University Physics

CALIFORNIA COMMUNITY COLLEGES ONLINE EDUCATION INITIATIVE

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Course Overview

Course Code and Semester: **Physics 4C, Class Number 20794, Spring 2025**
Course Description: Comprehensive study of major topics of physics: Light, interference, relativity, quantum physics, atoms, molecules, and nuclei. (Satisfies COA AA/AS area 1; CSU area B1/B3; IGETC area 5A/5C; transferable to CSU and UC)
Prerequisites: Physics 4B and Math 3C
Co-requisites: Math 3E and 3F

Who should take this course?

- Intended physics, astronomy, and engineering major students needing the third semester of calculus-based physics.
- Interested students who wish to learn mathematical treatments of special relativity and quantum mechanics (we also cover optics).

If you are taking Physics 4C to meet a transfer requirement, please check with your transfer institution and department. Not all engineering and physical science majors require Physics 4C. Nearly all physics and astronomy majors do require Physics 4C.

Student Learning Outcomes

1. Discuss the concepts of physics, and apply them to situations relevant to the course.
2. Develop descriptions of physical systems using mathematics and calculate measurable quantities.
3. Set up laboratory equipment safely, plan and carry out experimental procedures, identify possible sources of error, reduce and interpret data, and prepare clear written reports.

Instructor Information

Hi! My name is **Andrew Park**. The best way to contact me for course-related matters is through Canvas **Conversations (https://peralta.instructure.com/conversations)** tool (for non-course matters, best way is by email **bpark@peralta.edu (mailto:bpark@peralta.edu)**). You will hear from me regularly throughout the semester, usually through the **Course Announcements (https://peralta.instructure.com/courses/77743/announcements)**. If you need to talk (rather than write) to me individually, please see office hour information below.

Lab Sessions

This **hybrid** course has 100% online lecture section and 100% face-to-face lab section. The lab sessions are scheduled for **Wednesdays in ATLAN 100 from 6 p.m. to 9 p.m.**, in Peralta Science Annex at 860 Atlantic Avenue (starting on February 12).

Office Hours / Virtual Class Sessions

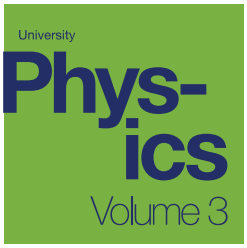
Following are office hours and virtual class session schedule for Spring 2025 *(Last updated at the beginning of semester)*.

Online virtual class session (attendance-optional; most of it recorded) is held regularly on **Fridays at 2 p.m.** Reminder and agenda of the session is announced earlier in the day (or the evening before).

In-person office hours will be held in **ATLAN 100 (Physics Lab Room), Monday and Tuesday from 6 p.m. to 8 p.m.** Drop by with any questions, or just to work on course content using the building WiFi. (And for administrative reasons, 10 minutes after the end of the class sessions on Wednesday evenings are also my in-person office hours.)

For appointments outside of regularly scheduled office hours, please email me to arrange for the time. I usually respond to appointment request emails within 24 hours, and often sooner.

Course Materials



Your course materials are free and available digitally. Our primary and required textbook is *University Physics Volume 3* by OpenStax. You can read it by:

- Accessing it online on **openstax.org** (https://openstax.org/books/university-physics-volume-3/pages/1-introduction),
- Downloading the **PDF** (https://assets.openstax.org/oscms-prodcms/media/documents/UniversityPhysicsVolume3-WEB.pdf) (about 50 MB), or
- Using additional access options on **OpenStax** (https://openstax.org/details/books/university-physics-volume-3).

Relevant textbook sections will be linked to from the Canvas pages, along with additional material on as-needed basis. One material I anticipate referring to from time to time is the classic ***Feynman Lectures on Physics*** (https://www.feynmanlectures.caltech.edu) (beware it does not cover topics in traditional order; I'll place them into proper context for the excerpts we will use).

Important Notes

Grading Standards

The course letter grades are assigned on the following standards:

- **A - Excellent understanding**: After some effort, most of the topics covered in lecture makes sense; student is working toward mastery of all problem-solving techniques necessary to answer most of the homework questions correctly. There are no major gaps in understanding.
- **B - Good understanding**: After some effort, majority of the key topics covered in lecture makes sense; student is familiar with different problem-solving techniques for different homework questions and is working toward mastery of at least one problem-solving technique. There may be some gaps in understanding but nothing that prevents progress in class.
- **C - Fair to Poor understanding**: After some effort, at least one or two key topics covered in lecture makes sense; while the student is struggling with application of problem-solving techniques, once the "correct formula" is given, the student can plug in the numbers correctly and obtain correct final numerical answer. The student can accurately identify areas of understanding and gaps in understanding.
- **Not Passing - No understanding or Not enough work**: The student has not completed a majority of homework assignments and, when given a list of topics to discuss, struggles to accurately identify the topics in which significant improvement in understanding is necessary.

