

PHYSICS 151: FUNDAMENTALS OF PHYSICS I

MECHANICS AND THERMODYNAMICS

FALL 2024

Instructor Information

Prof. Lara Martini
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SHS 369
Office Hours: TBA

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Course Information

Lecture 50380:	MWF	10:00 – 10:50am	SLH 200
Lecture 50382:	TTh	2:00 – 3:20pm	SLH 200
Quiz:	W	5:00 – 6:20pm	TBA

TA Information

TBA

GENERAL COURSE INFORMATION

Welcome to PHYS 151! This is the first course in a three-semester sequence covering the basic principles of physics at an introductory level, aimed at science and engineering majors. The courses start with classical mechanics, covering kinematics, Newton's laws, conservation of energy and momentum, Newtonian gravity, rotational dynamics, and statics. Then they proceed on to thermodynamics, electricity and magnetism, oscillations and waves, special relativity, optics, and finally end with an introduction to quantum mechanics.

In PHYS 151 we will cover classical mechanics and thermodynamics. Our assumption is that you have not seen this material at an introductory level, so we will introduce each topic from first principles and provide some derivations where we feel it is of pedagogical value. We will work a multitude of in-class examples and assign regular homework to help you master the concepts and their applications to problem solving. At its core, physics is about modeling the world mathematically and then using that formalism to analyze and solve problems. You should be comfortable with the use of trigonometry, algebra, and differential and integral calculus (at the level of the prerequisites for this course), as they will be used throughout the semester.

Textbook:

The assigned textbook for the course is *Physics for Scientists and Engineers*, 10th edition, by Serway and Jewett. This is a great introductory physics textbook and will be used for all three of

PHYS 151, PHYS 152, and PHYS 153 (for PHYS 153 you will need the copy that includes *with Modern Physics* in the title). We highly recommend obtaining a copy of the book (digital or physical) and reading the relevant sections before class. Reading the material ahead of time will help you to get the most out of the lectures.

Prerequisites:

- 1 from MATH 125 or MATH 126 or MATH 226 or MATH 129 or MATH 229.

Registration:

- Your registration for this course consists of three separate parts: a lecture, a quiz, and a laboratory. You must register for one of each. We only use the quiz section twice.
- Students who are repeating 151 must obtain written permission from the Undergraduate Physics Office (ACB 439, physics@dornsife.usc.edu) to be excused from repeating the laboratory. All other questions regarding registration should be directed towards the Undergraduate Physics Office.

Course Websites:

- Brightspace is used to distribute course materials.
- Gradescope will be used to submit homework and exams using your smart phone. Please contact your instructor if you will need assistance using Gradescope.
- Piazza is a learning management system where you can submit questions anonymously in a forum-type format. You may post to the entire class or to your instructor privately.

All links will be provided on Brightspace.

GRADING

Your cumulative course grade will be determined from the following distribution:

Lab	20%
Homework	10%
Midterm 1	20%
Midterm 2	20%
Final Exam	30%

Minimum Passing Requirements:

To receive a passing grade (D or above) you must pass both the lecture and lab components. To pass this course, you must meet the following minimum requirements, regardless of your cumulative score in the class:

- Complete 100% of the labs and earn a score of 70% or higher in the laboratory grade.
- Submit 75% of all homework. Even incomplete homework will count as submitted.
- You must pass the comprehensive final exam to pass this course.

Laboratory:

You should consider the lab as an *independent course*, although its grade is factored into your overall PHYS 151 grade (see above). The point of the lab is to get hands on experience doing experimental physics—not simply to confirm theoretical knowledge. In fact, we would encourage

you to approach the lab with the least amount of theoretical knowledge as possible. Answer the question “what do I think is going on?” rather than “what am I *supposed to think* is going on?” Newton did not have Newton’s laws when he wrote the Principia—he used the scientific method and synthesized the results of many experiments to come to his understanding of Nature.

Complete details about lab grading and make-up policies are provided on the laboratory section’s Brightspace site. Other questions concerning the laboratory should be referred to the Lab Director, Gökhan Esirgen (KAP B19, (213) 740-1138, esirgen@usc.edu).

Homework:

Homework will be assigned regularly, roughly once per week. The due dates of the assignments will be determined and posted as we go along but expect to have on average one assignment per week. Your solutions must be hand-written or typed, and you will upload a scan/picture of your solutions to Gradescope. Please be sure that your solutions and scan/picture are legible.

