University Physics

CALIFORNIA COMMUNITY COLLEGES ONLINE EDUCATION INITIATIVE

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Course Overview

Course Code and Semester: Physics 4A, Class Number 20673, Spring 2020
Course Description: Comprehensive study of major topics of physics: motion, forces, gravity, energy, momentum, rotation, equilibrium, fluids, oscillations, waves, and sound. (Satisfies CoA AA/AS area 1; CSU area B1/B3; IGETC area 5A/5C; C-ID PHYS 205; transferable to CSU and UC)
Prerequisite: Math 3A
Co-requisite: Math 3B

Who should take this course?

- Intended physical science and engineering major students
- Architecture students, if required by their intended transfer institutions
- Students interested in or considering STEM majors

Physics 3A-3B, a calculus-based two-semester sequence, may be a better option for students intending to major in biological sciences. Physics 4A-4B-4C sequence is designed to cover the same topics over three semesters. Please talk to me for additional guidance.

Student Learning Outcomes

1. Students apply the concepts of physics to everyday situations.
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 (http://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**. If you need to talk (rather than write) to me individually, please see office hour information below.

Lab Sessions

This **hybrid** course has online lecture section and face-to-face lab section. We will meet once a week on **Wednesdays in ATLAN 100 from 6 p.m. to 9 p.m.**, for a total of 16 times in the semester. The majority of these times (12) will be used for lab, either physical lab with equipment or worksheet lab. Some of these times (3) will be used for midterm exams. The very first meeting is used for course orientation, demonstration of the course website, and your first physics lab.

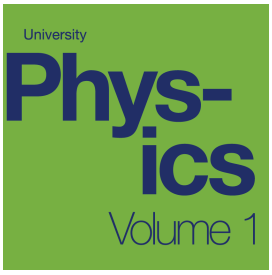
Office Hours and Virtual Class Sessions

There are three office hours to be scheduled for this class. One office hour will be used for an **online** virtual class session (**day/hour to be determined within first week**), to be held using ConferZoom.

Face-to-face office hours for this class are scheduled on **Wednesday from 4 to 6 p.m.** (two hours just before the lab section) in ATLAN 100.

If these hours do not work, please email or message me to arrange another time. I usually respond to emails and messages 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 1* by OpenStax. You can read it by:

- Accessing it online on **openstax.org** (https://openstax.org/books/university-physics-volume-1/pages/1-introduction),
- Downloading the **PDF** (https://d3bxy9euw4e147.cloudfront.net/oscms-prodcms/media/documents/UniversityPhysicsVolume1-OP_gUzvYbP.pdf) (about 65 MB), or
- Using additional access options on **OpenStax** (https://openstax.org/details/books/university-physics-volume-1).

Relevant textbook sections will be linked to from the Canvas pages, along with additional materials on as-needed basis. We will frequently refer to one particular resource, **The Portable T.A. Volume 1** by Andrew Elby (posted here with author's permission).

Important Notes

Exams

There will be three midterm exams (Exams 1, 2, and 3) and one comprehensive, cumulative final exam. Note the days for midterm exams (held in class during lab section) and the date and time for the final exam (held during the final exams week) below. Talk to me as soon as possible about any potential, unavoidable schedule conflicts.

- **Midterm exam** dates for Spring 2020: **February 26**, **April 1**, and **May 13**
- **Final exam** for Spring 2020: **6 to 8 p.m. on May 20**

Grading Contract

I'm trying something new this semester, something called **contract grading** (https://en.wikipedia.org/wiki/Contract_grading). It is an attempt at addressing a problem common in a rigorous, challenging class such as Physics 4A. The problem is this: the exam is the single largest piece of information used in assigning your final letter grade (and things will remain this way), but in order to do well on the exam, you have to do well on the homework (which is usually at 20% of grade weight). Too many students fall behind on homework, thinking you can catch up before the exam, and by the time exam comes up, there isn't enough time to work on catching up, even if you dropped everything else.

When you start the course, you will see a page named "Physics 4A Grading Contract". This page will spell out the details of what you need to do earn an A, a B, or a C. For the non-passing grades D and F, I will describe what

separates a D from an F. This *is* an experiment, and for anyone who requests it, I am willing to grade you under the old model.

