

Course Syllabus

Physics for Scientists and Engineers: Fluids, Waves, Optics and Thermodynamics

Physics 4C - Spring 2026

Instructor: Noha S. Farghal, Ph.D.

Email: farghalnoha@fhda.edu

Office Hours: 11 AM–12:40 PM Wednesdays (remote) or by appointment

Class Meets: MTWTh 01:30 PM-02:20 PM in S34; Friday Online

“The scientist does not study nature because it is useful; he studies it because he delights in it, and he delights in it because it is beautiful. If nature were not beautiful, it would not be worth knowing, and if nature were not worth knowing, life would not be worth living.”

— Henri Poincaré

N.B.: This syllabus is subject to change. Any modifications will be announced in class.

Prerequisites

Physics Requirement:

- Passing grade (C or higher) in Physics 4B

Mathematics Requirement:

- Concurrent enrollment in Math 1D or Math 1DH
-

Course Description

Contents

This course covers fluid mechanics (pressure, Archimedes’s principle, Bernoulli’s equation), thermodynamics (temperature, the laws of thermodynamics, thermal expansion, the ideal gas law, calorimetry, kinetic theory, heat engines, entropy), mechanical waves (traveling waves, sound, interference, standing waves, Doppler effect), and optics (geometric optics, reflection, refraction, image formation, interference, polarization).

Textbook Utilization: In the textbook (see below), we will cover chapters **14, 16–22, and 35–38**. I try to keep lectures as aligned with the textbook as possible to make it easier and more convenient to prepare for class and review materials.

For material review outside of lecture videos, please use the Textbook as exams will be based on it in the most part. **Lecture slides will not be shared** to ensure that you review the Book.

Required Materials

- **Textbook:** *Physics for Scientists and Engineers, Volume 1&2, 9th Edition, Serway and Jewett.*
 - **Calculator:** Casio FX-300MS, TI-30XIIS, TI-30Xa, or equivalent.
-

Teaching Philosophy

This course is designed to build a deep conceptual understanding and practical fluency in the core ideas of physics that underpin engineering and the physical sciences. Alongside technical proficiency, time permitting, we will explore the historical development of key ideas, examine real-world applications, and reflect on the broader scientific context. This course is designed not only to build problem-solving skills, but also to cultivate an appreciation for the intellectual richness and relevance of physics.

Lecture Attendance

- **Punctuality Required:** Students must arrive on time and attend all class sessions. Consistent participation

is essential for success in this course.

- **Consequences for Absences:**
 - 4 or more late arrivals or absences may result in being administratively dropped from the course
 - This action is at the instructor's discretion
- **Withdrawal Responsibility:** If you choose to stop attending, you must:
 - Officially withdraw through the registrar's office
 - Complete all required paperwork
 - Failure to properly withdraw will result in a grade of "F"

Class Environment

The classroom is a space where curiosity is encouraged, questions are always welcome, and we learn physics together through collaboration and mutual respect. We will work through challenges together, support each other's learning, and celebrate both effort and insight. It is a place where every student feels safe to participate, make mistakes, and grow. If you are having any difficulties with the material covered, please reach out to me during or outside of office hours. I am here to help! Do not wait! I welcome questions and feedback.

Grading

Weights of Various Components

- Homework: 15%
- Midterm I: 20%
- Midterm II: 20%
- Lab: 15%
- Final Exam: 30%
- **Total: 100%**

Lower threshold Percentage Ranges for Letter Grades

- **98%: A+**
- **92%: A**
- **90%: A-**
- **88%: B+**
- **82%: B**

- **80%: B-**
- **70%: C+**
- **65%: C**
- **60%: D+**
- **54%: D**
- **<54%: F**

Lecture Component

Homework

- Regular homework assignments will be posted on Canvas and must be submitted by the stated deadlines.
- Homework is graded and constitutes 15% of your grade in total.

Homework Solutions Guide

IMPORTANT: To receive full credit, every problem must follow the steps below, in order. Correct answers that do not follow this format will lose credit.

