

Welcome to Physics 8: Introductory Physics I for Physical Science and Engineering Majors.

Hi, I'm Dr. Menke and this is one of my favorite classes to teach because the topics are interesting and there are lots of cool demos I love to bring into the class. We'll learn *how* and *why* things move or don't, and be able to predict how the system behaves. We'll be able to look at the world around us and explain the physics of what's going on—conceptually, with pictures and graphs, as well as using math. So, what is physics? **Physics is the study of matter and energy and the interaction between the two.**

Beyond the specific topics, **another major goal for this course is to help you learn how to learn.** How do you know when you know something? And what works for you is likely different than what works for others. We're going to do this together in the context of physics. Even if you aren't a physics major, even if you're only taking the course because it's required for your major, I want this class to be useful *and* interesting for you. It's going to take a lot of work, because we're working towards something valuable. Everything I ask you to do in this class is for a specific reason. If you're not sure what that reason is, just ask.

Instructor Info

Dr. Carrie Menke

Email: cmenke@ucmerced.edu

Office: ACS - 267

Student Hours = Office Hours: See CatCourses for current schedule and [by appointment](#)

ProTip: I always bring chocolate and snacks to office hours. Plus, you can automatically schedule a 1-on-1 meeting with me (in-person or zoom) if you need to discuss something more private by clicking the “by appointment” link above and on the CatCourses homepage.

TA Info

Student Hours: See CatCourses for current schedule

- TA name

Lecture Section-Specific Details:

Lectures: TR PHYS 008-01 TR, 1:30 - 2:45pm, COB2-110	Lectures: MW PHYS 008-40 MW, 4:30 - 5:45pm, COB2-130
Discussions: Wednesdays Section 02D, 8:30 - 10:20am Section 03D, 10:30 - 12:20pm Section 04D, 12:30 - 2:20pm Section 05D, 2:30 - 4:20pm Section 06D, 4:30 - 6:20pm Section 07D, 6:30 - 8:20pm	Discussions: Thursdays Section 41D, 8:30 - 10:20am Section 42D, 10:30 - 12:20pm Section 43D, 4:30 - 6:20pm Section 45D, 12:30 - 2:20pm Section 46D, 2:30 - 4:20pm
TR CatCourses site	MW CatCourses site

Course Materials:

- **OpenStax textbook:** University Physics is free, open-access, and downloadable.
 - [OpenStax, University Physics, Volume 1](#)
 - [OpenStax, University Physics, Volume 2](#)
 - [OpenStax, University Physics, Volume 3](#)
- **Macmillan Achieve** online tutoring & homework system. Click on the **Achieve** link on CatCourses and you should be taken to the homework site. See the CatCourses announcement for more information.
- **TopHat** [[Need to add details here]]

- **Recommended:** Any university physics textbook published within the last 10 years. The following are particularly recommended.
 - University Physics by Hugh D. Young & Roger A. Freedman
 - Physics for Scientists and Engineers by Paul A. Tipler & Gene Mosca
 - Physics for Scientists and Engineers, A Strategic Approach by Randall Knight
 - (FYI: College Physics = algebra-based, University Physics = calculus-based).

CatCourses Site: The CatCourses sites listed above are used extensively throughout the course. Course material is organized in **Modules** with Course Information being at the top. The most recent course information, office hours, and contact information will be posted on the home page. If you expect something to be posted and it isn't, please email me.

Communication & Community. There are a lot of unknowns in the world and with how this semester will work out. I've tried to balance flexibility and accountability to keep us on track; that includes keeping me and the TAs on track, too. There will likely be some things that need to change. We can figure out what needs to change and how by communicating regularly.

My hope is that all of us and our families stay healthy and safe. It's important that we remember to take care of ourselves and each other. We're going to treat each with compassion and mutual respect. This course is structured to focus on learning, making the best use of our time, and accommodating the hiccups that life brings.

If you tell me or your TA that you're having trouble, we will not judge you or think less of you. We hope you extend us the same grace.¹

Course Structure

Each component of the course is designed to help you achieve the [course goals and learning outcomes](#).