ADA Accommodation

Students who may need accommodation for their disabilities are encouraged to contact **Disabled Students Program and Services (http://alameda.peralta.edu/dsps/)** (available in Room D-117 or by phone, 510-748-2328) as soon as possible in the semester so that reasonable (and *legally-mandated*) accommodations may be made. 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 DSPS 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 DSPS service do not use them and suffer consequences academically. The goal of DSPS (and ADA in general) is that you should be judged on your ability, not disability. For those students who are eligible, DSPS accommodation is what will help you express your full potential (not a special treatment or something to be stigmatized against).

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

Tutoring and Academic Support

Physics tutors are usually available in Tutorial Center in the Math Lab on the 2nd floor of the Learning Resources Center (LRC). Register for the free COA course, Learning Resources LRNRE 501, 24 hours in advance of using any tutoring services. Physics tutoring is also available at MESA center in ATLAN 125.

Study Group

Additional detail will be available as plans for an LRC-sponsored study group firm up.

Tips for Success in Physics 4A

Follow these advices to maximize your chance of success in this class.

First, here's a little bit on my grading approach. My goal in grading is to reward two things: (1) the effort you put into this class, and (2) your understanding of physics. If you want to just pass this class, I have a good news: *my* goal is to pass every student who stays engaged with the course to the end of the semester (and I usually succeed). But most of you will want to do better than a C. **So, how do you get a B or an A in this class?**

The only way to do that is to demonstrate that you can *solve* problems involving a physical situation, like an engineer or a scientist might. There are techniques and strategies that will help you do that (*some* of them, we will spend a fair amount of time learning). There are some tips and tricks that can simplify problem-solving (as you will see in the textbook, video lecture, and homework). In the end, the goal is to learn how to *solve* physics problems.

So, how do you learn how to solve physics problems? Here's what you need to do:

- First, realize that this *hybrid* class (fully online lecture, face-to-face lab) requires more self-discipline and integrity, as well as a level of comfort with technology, than face-to-face classes do. Set aside a time to regularly work on the assigned readings and problems, and be proactive in contacting me if you have any issues with Canvas, or any other technologies being used for the class. (Read more: **Orientation to Online Learning**; and don't miss labs!)

- Second, get your reading done early. We move at a pace of about one to two chapters each week. This is about 30 to 40 pages per week of dense, technical reading. There will be some activities to help support reading practice, and you need to get this done early. After the reading, you will need to spend a significant amount of time working on homework problems.
- Third, practice solving problems. Take your time working through the homework problems and spread it out. The homework problems are the most important resource available to you for your problem-solving practice. They represent the topics covered and emphasized in this class, as well as the difficulty level of the problems you should be able to do after studying. I am available online and in person during office hours to help when you get stuck, and *The Portable T.A.* will also teach you how to think about physics problems.

That's enough advice to start with. In lecture videos (and homework assignments), I will emphasize types of problem-solving techniques you will need, alongside the examples of physical intuition you should develop as an engineer or a scientist.

I believe it is possible not only for every one of you to pass this class but also for everyone to do so with a grade of B or better—all that is needed is for you to have a little bit of self-discipline and to put in a consistent effort.

Calendar and Assignments

This course syllabus is hosted on Canvas which makes the calendar and upcoming assignment available to you at one glance (as well as schedule of topics for the whole semester). Please look on your right for the calendar of upcoming assignments and course events, as well as weighting of assignments for your course grade. Please look below for summary of course assignments. Fine-print details are below—I encourage you to read through them (this is our contract for the semester), 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 (**February 2**), 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. 28 of College of Alameda 2019-2020 catalog (https://alameda.peralta.edu/wp-content/uploads/2019/03/COA-Catalog-2019-2020.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.
- **Participation**: Every student is expected to fully participate as a member of a group during lab. As the saying goes, "physics is not a spectator sport." By participating, you will: (1) learn much better, (2) contribute to the community of physics learners, and (3) be fair to your group mates.
- **Disruptions**: Please take care of your personal needs before class, and please turn off cell phones and other communication devices and put them in your bag. Keep group discussions at a reasonable volume, and be respectful of your classmates. Please see pg. 284-285 of College of Alameda 2019-2020 catalog (https://alameda.peralta.edu/wp-content/uploads/2019/03/COA-Catalog-2019-2020.pdf) for student standards of conduct.
- **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. 284-289 of College of Alameda 2019-2020 catalog (https://alameda.peralta.edu/wp-content/uploads/2019/03/COA-Catalog-2019-2020.pdf) for the college policy on academic dishonesty and possible disciplinary measures.

