PHYS 2051: Principles of Physics I
Summer 2024

Welcome to PHYS 2051!

This is the first semester of a calculus-based introduction to physics, particularly suited to the needs of premed students and science majors. The overall goal of the course is to introduce the fundamental ideas that form the foundation of physics, and to show that this framework of ideas can be used to explain the behavior of a wide variety of complex physical systems. The course will cover the traditional introductory topics, including kinematics, Newton's Laws, momentum, energy, rotational dynamics, gravitation, oscillations, fluids, and thermodynamics.

When you join this class you become part of a community that has a single mission: to help you learn in a supportive environment so that you can achieve your personal goals for success. In our community, there is great diversity and we all have different life experiences. Those experiences bring equally valuable insights, perspectives, and backgrounds. Respecting and honoring those is an important part of working together to achieve our common goals.

Course Team

Course instructor: Prof. Leanne Doughty, leanne.doughty@georgetown.edu

Course Meeting Days and Times

Lectures: Mon-Fri, 8:30 - 10:00 am

Recitation:

- Section 10: Tues & Thurs, 10:15 - 11:15 am
- Section 11: Mon & Wed, 10:15 - 11:15 am

Office Hours

Time: TBD

Required Course Materials and Tools

- Textbook: *OpenStax University Physics Volume 1*
- Access to Canvas: All course content will be shared via Canvas as well as discussions and assignments..

- Means to upload scanned written work as a pdf document. More details on options for doing this will be available on Canvas.

Learning Goals

The primary learning goals of this course are:

1. To develop a conceptual understanding of physics and the interconnectedness of physical phenomena, and how the laws of physics affect living organisms. For example, we will explore why bugs don't need lungs, but humans do and how Newton's Laws apply even at the cellular level.
2. To develop autonomous learning skills, particularly in relation to creating a toolkit of representations for expressing and manipulating the laws of physics, which will help you to make quantitative predictions about various phenomena.
3. To learn to think clearly and simply about the physical world. We will work on increasing problem-solving and modeling skills. Specifically, we will focus on identifying the important elements of a problem (in a physics context or otherwise), making appropriate simplifications, constructing a solution, and identifying the limitations of the solution. A few years after this course is over, it is likely that you will have forgotten the formula for the kinetic energy of an object that rolls without slipping - but you hopefully will have retained these modeling skills.

Expectations

PHYS 101 in the summer is a condensed course and as such we cover a lot of material each day (often one full chapter). The nature of the subject matter is such that the content builds on itself, meaning that in order to understand Week 3 ideas you must have a solid understanding of ideas covered in Week 1 and 2. Therefore, you should plan to attend every class and spend a substantial amount of time outside of class (3-5 hrs per day) revising lecture notes, completing assignments, attending office hours and reading ahead for the next day. ***We have many office hours per week and we very much hope that you will come and ask questions from lecture and recitation and about the assignments you are working on.***

Course Components

Lecture
Much of the course concepts will be introduced through lecture.This will be a space for us to build up an understanding through conceptual questions and also to practice solving problems together. Even though we have quite a large class size I do want our class time to be as interactive as possible.

Recitation & Recitation HW
People generally learn best by discussion, lots of practice, and by teaching one another. Recitation will be a space for us to engage in activities that explore concepts and their applications more deeply. During this time you will work in assigned groups of 3-4 with a TA available for questions and to help guide your reasoning. If you think you can not attend the scheduled recitation time please let me know as soon as possible. Every recitation will have a follow-up homework that will allow you to continue exploring the concepts in another context. Both recitation homeworks from the previous week will be due at the start of your first recitation the next week (Monday or Tuesday depending on your section).

Lecture Homework
One of the most important things that you can do to train your brain to simplify the physical world is *to think through physics problems.* We will assign homework in two forms:

- *Problem Sets***:** The homework here will generally focus on numerical response questions.
- *Conceptual Homework:* These assignments will usually be more involved problems, requiring the drawing of diagrams and writing of explanations.

I very strongly encourage you to work on the problems in (small) groups. After discussions with classmates, I expect you to write up your solutions independently; solutions should not appear to have been copied from a shared template. Your homework solutions should be presented cleanly (they should not look like scratch paper) and equations should be framed and connected by complete, grammatical sentences. Your solutions should read like stories or like textbook excerpts. You should not simply copy solutions to similar problems that you have found on the internet. This is academic dishonesty unless you acknowledge the source of your "solution," and you will likely learn little this way.

