University Physics

CALIFORNIA COMMUNITY COLLEGES ONLINE EDUCATION INITIATIVE

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Course Overview

Course Code and Semester: **Physics 4C, Class Number 20948, Spring 2023**
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?

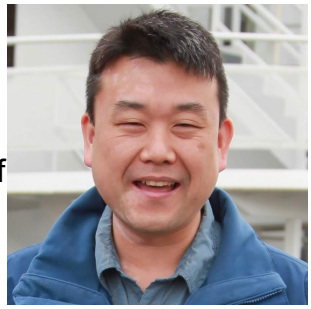
- Intended physics, astronomy, and engineering major students needing the third semester of calculus-based physics.
- Interested students who wish to learn mathematical treatments of special relativity and quantum mechanics (we also cover optics).

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. Students discuss and apply the concepts of physics.
2. Students develop descriptions of physical systems using mathematics and calculate measurable quantities.
3. Students 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** 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**. 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 15).

Office Hours / Virtual Class Sessions

Following are office hours and virtual class session schedule for Spring 2023 *[Updated February 21]*.

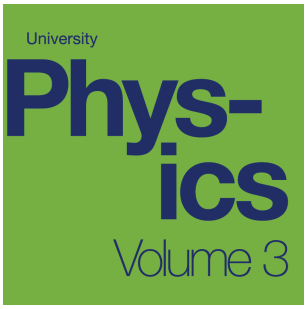
Online virtual class session (attendance-optional; most of it recorded) is held on **Fridays 4-5 p.m.** Reminder and agenda of the session is announced earlier in the day.

In-person office hours will be held in **ATLAN 100 (Physics Lab Room), Wednesdays 4 to 6 p.m. and Fridays 11 to 12 p.m.** Drop by with any questions, or just to work on course content using the building WiFi. For online availability during in-person office hours, please message or email me requesting online Zoom meeting join information. Please allow up to 30 minutes for your request to be responded to.

For appointments outside of regularly scheduled office hours, please email me to arrange for the time. I usually respond to emails within 24 hours, and often sooner (sooner for physics-related questions, as long as they are being sent during normal business hours; I may wait until next morning to answer "last minute" questions being asked a few hours before midnight).

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 Contract

One traditional item you will not see in this syllabus is a detailed grading breakdown for how course letter grade will be assigned. This is primarily because there isn't enough space on this syllabus to adequately describe the grading arrangement for this class. The detailed description is given on course Canvas page, **Physics 4C Grading Contract** (may need to unlock Module requirements to access the page).

A short, admittedly inadequate description I can give here is this: we keep scores for course item completion and evidence of effort only (80% weight for lecture items; 20% weight for lab items). For the assignment of a 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.

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** (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**. So, please, work through the **Getting Started** module in the first couple days of the semester (or as soon as you can).

Schedule of Assignments

The **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** 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. 26 of **College of Alameda 2022-2023 catalog (https://alameda.edu/wp-content/uploads/2022/04/CoA-Catalog-22-23_v5_ONLINE-FINAL.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. 384-389 of **College of Alameda 2022-2023 catalog (https://alameda.edu/wp-content/uploads/2022/04/CoA-Catalog-22-23_v5_ONLINE-FINAL.pdf)** for the college policy on academic dishonesty and possible disciplinary measures.
- **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". Twenty-four late passes are given at the beginning of semester, and each late pass extends a MyOpenMath assignment deadline by one week (168 hours). Satisfactory progress through the course in a timely manner is required to pass the class.
- **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 Contract**: This course uses **contract grading (https://en.wikipedia.org/wiki/Contract_grading)** . Please review **Physics 4C Grading Contract** and make any exception requests in a timely manner.

Topics Covered

Following is the 14-week schedule of topics being covered (shortened in Spring 2023 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)