- **Schedule Subject to Change**: Assignment and exam 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". Twelve late passes are given at the beginning of semester, and each late pass extends a MyOpenMath assignment deadline by 72 hours. Exams will be extended only in rare circumstances arising out of a situation beyond the student's control.
- **Missing Lab**: One missed lab will be dropped for grade calculation. This is accomplished by dropping two (2) lowest grades in Labs category, which will ignore a missed prelab and lab report. Any prelabs turned in for missed lab will not be given credit. Late prelabs should be made up by completing the optional lab narrative. There *may* be an end-of-semester opportunity to make up one (1) lab.
- **Allowed/Prohibited Items During Exams**:
  - Allowed: calculators without communication capability, limited notes (usually an index card for midterms and a letter-size page for final), paper-bound foreign language dictionaries, writing instruments (pencil and pen), and a water bottle.
  - Prohibited: communication devices of any kind (cell phones, pagers, etc.), electronic devices other than a calculator, English-to-English dictionaries or any other books including the textbook.
- **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.
- **OLD Course Assignment Weights, FOR REFERENCE ONLY**: This is the old course assignment weights I used to use, listed here only for your reference. By default, everyone is graded under the grading contract described in the course: Homework Assignments (20%), Labs (20%), Midterm Exams (40%), and Final Exam (20%).
- **OLD Course Grading Scale, FOR REFERENCE ONLY**: This old grading scale is listed only for your reference. By default, everyone is graded under the grading contract described in the course: A - 85 to 100%, B - 70 to 84%, C - 50 to 69%, D - 40 to 50%, F - below 40%. The instructor reserves the right to exercise discretion on the margins around this scale.

Note: below "Course Summary" includes the list of all assignments that are scheduled in Canvas currently. If you are seeing the PDF version of this syllabus, there may be additional minor assignments (graded discussion, etc.) that are added later.

Course Summary:

Date	Details	
Tue Jan 21, 2020	[Graded Discussion] Introduce Yourself Online (https://peralta.instructure.com/courses/27503/assignments/225453)	due by 11:59pm
	Physics 4A Study Plan (https://peralta.instructure.com/courses/27503/assignments/225852)	due by 11:59pm
Wed Jan 22, 2020	Lab 1: Intro to Physics Lab (https://peralta.instructure.com/courses/27503/assignments/225475)	due by 6pm
Mon Jan 27, 2020	[Graded Discussion] The Golden Line for Chapters 1 and 2 (https://peralta.instructure.com/courses/27503/assignments/226003)	due by 11:59pm
	Problem Set 1: Introduction (https://peralta.instructure.com/courses/27503/assignments/225505)	due by 11:59pm
Wed Jan 29, 2020	Prelab 2: Motion (https://peralta.instructure.com/courses/27503/assignments/225495)	due by 6pm
	Lab 2: Motion (https://peralta.instructure.com/courses/27503/assignments/225476)	due by 11:59pm
	Lab Narrative: Lab 1 (https://peralta.instructure.com/courses/27503/assignments/225993)	due by 11:59pm
Fri Jan 31, 2020	Conceptual Questions: Kinematics (Peer-Graded) (https://peralta.instructure.com/courses/27503/assignments/225457)	due by 11:59pm
Mon Feb 3, 2020	Peer Review: Kinematics (https://peralta.instructure.com/courses/27503/assignments/225487)	due by 11:59pm
	Problem Set 2: Motion (https://peralta.instructure.com/courses/27503/assignments/225506)	due by 11:59pm
Wed Feb 5, 2020	Prelab 3: Projectile Motion (https://peralta.instructure.com/courses/27503/assignments/225496)	due by 6pm
	Lab 3: Projectile Motion (https://peralta.instructure.com/courses/27503/assignments/225477)	due by 11:59pm
Fri Feb 7, 2020	[EXTRA CREDIT DISCUSSION} How do you access peer reviews? (https://peralta.instructure.com/courses/27503/assignments/225452)	due by 11:59pm
	Conceptual Questions: Newton's Laws (Peer-Graded) (https://peralta.instructure.com/courses/27503/assignments/225459)	due by 11:59pm