Component of Course	Weight	
A. Lecture Prep & Review	10%	Grades will be determined using the <i>approximate</i> framework: A: 100-90%, B: 89-75%, C: 74-60%, D: 59-55%. The flavor of letter grade (+, even, -) will be determined when final grades are calculated.
B. Lectures & Participation	10%	
C. Homework	20%	
a. HW (10%)		
b. Discussion Quiz (10%)		
D. Research Activities	10%	
E. Exams	45%	*This is calculated before submitting final grades.
a. Midterms (2, 15% each)		
b. Final Exam (15%)		
F. Towards <i>your</i> highest average of quizzes, midterms, or final exam.*	5%	

A. **Lecture Prep & Review** This is semi-flipped class, which means the preparation will cover smaller, key concepts and equations of the material. We will use our lecture time together to clarify the most confusing parts and weave them together to analyze more complex systems.

- a. **Prep & Review** Lecture prep will include actively watching content videos and reading the textbook, and possibly working through simulations or finishing an example problem from the previous lecture, etc. To find out where we need to focus our efforts during lecture, a CatCourses "quiz" ask questions about the prep materials. There will also be questions about material covered in lecture to help reinforce that material. There is partial credit on these quizzes.

¹This statement was adapted from data science instructor Andrew Heiss at Georgia State University. Source: <https://twitter.com/andrewheiss/status/1293909055795105792>

b. **Surveys.** There will be approximately 3 surveys this semester, not including student course evaluations (which are anonymous). They focus on setting goals for the course and periodically reflecting on them. Scoring is based upon completion.

- **Frequency:** approximately 1 per week.
- **Collaborating:** Prep material ✓; quizzes and surveys ✗
- **Life Happens:** Lowest 20% of scores will be dropped before calculating your final grade. According to the schedule, that's the lowest 3 preps and survey scores.

B. **Lectures & Participation** builds upon the preparation you do. Lectures should be useful and interesting; if they're not, then we need to change something. Be prepared for a combination of "board" work, demonstrations, videos, and questions (from you and me). It includes clicker questions, working on your own during the "on your own" portions in lecture, and engaging with your peers during the "with your group" portions of lecture. Make the most of your tuition dollars by coming to lecture and participating.

- **Frequency:** Clicker questions are included in every lecture and use the TopHat system (see CatCourses homepage). Each question is worth a maximum of 4 points—3 points for answering, 1 additional point for answering correctly. *To earn participation credit, you must be present in the lecture you're officially enrolled in.*
- **Collaborating:** "Answer on your own" (for the first click) ✗; "Prove your answer to your neighbor" (before clicking again) ✓
- **Life Happens:** : To emphasize learning (which includes getting things wrong initially), accommodating absences, technological difficulties, and life's hiccups, your overall score will be calculated as follows:

CatCourses Percentage	Factored into your course grade
85% and above	100%
84% - 75%	90%
74% - 65%	80%
64% - 55%	70%
54% and below	CatCourses percentage

C. **Homework** There are two aspects to homework. The weekly assignments and the quizzes at the beginning of your discussion sessions.

a. **Homework** is done online through Macmillan Achieve system (on CatCourses) and gives you immediate feedback. These "textbook" questions are often much simpler than what you'll experience in the real world. They're still valuable in developing basic skills. Think of them as practice drills: dribbling in soccer, doing scales on a piano, or easy mode in video games. Everyone automatically has access to Macmillan Achieve through "OpenAccess." There will be a CatCourses announcement towards the beginning of the semester from the bookstore manager with more information.

- **Grading:** The grading policy for the homework is available on each assignment.
- **Collaborating:** ✓
- **Life Happens:**
 - Assignments can be submitted late, but it will cost you points (see the grading policy on the assignment). Use this when needed, but don't make it a habit.
 - Lowest 20% of scores will be dropped before calculating your final grade. According to the schedule, that's the lowest 2 HW assignment scores.
- **Pro Tip:** *Start HW early* and break the assignment into chunks. You'll remember more of the material and it gives you time to go to office hours or the Physics Help Center if you need some help.