Points and scores are not used to determine your course letter grade; any scores kept are kept for course item completion and evidence of effort only (80% weight for lecture items; 20% weight for lab items). For assessment of your course letter grade, you will tell me (in special-purpose Canvas Assignments set aside for this) what grade you think you should get, and we will attempt to come to a consensus—between how well you feel you understood physics and how much of that I see as your instructor.

Additional detail is given on course Canvas page, **Physics 4C Grading Standards** (https://peralta.instructure.com/courses/77743/pages/physics-4c-grading-standards) (may need to unlock Module requirements to access the page).

ADA Accommodation

Students who may need accommodation for their disabilities are encouraged to contact **Student Accessibility Services** (https://alameda.edu/students/student-accessibility-services-sas/) as soon as possible in the semester so that reasonable (and *legally mandated*) accommodations may be made. The contact information is at the bottom of the SAS website (if you are in a

hurry, this is their email: **SAS.Alameda@peralta.edu (mailto:SAS.Alameda@peralta.edu)**). Usual accommodations made include extended exam time and/or transcription service. Most students with a diagnosed learning disability (such as ADHD or ADD) are eligible. If you are not sure whether you are eligible, please check with a SAS counselor. The details regarding the nature of your disability are confidential and not shared with your instructor.

Instructor's personal note: In my experience, many students who SHOULD HAVE utilized this service do not use them and suffer consequences academically. The goal of SAS (and ADA in general) is that you should be judged on your ABILITY, not disability. For those students who are eligible, the ADA accommodation is what will help you express your full potential (not a special treatment or something to be stigmatized against).

Talk to a SAS counselor today; the worst that can happen is they will tell you that you are not eligible and you wasted a little bit of time.

Tutoring and Academic Support

For tutoring support, please check **Learning Resources Center (https://alameda.edu/students/learning-resources-center-lrc/)** website for access information.

Additional online tutoring may also be available through Online Tutoring link in Canvas course sidebar. Please let me know if there are any issues in accessing any of these academic support services, so that I can help.

Preferred Names and Pronouns

Please help me refer to you in the way you prefer by completing following two things at the beginning of the semester:

- **[GRADED DISCUSSION] Introduce Yourself (https://peralta.instructure.com/courses/77743/discussion_topics/1294721)** (also accessible from Modules, may need to complete Module requirements to access)
- Name Coach entry (see Canvas course sidebar).

I will always do my best to pronounce your name correctly and refer to you with respect. Please help me do that by correcting me if I mispronounce your name—or any other mistakes I may make unwittingly in how I refer to you.

Additional Advice

In the remainder of this syllabus, you will see course policies and other additional detail that may be good to know. But in terms of how you can best prepare yourself for *success* in this class, additional advice is given throughout the Canvas module, **Getting Started (https://peralta.instructure.com/courses/77743/modules/655288)** . So, please, work through the **Getting Started (https://peralta.instructure.com/courses/77743/modules/655288)** module in the first couple days of the semester (or as soon as you can).

Schedule of Assignments

The **Modules (https://peralta.instructure.com/courses/77743/modules)** view in Canvas shows all course materials, assignments, and due dates on a single page, and this is the recommended view for the class. Please use the **Modules (https://peralta.instructure.com/courses/77743/modules)** view to see upcoming assignments and their due dates. Please look at the end of the syllabus for a summary of topics covered, with textbook references.

Fine-print details are below—I encourage you to read through them (it lays out course policies in detail), but I will remind you of anything that is important.

The Fine Print - Course Policies

Please read on for the full listing of course policy. If you would rather skip it, that is fine; I will remind you of anything that is important.