1. **Start with equation(s) in symbols:** Write the equation(s) that you will use before substituting numbers.
2. **Number your equations:** Number your finalized version of each of your equations.
3. **Reference your equations:** If you use the same equation again, just cite its number (e.g., "see equation 3") instead of rewriting it.
4. **Solve for the requested variable in symbols:** Isolate the unknown algebraically, keeping everything symbolic.
5. **Make substitutions:** Plug in known values and show intermediate work clearly. It is highly preferred but not required that you include units in intermediate steps.
6. **Attach units using SI units consistently:** Include correct SI units (e.g., 9.81 m/s^2) with your final answer.
7. **Compute the final numeric value:** Carry appropriate significant figures; round only at the end.
8. **Put a box around your final answer:** Emphasize your result clearly.
9. **Organize in columns or sections:** Make sure that the instructor can follow your work with reasonable ease.

Do not skip any calculation steps that show how you got from one partial result to the other!

Exams

- The course includes **two in-person midterm exams** and **one in-person comprehensive final exam**.
- **No makeup exams** will be given.

Permitted materials:

- Any non-web-enabled calculator (no cell phones, tablets, Desmos, or internet-capable devices)
- An equation sheet and scratch paper (provided)

Not permitted: Additional notes, books, or reference materials.

Exam score replacement policy:

If the final exam score is higher than the student's lowest midterm score, the two scores will be averaged and the resulting value will replace the lowest midterm score.

- The **final exam must be completed to pass the course**.
- **No extra credit** assignments will be offered.
- The **final exam is comprehensive**.

Exam Dates

- Midterm 1: **TBD**
- Midterm 2: **TBD**
- Final Exam: **Tuesday from 1:45 PM to 3:45 PM**

Lab Component

For lab policies, please visit your lab section's Canvas page.

Course Policies

Grade Disputes

- Grade disputes must be submitted within **2 school days** after the assignment is returned.
- Requests must include a written explanation identifying the specific items in question.

- No regrade requests will be accepted after the deadline.

Late Work Policy

- **General Rule:** Assignments are due at the posted due date/time. Work submitted after the deadline is considered late and will receive a penalty.
- **Late Penalty:** Late work is accepted with a deduction of **5% of the total possible points per calendar day** (or portion of a day) late.
 - Example: A 20-point assignment submitted 2 days late receives a 10% penalty (2 points deducted), for a maximum score of 18/20.
 - A submission even a few minutes after the deadline counts as **1 day late**.
- **Maximum Late Period:** Late work will be accepted for up to **7 calendar days** after the due date. After 7 days, late submissions will receive a score of **0**.
- **Extensions:** If you anticipate a conflict, contact me **before the deadline** whenever possible. Extensions may be granted at my discretion.
- **Exceptions:** Documented medical emergencies or university-approved accommodations may qualify for an exception to the late penalty. Please communicate as soon as possible.

Consequences for Not Participating:

- 3 or more missed homework assignments may result in being administratively dropped from the course.
- This action is at the instructor's discretion.

Withdrawal Responsibility:

If you choose to stop participating, you must:

- Officially withdraw through the registrar's office
- Complete all required paperwork
- Failure to properly withdraw will result in a grade of "F"

Academic Support

- Attend instructor office hours for clarification and guidance.
- Form study groups with classmates.
- Utilize the Math, Science, and Technology Resource Center.
Website: deanza.edu/studentsuccess/mstrc/ (Canvas-friendly text version)

Classroom Conduct Policy

Academic Integrity

"The following types of misconduct for which students are subject to disciplinary sanctions apply at all times on campus as well as to any off-campus functions sponsored or supervised by the college: cheating, plagiarism or knowingly furnishing false information in the classroom or to a college officer."

Violating the Academic Integrity Policy will result in a grade of "F" in the class and the incident will be reported to the college disciplinary office.

Communication

Via e-mail ONLY: farghalnoha@fhda.edu

Zoom Links

Zoom link for Office Hours:

Zoom Meeting Link (Canvas-friendly text label)

Student Learning Outcome(s):

- Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of waves, fluids, optics, and thermodynamics.
- Acquire confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories.

Office Hours:

W 11:00 AM - 12:40 PM

Zoom