- **Pro Tip:** *Keep a homework notebook* and write out your solutions thoroughly. This helps you understand the material better and creates a great study tool when preparing for quizzes and exams. It gets you into the habit of clearly communicating your understanding (which makes it easier for graders to give more partial credit).
- b. **Quizzes** are at the beginning of your discussion session and based on the most recently-submitted homework.
- **Frequency:** Every week there is a discussion session unless it's an exam week.
 - **Format:** An individual portion, followed by **group** portion. The formula sheet is printed on the back; no other notes are allowed on quizzes.
 - **Collaborating:** Individual portion ✗; Group portion ✓
 - **Life Happens:** Lowest 20% of scores will be dropped before calculating your final grade. According to the schedule, that's the lowest 2 quiz scores. *There are no make-up quizzes in this course.*
- D. **Research Activities** The principles covered in this introductory physics course are applicable to a wide variety of current and exciting research areas. The research activities will help you see this connection, practice working with scientific literature, and develop presentation skills. You will research a question related to a physics topic by finding and reading scientifically reputable journal articles. You will present your topic in your discussion session and submit an annotated bibliography. Information and presentation rubric are posted on CatCourses.
- **Frequency:** Please see the schedule for smaller assignments spaced throughout the semester that build up to the presentation and annotated bibliography.
 - **Collaborating** with peers? ✓, in the form of feedback.
UC has strict rules about plagiarism, which guarantees severe action against the student. Refer to the [Academic Honesty Policy](#) for further information about plagiarism.
 - **Life Happens:** One of the smaller assignments will be dropped. For an excused absence, your presentation will be rescheduled to another presentation week if possible, or will be scheduled during Finals week. The annotated bibliography will be accepted a few days late; plan well because the TAs need time to grade all of them.
- E. **Exams** are traditionally used as a check of "did you learn it" after the fact. The purpose of the class is to coach you in learning the material. Therefore, we use **group exams** to bring in a coaching aspect. Also, in the real world, if a project is very important, you check with others and get feedback before submitting it. Group exams also bring more of a real world aspect to the experience. At first, you take the exam on your own. Then, you get with classmates (typically in groups of 3-4 students) and take the exam again. The individual portion is worth 80% of your overall exam score; the group portion is worth 20%. Group exams can only help you. *If your individual score is higher than your group score, only your individual score will be used.* This format is also used on quizzes so that will be very familiar with how it works before getting to an exam.
- a. **Midterms** The first midterm will cover all material covered from the beginning of the semester. The second midterm will cover material that wasn't on the first midterm. Although midterms are not cumulative, physics materials does build upon itself. See the applicable Exam information **Page** on CatCourses for more information about the exam and the notes sheet and the schedule to see when the individual and group portions are scheduled.
- b. **Final Exam** is cumulative, weighted more heavily on material covered since the most recent midterm exam. Why cumulative? For two reasons: 1) you should get credit for understanding material by the end of the term even if you had trouble understanding it on an earlier exam; 2) by having it on the final exam, it's extra incentive for you to learn material for the long term, rather than cramming for an exam then forgetting.
- **Frequency:** See the course schedule.

- **Format:** An individual portion, followed by a group portion. You will create a notes sheet for each exam. Information about each exam will be posted on CatCourses in that week's **Module**.
- **Collaborating:** Individual portion ✗; Group portion ✓
- **Life Happens:** For an excused absence, there will be a make-up midterm exam during finals week. The "feel sick? then stay home" policy applies to all exams! Contact Dr. Menke if you miss an exam due to illness.
- **Final Exam Schedule Conflict:** It usually happens that some students have a final exam schedule conflict with another course. Make sure to contact your instructor during the last week of instruction to arrange an alternate time.

F. **The remaining 5%** of the course weight is applied to whichever is *your* highest average of quizzes, midterms, or final exam. This is manually calculated for each student. If your quiz average is the highest of the three, then it will be weighted 15% (instead of the 10% listed in the Course Component table at the beginning of this section. There is an assignment on CatCourses that explains this and contains a spreadsheet for you to see the calculation for yourself.

Course Policies

I. **"Life Happens"** and not always in a convenient way. Accommodations are automatically built into each course component to make your and my life easier. You may get sick—even if it's not Covid, be exposed to someone with Covid and have to stay quarantined until approved to come back to campus, have a life event that needs to take priority over an assignment, be so swamped with exams that something needs to give, or something else that you weren't planning on happening. This can take the form of dropping lowest scores and/or allowing assignments to be late. See the particular course component for the specifics.

If you feel sick, stay home!

Sharing is caring, unless we're talking about contagion!

ProTip: Use the life happens policies as necessary. Be strategic. If you're late on a couple assignments, it shouldn't affect your course grade. If it becomes the norm, your course grade is going to suffer. Feel free to contact me (Dr. Menke) if you need some help getting on (or back on) track.