The problems will mostly be from our assigned textbook for the course (see above). The problems will be typed out and the assignments will be posted to Brightspace. Expect the problems to range in difficulty. We encourage you to work together with your fellow classmates. However, you must submit your own work. Any blatant copy of another student’s work, online solutions, etc., will be subject to the full penalties of plagiarism as enforced by the University, and will result in all subsequent consequences. *Work together to solve the problems but write up your own solutions.*

No late homework is accepted. To accommodate unforeseen circumstances, we will cap the maximum score for the homework to be out of two less than the total number of assignments. For example, we anticipate there will be 12 assignments total, so the maximum score for the homework will be out of 10 assignments if that is the case. *This is better than dropping the two lowest scores* since you can use all the assignments to reach the maximum score.

Notice that the homework is worth 10% of your grade, while the exams make up 70% of your grade. If you simply copy solutions from an online resource, not only is this considered a violation of academic integrity, but you are also putting yourself at a *severe disadvantage* for the exams.

Exams:

There will be two midterm exams and one final exam. We will announce exactly what material (i.e. textbook chapters/lectures) will be covered on the midterms at least one week before the exams. There are no make-up exams. The midterm exams will be held during the quiz section. The two midterms are the *only* times we will use the quiz section during the semester. The final exam will be cumulative with emphasis on the material learned after the second midterm. You must pass the comprehensive final exam to pass this course.

Midterm Exam 1 – Wednesday, October 2nd, 5:00 – 6:20 PM

Midterm Exam 2 – Wednesday, November 6th, 5:00 – 6:20 PM

Final Exam – Monday, December 16th, 4:30 – 6:30 PM

IMPORTANT DATES FOR FALL 2024

August 26	Fall semester classes begin
September 2	Labor Day (University Holiday)
September 13	Last day to drop/add and change to Pass/No Pass
October 2	Midterm 1
October 10-11	Fall Break
October 11	Last day to withdraw without a “W” on transcript
November 6	Midterm 2
November 11	Veteran’s Day (University Holiday)
November 15	Last day to drop class with mark of “W”
November 27-29	Thanksgiving Break
December 6	Fall semester classes end
Monday, December 16, 4:30 – 6:30 PM	Final exam

LIST OF TOPICS

Here is a tentative list of topics with corresponding chapters in the course textbook (see above).

Week	Topic	Chapters
1	Introduction & 1D Motion	1, 2
2	Vectors & 2D Motion	3, 4
3	Newton’s Laws of Motion	5
4	Applications of Newton’s Laws	5, 6
5	Work and Energy	7, 8
6	Linear Momentum & Collisions	9
7	Rotational Kinematics	10
8	Rotational Dynamics	11
9	Universal Gravitation	13
10	Simple Harmonic Oscillations	15
11	Fluid Mechanics	14
12	Temperature & Kinetic Theory of Ideal Gases	18, 20
13	Heat & the First Law of Thermodynamics	19
14	Heat Engines, Entropy & the Second Law of Thermodynamics	21
15	Buffer week & Review	

STATEMENTS ON ACADEMIC CONDUCT AND SUPPORT SYSTEMS**Academic Conduct:**

Plagiarism is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Disabilities:

Students who need to request accommodation based on disability are required to register each semester with the Office of Student Accessibility Services (OSAS, (213) 740-0776, GFS 120). You must send an updated letter of verification to the instructor for the semester you are enrolled in.

Faculty Liaison:

All courses in the Department of Physics & Astronomy have an assigned Faculty Liaison to serve students as a confidential, neutral, informal, and independent resource when they wish to discuss issues concerning their course without directly confronting their instructor. The Faculty Liaison for this course is Prof. Jack Feinberg (feinberg@usc.edu, (213) 740-1134, SSC 327).

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime. Provides overall safety to USC community. dps.usc.edu

Frequently asked questions about grading:

- *Is there a predefined grading scale?* **A.** We assign course grades at the end of the semester by examining the distribution curve of the full combined score (homework, midterm exams, final exam and labs). The demarcation points for specific letter grades are decided only at that time, not in advance.
- *Will any low homework or lab scores be dropped?* **A.** No, but the maximum score for the homework will be that of two less than the total number of assignments. This is better than dropping low homework scores.
- *How do I ask for a regrade of a homework or quiz problem?* **A.** All regrade requests must be submitted *in writing within one week* after the graded work is returned to you. Send me a clear detailed explanation of why you think the grader missed some appropriate credit. Note that requests of the type "I think Problem 2 should be given more points, please check" will not be accepted.
- *I'm putting a lot of work and time into the class, shouldn't that by itself count for credit?* **A.** We are pleased to hear about your serious approach to studying. However – as generally is the case in life, for better or for worse – grades are based on performance, not merely effort (of course, the former will not come without the latter). But if we see good strengthening of your scores over the course of the semester, we'll definitely take that into account.