Date	Details	
Mon Feb 10, 2020	Peer Review: Newton's Laws (https://peralta.instructure.com/courses/27503/assignments/225489)	due by 11:59pm
	Problem Set 3: Newton's Laws Intro (https://peralta.instructure.com/courses/27503/assignments/225507)	due by 11:59pm
Wed Feb 12, 2020	Prelab 4: Dynamics (https://peralta.instructure.com/courses/27503/assignments/225497)	due by 6pm
	Lab 4: Dynamics (https://peralta.instructure.com/courses/27503/assignments/225478)	due by 11:59pm
Fri Feb 14, 2020	Conceptual Questions: Free-Body Diagrams (Peer-Graded) (https://peralta.instructure.com/courses/27503/assignments/225456)	due by 11:59pm
Mon Feb 17, 2020	Peer Review: Free-Body Diagrams (https://peralta.instructure.com/courses/27503/assignments/225486)	due by 11:59pm
	Problem Set 4: Newton's Law Applications (https://peralta.instructure.com/courses/27503/assignments/225508)	due by 11:59pm
Wed Feb 19, 2020	Prelab 5: Forces in Equilibrium (https://peralta.instructure.com/courses/27503/assignments/225498)	due by 6pm
	Lab 5: Forces in Equilibrium (https://peralta.instructure.com/courses/27503/assignments/225479)	due by 11:59pm
Wed Feb 26, 2020	Exam 1: Motion and Forces, Freeform (https://peralta.instructure.com/courses/27503/assignments/225464)	due by 11:59pm
	Exam 1: Motion and Forces, Multiple-Choice (https://peralta.instructure.com/courses/27503/assignments/225465)	due by 11:59pm
Wed Mar 4, 2020	Prelab 6: Circular Motion (https://peralta.instructure.com/courses/27503/assignments/226001)	due by 6pm
	Lab 6: Circular Motion (https://peralta.instructure.com/courses/27503/assignments/226002)	due by 11:59pm
Fri Mar 6, 2020	Conceptual Questions: Conservation of Energy (Peer-Graded) (https://peralta.instructure.com/courses/27503/assignments/225455)	due by 11:59pm
Mon Mar 9, 2020	Peer Review: Conservation of Energy (https://peralta.instructure.com/courses/27503/assignments/225485)	due by 11:59pm
	Problem Set 5: Work and Energy (https://peralta.instructure.com/courses/27503/assignments/225509)	due by 11:59pm
Wed Mar 11, 2020	Prelab 7: Conservation of Energy (https://peralta.instructure.com/courses/27503/assignments/225499)	due by 6pm
	Lab 7: Conservation of Energy (https://peralta.instructure.com/courses/27503/assignments/225480)	due by 11:59pm