- **Q: When should you (student) contact me (Dr. Menke) about an absence?** A: Email me if you're going to miss a big assignment, like an exam or the research presentation.
- **Q: What's considered an excused absence?** A: Illness, campus athletics away games and championship games, attending a conference, citizenship/residency appointments, family emergency. Stuff like that. If you're not sure, ask.
- **Q: What if something is going on in your (student) life that can't be handled by the dropped scores and late submissions already in place? What if you need further accommodations?** A: An example of this is if you're going to miss over a week straight of classes. That makes it really hard to stay on track, especially if it's unplanned. Contact me (Dr. Menke). Remember that you can automatically schedule a one-on-one meeting with me (see my info above or my info on CatCourses). If this is a student accessibility thing, see the section below. Sometimes life smacks us around big time. There are various options and resources on campus. I'll work with you, the Dean of Students, Advising, Counseling Services, etc. to help figure out a way forward. Communication is key, so don't hesitate to contact me.

II. **Collaboration & Getting Help:** Working together is a useful (and often fun) way to learn new things. Teaching is a great way to learn. Helping a classmate understand something feels good; getting help when you need it, and finally understanding that tricky new thing also feels good.

- I've explicitly listed under each course component description when collaborating with your classmates is encouraged (✓) or not allowed (✗).
- Forming study groups is a good thing. A core study group of 3 tends to work very well.
- Check out the **STEM Tutoring Hub** for campus tutoring resources. These students are trained in tutoring. **ProTip:** the best tutors make talk less than you do, have you write on the board more than they do, and ask you lots of questions about your understanding. Why? Because you learn the material better and for longer that way!
- Office Hours = Student Hours: The TAs and I have this time blocked on our schedules to help you. We *like* helping you! Don't have a specific question. You can still come to office hours. Something about lecture wasn't clear? Ask in office hours. Want to know how to get more out of lecture prep, lecture, homework, this whole university thing? Ask in office hours. Want to know more about what you can do with physics or what kind of research is going on in the department? Ask in office hours. Want some chocolate or a snack? Come to Menke's office hours!
- Getting answers from "Homework Help" Sites (i.e. Chegg, Course Hero, and Koofers, to name a few) is **not** collaborating and also not permitted for any component of this course.
 - Unfortunately, this needs to be clearly stated and will be fully enforced. Sites such as Chegg, Course Hero, and Koofers (to name a few) market themselves as homework help and study guides, but enable cheating, which is a violation of the Academic Honesty Policy.
 - All content in this course is protected and may not be shared, uploaded, or distributed.

III. **Student Accessibility Services (SAS):** University of California, Merced is committed to creating learning environments that are accessible to all. If you anticipate or experience physical or academic barriers based on a disability, please feel welcome to contact me privately so we can discuss options. In addition, please contact **Student Accessibility Services (SAS)** at (209) 228-6996 or access@ucmerced.edu as soon as possible to explore reasonable accommodations. All accommodations must have prior approval from Student Accessibility Services on the basis of appropriate documentation.

If you anticipate or experience barriers due to pregnancy, temporary medical condition, or injury, please feel welcome to contact me so we can discuss options. You are encouraged to contact the Dean of Students for support and resources at (209) 228-3633 or their [website](#).

IV. **Inclusion & Diversity** I value all students regardless of their background, country of origin, race, religion, ethnicity, gender, sexual orientation, disability status, etc. and am committed to providing a climate of excellence and inclusiveness within all aspects of the course. If there are aspects of your culture or identity that you would like to share with me as they relate to your success in this class, I am happy to meet to discuss. Likewise, if you have any concerns in this area or facing any special issues or challenges, you are encouraged to discuss the matter with me (set up a meeting by e-mail) with an assurance of full confidentiality (only exception being mandatory reporting of academic integrity code violations or sexual harassment).²

V. **Academic Honesty Policy (abbreviated):**

- Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy.
- Any work submitted by a student in this course for academic credit will be the student's own work. Where collaborating is allowed (and encouraged) is explicitly listed in this syllabus. If you're not sure, ask.
- You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e-mail, an e-mail attachment

²This inclusion statement was written by chemistry professor Dr. Steve Zimmerman at the University of Illinois at Urbana-Champaign. Source: <https://mobile.twitter.com/steveczimmerman/status/1161019135251353606>

file, a disc, a hard copy, etc. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action.