- **Registration**: After the last day to register for classes (see **academic calendar (https://www.peralta.edu/admissions/academic-calendar-finals-schedule-enrollment-calendar)**), you must be registered in the class in order for you to receive credit. No students can be added after this date.
- **Attendance**: Please come ready to work at the beginning of every lab class. Instructor may drop a student if the number of unexcused absences exceeds 2 (number of times the class meets in two weeks; refer to pg. 25 of **College of Alameda 2024-2025 catalog (https://alameda.edu/wp-content/uploads/2024/08/CoA-Catalog-24-25_PRINT_v1.pdf)** for the college policy on attendance). Lecture portion is online and no face-to-face attendance is required for the lecture portion of class. If any difficulties in regular attendance arise, please email me so that we can figure out what can be done.
- **Academic Integrity**: Everything you turn in must be your own work. If you use sources other than the textbook, please clearly cite it and give credit where it is due. Allowing another student to copy your own work also constitutes academic dishonesty (there is a fine line between group collaboration and dishonest copying of others' work; I will help you see it, as needed). Please refer to pg. 394-399 of **College of Alameda 2024-2025 catalog (https://alameda.edu/wp-content/uploads/2024/08/CoA-Catalog-24-25_PRINT_v1.pdf)** for the college policy on academic dishonesty and possible disciplinary measures.
- **Ethical Use of AI Tools**: If any artificial intelligence (AI) tools are used in completing your class work, they must be used ethically. Unethical use of AI tools is academic dishonesty and will have the same consequences as academic dishonesty. For ethical use of AI tools, you must: (1) cite your sources (a Discussion topic will be available to help you do that), (2) review and understand the AI generated content, and (3) be responsible yourself for any mistakes or errors in the AI generated content.
- **Honor Code Pledge**: You must complete the honor code pledge (accessible within the first few course Modules) to continue in this class. Students who do not maintain their honor code pledge may become ineligible to participate in certain course activities or be required to complete activities in a format that does not assume honorable conduct of participants.
- **Schedule Subject to Change**: Assignment and assessment schedules are subject to change. Any changes will be announced through Canvas.
- **Late Assignments**: All assignments are due on the date noted. Canvas will accept late submissions on essay or discussion assignments (the instructor reserves right to grade late submissions in appropriate cases). MyOpenMath assignments must be extended using a "late pass". Thirty-six late passes are given at the beginning of semester, and each late pass extends a MyOpenMath assignment deadline by one week (168 hours). If you have run out of late passes, you are advised to (1) schedule a 1-on-1 meeting with the instructor to plan the best path forward and (2) continue working on the course material using MyOpenMath practice mode (scores in gradebook won't reflect any practice mode attempts).
- **Allowed/Prohibited Items During Timed Assessments (open book)**: Certain assessments are timed and are used similarly as "exams" in face-to-face classes. Following is the description of what you may use and what you may not use during these assessments.
  - Allowed: calculators, foreign language dictionaries, any material that is provided in the context of the course (usually through Canvas), and the means used to access the assessment.
  - Prohibited: any outside help, including but not limited to: (a) any individual other than the instructor providing help during the assessment, (b) external websites, unless they are used purely for calculation function, and (c) external references, either in digital or paper-bound format, other than those allowed above.
- **Holistic Grading Rubric**: A holistic grading scale is used for grading an essay or freeform-answer questions.
  - 5 (out of 5 points possible): "Excellent understanding." The student clearly understands how to solve the problems; one or two minor mistakes can appear on a “5” solution, if they don’t lead to larger conceptual errors.
  - 4: "Good understanding." The student understands the main concepts and problem-solving techniques but is missing one major concept, or made one major mistake that may involve conceptual misunderstanding.
  - 3: "Fair understanding." The student started to set up the solution and is on the right track of applying the problem-solving techniques but is several major steps (or mistakes) away from being able to solve it.
  - 2: "Poor understanding." The student jots down some formulas from memory that may be relevant to the problem but shows little conceptual understanding of how they should be used.

- 1: "No understanding." The student writes down something that has something to do with the problem.
- 0: "Blank." Blank answers.

Any requests for consideration of grade change must be submitted in writing.

- **Course Grading Standards**: This course uses a version of **contract grading** (https://en.wikipedia.org/wiki/Contract_grading). Please review **Physics 4C Grading Standards** (https://peralta.instructure.com/courses/77743/pages/physics-4c-grading-standards) and raise any questions in a timely manner.

Topics Covered

Following is the 14-week schedule of topics being covered (shortened in Spring 2025 from the normal 16-week schedule). Chapter references are for OpenStax ***University Physics Volume 3*** (https://openstax.org/details/books/university-physics-volume-3), unless otherwise stated.

- **Week 1: Optics Intro** (Chapter 1)
- **Week 2: Geometric Optics** (Chapter 2)
- **Week 3: Interference** (Chapter 3)
- **Week 4: Diffraction** (Chapter 4, first half)
- **Week 5: Physical Optics Applications** (Chapter 4, second half)
- **Week 6: Special Relativity Introduction** (Chapter 5, first third)
- **Week 7: Lorentz Transformation** (Chapter 5, middle third)
- **Week 8: Relativistic Dynamics** (Chapter 5, last third and additional materials)
- **Week 9: Quantum Mechanics Introduction** (Chapter 6, first half)
- **Week 10: Semiclassical Models** (Chapter 6, second half)
- **Week 11: Wave Mechanics Introduction** (Chapter 7)
- **Week 12: Quantum Mechanics Review and Applications** (Chapters 6 and 7, and additional materials)
- **Week 13: Atomic Physics** (Chapter 8)
- **Week 14: OPTIONAL TOPICS, Nuclear and Particle Physics** (Chapters 10 and 11)