How we will assess the goals
Final grades will be based on the following components:

- Attendance and Participation (20%)
    - Engaging with material and in class discussion during lecture
    - Engaging with your group to complete the recitation worksheet
- Homework (35%)
    - Problem Sets (10%)
    - Lecture HW (12.5%)
    - Recitation HW (12.5%)
- Exams (45%; 15% each)
    - Exam 1: Friday, June 14th
    - Exam 2: Friday, June 28th
    - Exam 3: Friday, July 5th

Your numerical grade is translated into a letter grade according to:

A range ≥ 90%
B range ≥ 80%
C range ≥ 70%
D range ≥ 60%
F < 60%

Course Schedule

Course Schedule					
Week	*Mon*	*Tues*	*Wed*	*Thurs*	*Fri*
1	Introduction (Ch 1)	Motion & Kinematics (Ch 3)	Forces (Ch 5.1-5.3)	Forces (Ch 5.7) & Projectile motion (Ch 4.1-4.3)	Relative motion (Ch 4.5) & Friction (Ch 6.2)
	Rec #1:How big is an earthworm?	Rec #1:How big is an earthworm?	Rec #2: Kinematics	Rec #2: Kinematics	
2	Newton's 3rd Law (Ch 5.5) & Force Practice (Ch 6.1,6.2,5.4)	Circular motion (Ch 4.4, 6.3)	Work and kinetic energy (Ch 7.1-7.3)	Potential energy (Ch 8.1)	Exam 1
	Rec #3: Statics	Rec #3: Statics	Rec #4: Dynamics	Rec #4: Dynamics	
3	Energy conservation (Ch 8.2-8.4)	Impulse and momentum (Ch 9.1-9.4)	**Juneteenth**	Rotational motion & dynamics (Ch 9.6, 12.1)	Rotational motion & dynamics (Ch 10)
	Rec #5: Energy	Rec #5: Energy		Rec #6: Momentum	
4	Angular momentum (Ch 11)	Gravity (Ch 13)	Fluids (Ch 14)	Oscillations (Ch 15)	Exam 2
	Rec #6: Momentum	Rec #7: Rotational	Rec #7: Rotational	Rec #8: Pressure in a liquid	

5	Ideal Gas Law (Vol 2, Ch 2.1)	First law of thermodynamics (Vol 2, Ch 3.1-3.4)	Second law of thermodynamics (Vol 2, Ch 4)	**Independence Day**	Exam 3
	Rec #8: Pressure in a liquid	Rec #9: Buoyancy	Rec #9: Buoyancy		

Policies

Accommodations

Accommodations Requests: If you have a disability that may affect your academic work or well-being and for which accommodations may be necessary, I encourage you to approach me within the first two weeks of the course (or, in other circumstances, as soon as possible after accommodation becomes necessary) so that I can arrange for your needs to be met in this regard. You will also need to contact the Academic Resource Center (http://academicsupport.georgetown.edu), located in Leavey Center

Honor System

The Georgetown Honor System can be found online at http://honorcouncil.georgetown.edu. All students are expected to maintain the highest standards of academic and personal integrity in pursuit of their education at Georgetown. Academic dishonesty, including plagiarism, in any form is a serious offense, and students found in violation are subject to academic penalties. All students are held to the Georgetown University Honor System.

Support

When it comes to issues around health and wellness, you may face challenges in your time at Georgetown—and even in the course of one semester. It's important to be aware of the resources available to support you, myself included. Here is a link to the mental health, wellness and health care resources Georgetown provides: Mental Health, Wellness and Health Care Resources - Georgetown University

Sexual Misconduct

Georgetown University and its faculty and staff are committed to supporting survivors and those impacted by sexual misconduct, which includes sexual assault, sexual harassment, relationship violence, and stalking. Georgetown requires faculty members, unless otherwise designated as confidential, to report all disclosures of sexual misconduct to the University Title IX Coordinator or

a Deputy Title IX Coordinator. If you disclose an incident of sexual misconduct to a professor or staff member in or outside of the classroom (with the exception of disclosures in papers), that faculty or staff member must report the incident to the Title IX Coordinator, or Deputy Title IX Coordinator. The coordinator will, in turn, reach out to the student to provide support, resources, and the option to meet. Please note that the student is not required to meet with the Title IX coordinator and no action will be taken without the student's awareness. More information about reporting options and resources can be found on the Sexual Misconduct Website: https://sexualassault.georgetown.edu/resourcecenter.

If you would prefer to speak to someone confidentially, Georgetown has a number of fully confidential professional resources that can provide support and assistance. These resources include:

- Health Education Services: Sexual Assault Response and Prevention: sarp@georgetown.edu
- Counseling and Psychiatric Services (CAPS): 202.687.6985

Additional resources are included below:

- Georgetown Self-Care Resource Guide: https://studenthealth.georgetown.edu/health-promotion/self-care/
- Georgetown Wellness Wheel: https://studenthealth.georgetown.edu/hoya-wellness-wheel/
- Georgetown Guide to Recognizing Students in Distress: https://studentaffairs.georgetown.edu/studentoutreach/facultystaffresources/

Pregnancy Modifications and Adjustments

Georgetown University is committed to creating an accessible and inclusive environment for pregnant students. At any point throughout their pregnancy students may request adjustments/modifications based on general pregnancy needs or accommodations based on a pregnancy-related complication or medical need. Students may also request accommodations following labor and delivery based on a complication or medical need.

To request pregnancy modifications, please complete the SCS Pregnancy Modification Request Form: https://forms.gle/ZBfASxui7u13A8TU6
More information about pregnancy modifications can be found on the Title IX Georgetown University Website: https://titleix.georgetown.edu/title-ix-pregnancy/student-pregnancy/