- During the individual portion of examinations you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the individual portion of examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.
- Plagiarism will not be tolerated. Plagiarism refers to the use of another's ideas or words without proper attribution or credit. This includes, but is not limited to: copying from the writings or works of others into one's academic assignment without attribution, or submitting such work as if it were one's own; using the views, opinions, or insights of another without acknowledgment; or paraphrasing the ideas of another without proper attribution. Credit must be given: for every direct quotation; when a work is paraphrased or summarized, in whole or in part (even if only brief passages), in your own words; and for information which is not common knowledge. The requirement to give credit applies to published sources, information obtained from electronic searches, and unpublished sources. **Plagiarism includes using "homework help" sites, such as Chegg, Course Hero, etc.** *Plagiarism will result in failure of the assignment, and may lead to failure of the course and University disciplinary action.*
- Clickers: Entering answers for another student using their account is considered a violation of the academic honesty policy.
- The full academic honesty policy is available on the [Office of Student Rights and Responsibilities](#) website.

Goals, Objectives & Outcomes

This section is required in every syllabus. It formally outlines the goals, objectives, and outcomes of the course and how that maps onto the physics major and educational mission UC Merced. You may find it interesting to see that this is intentional. It's also OK if you find this boring and want to skip it!



- **Goals** are big-picture statements of what the course should do. They are in **bold and underlined** below.
- **Objectives** are more specific statements of what the teacher (me and the TAs) will do towards that goal.
- **Outcomes** describe what you will be able to do once you successfully complete the course. Specific outcomes for individual topics are included in the lecture worksheets.

1. Physics 8 will introduce students to the principles and mathematical tools of classical mechanics.

- Teaching Objectives:* We will provide content resources and activities regarding the definitions, language, and mathematical tools of introductory classical mechanics.
- Student Learning Outcomes:*
 - You will be able to *explain* and *apply* basic principles of kinematics, dynamics, energy, and momentum to qualitative and quantitative problems at the introductory level.

- ii. You will most likely discover some misconceptions you have about the physical world and will be able to reconcile them using the Newtonian-based reasoning of classical mechanics.

2. Physics 8 will present applications to real-world problems in the context of physical and engineering, sciences.

- a. *Teaching Objectives:* We will demonstrate and then coach you in the process physicists use to solve problems, and apply that process to solve problems in classical mechanics.
- b. *Student Learning Outcomes:* You should be able to analyze a written problem or observed phenomena, simplify it, identify the key known and unknown features, make predictions, and evaluate those predictions based on the principles of physics.

3. Physics 8 will provide multiple opportunities for you to develop the problem-solving perseverance required to succeed in physical sciences and engineering.

- a. *Teaching Objectives:* We will reinforce the tools, methods, and material throughout the semester to prepare you for advanced courses requiring strong critical-thinking skills.
- b. *Student Learning Outcomes:* By learning and practicing the basic techniques of problems solving and conscientiously expressing physical problems mathematically you will be well-prepared to study more advanced topics in physical science and engineering.

4. Physics 8 will connect course material to contemporary research topics.

- a. *Teaching Objectives:*
 - i. We will share our enthusiasm for physics by connecting course material with real-world problems, demonstrations, and ongoing research.
 - ii. We will coach you in finding and analyzing contemporary research in the scientific literature.
- b. *Student Learning Outcomes:*
 - i. At the level of an introductory physics/engineering student, you will practice analyzing various phenomena from a physics perspective.
 - ii. At the level of an introductory physics/engineering student, you will practice reading, analyzing, and summarizing contemporary research in the scientific literature.
 - iii. Your interest in and appreciation for physics and its applications will hopefully increase throughout the course, regardless of your major.

Program Learning Objectives (PLOs): The course goals also support the PLOs for Physics and General Education programs.

Physics PLOs	General Education PLOs
By the end of the program, physics majors will demonstrate the following:	
1. Physical Principles ✓ 2. Mathematical Expertise ✓ 3. Experimental Technique 4. Communication & Teamwork ✓ 5. Research Proficiency ✓	1. Life at the Research University: Asking Questions ✓ 2. Reasoning: Thinking Critically ✓ 3. Communication: Explaining and Persuading ✓ 4. Cultural and Global awareness: Engaging with differences 5. Citizenship: Contributing to the Public Good