Date	Details	
Fri Mar 13, 2020	Conceptual Questions: Collisions and Momentum Conservation (Peer-Graded) (https://peralta.instructure.com/courses/27503/assignments/225454)	due by 11:59pm
Mon Mar 16, 2020	Problem Set 6: Momentum and Conservation Laws (https://peralta.instructure.com/courses/27503/assignments/225511)	due by 11:59pm
	Peer Review: Collisions and Momentum Conservation (https://peralta.instructure.com/courses/27503/assignments/225484)	due by 11:59pm
Wed Mar 18, 2020	Prelab 8: Ballistic Pendulum (https://peralta.instructure.com/courses/27503/assignments/225500)	due by 6pm
	Lab 8: Ballistic Pendulum (https://peralta.instructure.com/courses/27503/assignments/225481)	due by 11:59pm
Fri Mar 20, 2020	Conceptual Questions: Rotation (Peer-Graded) (https://peralta.instructure.com/courses/27503/assignments/225460)	due by 11:59pm
Mon Mar 23, 2020	Problem Set 7: Rotation (https://peralta.instructure.com/courses/27503/assignments/225512)	due by 11:59pm
	Peer Review: Rotation (https://peralta.instructure.com/courses/27503/assignments/225490)	due by 11:59pm
Wed Mar 25, 2020	Prelab 9: Rotational Inertia (https://peralta.instructure.com/courses/27503/assignments/225501)	due by 6pm
	Lab 9: Rotational Inertia (https://peralta.instructure.com/courses/27503/assignments/225482)	due by 11:59pm
Mon Mar 30, 2020	Problem Set 6b: More Conservation Law Questions (https://peralta.instructure.com/courses/27503/assignments/225510)	due by 11:59pm
Wed Apr 1, 2020	Exam 2: Energy, Momentum, and Rotation, Freeform (https://peralta.instructure.com/courses/27503/assignments/225466)	due by 11:59pm
	Exam 2: Energy, Momentum, and Rotation, Multiple-Choice (https://peralta.instructure.com/courses/27503/assignments/225467)	due by 11:59pm
Wed Apr 8, 2020	Prelab 10: Static Equilibrium (https://peralta.instructure.com/courses/27503/assignments/225502)	due by 6pm
	Lab 10: Static Equilibrium (https://peralta.instructure.com/courses/27503/assignments/225483)	due by 11:59pm
Fri Apr 10, 2020	Conceptual Questions: Newton's Law of Universal Gravitation (Peer-Graded) (https://peralta.instructure.com/courses/27503/assignments/225458)	due by 11:59pm
Mon Apr 20, 2020	Peer Review: Newton's Law of Universal Gravitation (https://peralta.instructure.com/courses/27503/assignments/225488)	due by 11:59pm
	Problem Set 8: Static Equilibrium and Gravity (https://peralta.instructure.com/courses/27503/assignments/225513)	due by 11:59pm

Date	Details	
Wed Apr 22, 2020	Prelab 11: Oscillations (https://peralta.instructure.com/courses/27503/assignments/225493)	due by 6pm
	Lab 11: Oscillations (https://peralta.instructure.com/courses/27503/assignments/225473)	due by 11:59pm
Fri Apr 24, 2020	Conceptual Questions: Simple Harmonic Motion (Peer-Graded) (https://peralta.instructure.com/courses/27503/assignments/225461)	due by 11:59pm
Mon Apr 27, 2020	Peer Review: Simple Harmonic Motion (https://peralta.instructure.com/courses/27503/assignments/225491)	due by 11:59pm
	Problem Set 9: Oscillations (https://peralta.instructure.com/courses/27503/assignments/225514)	due by 11:59pm
Wed Apr 29, 2020	Prelab 12: Standing Waves in Sound (https://peralta.instructure.com/courses/27503/assignments/225494)	due by 6pm
	Lab 12: Standing Waves in Sound (https://peralta.instructure.com/courses/27503/assignments/225474)	due by 11:59pm
Fri May 1, 2020	Conceptual Questions: Waves and Sound (Peer-Graded) (https://peralta.instructure.com/courses/27503/assignments/225462)	due by 11:59pm
Mon May 4, 2020	Peer Review: Waves and Sound (https://peralta.instructure.com/courses/27503/assignments/225492)	due by 11:59pm
	Problem Set 10: Waves (https://peralta.instructure.com/courses/27503/assignments/225503)	due by 11:59pm
Mon May 11, 2020	Problem Set 11: Fluids (https://peralta.instructure.com/courses/27503/assignments/225504)	due by 11:59pm
Wed May 13, 2020	Exam 3: Static Equilibrium, Gravitation, Oscillations, Waves, and Fluids, Freeform (https://peralta.instructure.com/courses/27503/assignments/225468)	due by 11:59pm
	Exam 3: Static Equilibrium, Gravitation, Oscillations, Waves, and Fluids, Multiple-Choice (https://peralta.instructure.com/courses/27503/assignments/225469)	due by 11:59pm
Wed May 20, 2020	Final Exam: All Topics, Freeform (https://peralta.instructure.com/courses/27503/assignments/225471)	due by 11:59pm
	Final Exam: All Topics, Multiple-Choice (https://peralta.instructure.com/courses/27503/assignments/225472)	due by 11:59pm
Fri May 22, 2020	Errata Extra Credit (https://peralta.instructure.com/courses/27503/assignments/225463)	due by 11:59pm
	Final Course Letter Grade (https://peralta.instructure.com/courses/27503/assignments/225470)	due by 11:59pm