

# PHYSICS 135A: PHYSICS FOR THE LIFE SCIENCES

## MECHANICS AND THERMODYNAMICS

### FALL 2024

#### **Instructor Information**

Prof. Aaron Wirthwein  
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SHS 370  
Office Hours: TBA

#### **Course Information**

Lecture 50382:	TTh	8:30 – 9:50am	SLH 100
Quiz:	W	5:00 – 6:20pm	TBA

#### **TA Information**

TBA

#### **GENERAL COURSE INFORMATION**

Welcome to Physics 135A! This is the first semester in the physics sequence for students majoring in the life sciences or preparing to enter a health-related profession. Physics 135A will cover basic concepts of mechanics, fluids, waves, and thermodynamics. These physical theories explain a wide variety of phenomena directly accessible to our senses and have revolutionized technology and our understanding of nature. No prior knowledge of physics is required.

#### **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 four times.
- Students who are repeating 135A 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.

#### **Required Materials:**

- Course Textbook: Giancoli, *Physics: Principles with Applications*, 7<sup>th</sup> ed, with access to Mastering Physics for the online portion of the homework (see below).
- The laboratory manual will be provided on the lab's Brightspace site. You will need to read the manual in advance of your lab meetings. Please contact the Lab Director, Dr. Gökhan Esirgen (KAP B19; [esirgen@usc.edu](mailto:esirgen@usc.edu)) for any questions regarding the lab.

#### **Prerequisites:**

- 1 from MATH 108 or MATH 125 or MATH 126 or MATH 226.

Recommended Preparation:

Mathematics is the language of physics. However, only minimal knowledge will be assumed for this course. The prerequisite for this course is a working knowledge of elementary algebra and trigonometry. I highly recommend reviewing the notes on algebra and trigonometry provided by Paul Dawkins of Lamar University at the following address: <https://tutorial.math.lamar.edu/>. Your textbook also has a brief review in Appendix A.

Course Websites:

- Brightspace is used to distribute course materials (lecture notes, homework, etc.).
- Gradescope will be used to submit the homework, quizzes, and the final exam 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%
Four Quizzes	40%
Final Exam	30%

Minimum Passing Requirements:

To receive a passing grade (D or above) you must pass all portions of the lecture and the 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.
- Pass the quizzes and comprehensive final exam. Your lowest quiz score will be dropped.

Extra Credit Opportunity:

This semester the USC Rossier School of Education is assessing a brief online program aiming to enhance student motivation and engagement. More details will be provided in class. Your participation is entirely voluntary. An optional 1% extra credit to your overall course grade will be given for participation in the School of Education project.

Laboratory:

You should consider the lab as an *independent component of the course*. 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](mailto:esirgen@usc.edu).

### Homework:

There will be weekly homework assignments, appearing on Mondays in the Assignments subfolders of Brightspace. Homework will be due the following Monday on Gradescope by midnight. Solutions will pop up online in the same folders at class time, and therefore we will be unable to accept any late homework.

Homework will have two components: written and online. The online assignment will be done via the Mastering Physics website (<https://mycourses.pearson.com>, course login information will be posted on Brightspace), while the other part will come from problems and questions that you'll be writing out by hand in the traditional way and uploading via Gradescope. Online assignments are graded as you submit them (you will have three attempts to arrive at the correct answers). The graded written component will be returned to you within a week.

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.*

Notice that the homework is worth 10% of your grade, while the exams are worth 70%. 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 four relatively short quizzes and a final exam. The quizzes, approximately 40 minutes long, will be given on Wednesday evenings during the quiz period. These four times, spaced through the semester, are the only use of the quiz period. The quizzes will cover the material incrementally, while the final will cover the entire course. The lowest of the four quiz scores will be dropped.

All tests will be *closed book*: no notes, mobile phones, smart watches, programmable calculators, or other devices and materials are allowed. You may bring a very basic non-programmable calculator. We will, however, provide a page of main formulas, which also will be posted on Brightspace ahead of time for help with studying. Please be sure to have your student ID available for inspection upon request during the exams.

Please pay attention to the exam dates and times. *No exceptions are allowed.* If you have a conflict, please attend to it immediately. There are no make-up exams—a missed exam will count as a zero. If you cannot attend a test due to a documented medical emergency, *you must contact the instructors as promptly as possible before the test if possible.*

**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
<b>September 18</b>	<b>Quiz #1</b>
<b>October 9</b>	<b>Quiz #2</b>
October 10-11	Fall Break
October 11	Last day to withdraw without a "W" on transcript
<b>October 30</b>	<b>Quiz #3</b>
November 11	Veteran's Day (University Holiday)
November 15	Last day to drop class with mark of "W"
<b>November 20</b>	<b>Quiz #4</b>
November 27-29	Thanksgiving Break
December 6	Fall semester classes end
<b>Monday, December 13<sup>th</sup>, 8am</b>	<b>Final exam</b>

**LIST OF TOPICS**

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

<b>Week #</b>	<b>Topic</b>	<b>Chapter(s)</b>
1	Introduction & 1D Motion	1, 2
2	Vectors & 2D Motion	2, 3
3	Newton's Laws	3, 4
4	Applications of Newton's Laws	4
5	Circular Motion & Gravitation	5
6	Work & Energy	6
7	Conservation of Energy	6
8	Linear Momentum & Collisions	7
9	Rotational Motion & Statics	8, 9
10	Fluid Mechanics	10
11	Oscillations & Waves	11
12	Properties of Sound	12
13	Temperature & Kinetic Theory	13
14	Heat & First Law of Thermodynamics	14
15	Entropy & Second Law of Thermodynamics	15

## STATEMENT ON ACADEMIC CONDUCT AND SUPPORT SERVICES

### 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](http://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](mailto: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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://dps.usc.edu)*

Frequently asked questions about grading:

- *Is there a predefined grading scale?* **A.** I assign course grades at the end of the semester by examining the distribution curve of the full combined score (homework, quizzes, 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 lowest quiz score will be dropped.
- *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.** I am 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 I see good strengthening of your scores over the course of the semester, I'll definitely take that into account.

