded for correctness).

Homework: Each week, there will be a homework assignment on MasteringPhysics, generally due on Sunday nights (but you are encouraged to do as much as possible before the weekend, since that's when Dr. Dreyfus and the LAs will be around to answer questions). Students are

encouraged to work in groups, but what you submit should represent your own work (and to ensure this, MasteringPhysics may give you a different version of the problem from what your friend has).

Exams: There will be two in-class 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 shown above; don't make travel plans to leave town until after the final exam is over! 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 (with appropriate documentation) as soon as possible. Unexcused absences from an exam will result in a grade of zero.

If the university closes due to weather or any other reason, exams scheduled on the date of the closing will be held during the next class session unless otherwise announced.

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**.

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 honor committee**.

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

Grade component	Points
Exams	450
Weekly homework	275
Pre-class assignments	100
In-class participation (clickers)	100
In-class participation (group activities)	60
Survey participation	15
TOTAL	1000

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

Note that, compared to other science classes you may have taken, exams are a relatively small part of your final grade. Note also that you get a lot of points just for showing up and participating. But the flip side is that if you don't show up and participate, you are not going to do well in the class.

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 questions about grades:

FAQ 1: I submitted my homework on MasteringPhysics and got 25/25, but Blackboard says I only got 4/25! 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.

FAQ 2: What happens to my participation points if I have to miss class for [insert valid reason]? I know that you're going to make every effort to come to class, but I understand that sometimes absences are unavoidable. Other than for exams, I'm not going to investigate whether every absence was excused or unexcused. But recognizing that everyone might have to miss a class or two, the total possible participation points are going to be greater than 100 (and likewise for pre-class assignments), but when the final grade is calculated, it will be only out of 100. So if you have 110 points, that will count as 100/100; if you have 100 points, that will also count as 100/100. So you're not going to get participation credit for days you weren't there (even if it was for a good reason), but you could still get 100% participation points anyway. (Of course, you're still responsible for talking to someone who was there about what you missed.) If extraordinary circumstances require you to miss multiple classes, please speak with Prof. Dreyfus and we'll figure out what to do.

Snow days: While the university is open, class **is** happening, unless you hear explicitly otherwise. (This is true even if the university opens late. For example, if the university opens at 11:00, then our 10:30 class is still happening (from 11:00 until the scheduled end) unless you hear otherwise.) If the university is closed, all classes are cancelled.

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 papaya.
- Material that is drawn from written or electronic sources must be appropriately cited. Cut and paste from web sources without citation is considered plagiarism.
- There is no valid reason why you should ever have a clicker other than your own.

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/>

A few of the resources available are listed below.

- **Counseling and Psychological Services** offers psychological services, a variety of learning services, multicultural services, and educational programs that support students' educational goals.
- **Learning Services** provides a variety of experience based learning opportunities through which students explore a wide range of academic concerns. Services include support to students with learning differences, individual study skills counseling, individualized programs of study, and provision of tutoring resources.
- **Mathematics Tutoring Center** offers tutoring on a walk-in basis for all George Mason students enrolled in math courses up to MATH 290.
- **Office of Disability Services** implements and coordinates reasonable accommodations and disability-related services that afford students with special needs equal access to university programs and activities.
- **Office of Diversity, Inclusion, and Multicultural Education** serves students, cultural organizations, and the Mason community by promoting an environment that fosters and values human understanding and diversity. The office seeks to provide services and

programs that will instill university-wide appreciation for diverse perspectives and ensure equal levels of inclusion, participation, and retention of underrepresented student groups in their quest for a quality education.

- **Student Health Services** provides high quality health care, counseling, education and prevention services in support of student learning and retention.
- **Student Support and Advocacy Center** provides comprehensive services for students in an effort to foster the safety and well-being of the Mason community. SSAC services include assisting students who are encountering barriers to their academic success or personal growth, interpersonal violence prevention, alcohol and drug education, health promotion/healthy relationships, student crisis intervention, and connecting students with appropriate campus and off-campus resources.

Disability support: Please contact the Office of Disability Services (SUB I, Suite 2500, ods@gmu.edu) if you have a learning or physical disability that will require accommodation in this class. You must obtain the proper paperwork as soon as possible and contact me during the first week of classes so that I can accommodate your needs throughout the course.

CLASS SCHEDULE (See the course Blackboard site for a more detailed schedule, which will be updated throughout the semester)

Week #	Week of	Topic(s)	Chapter(s)
1	Jan 21	Introduction, Motion in 1 dimension	1, 2
2	Jan 28	Motion in 1 dimension, Vectors	2, 3
3	Feb 4	Motion in 2 dimensions, Forces	3, 4
4	Feb 11	Forces	4
5	Feb 18	Energy	6
6	Feb 25	Energy	6
7	Mar 3	Momentum	7
8	Mar 17	Circular and Rotational Motion	5, 8
9	Mar 24	Oscillations	11
10	Mar 31	Fluids	10
11	Apr 7	Temperature	13
12	Apr 14	Gases, Diffusion	13
13	Apr 21	Thermodynamics	14, 15
14	Apr 28	Thermodynamics	15

The “ph” in physics stands for: phun