

Term Information

Effective Term Autumn 2022

General Information

Course Bulletin Listing/Subject Area Physics
Fiscal Unit/Academic Org Physics - D0684
College/Academic Group Arts and Sciences
Level/Career Undergraduate
Course Number/Catalog 1270
Course Title Classical Mechanics, Conservation Laws, and Special Relativity for Majors
Transcript Abbreviation Mech, Energy, Rltvty
Course Description Calculus-based introduction to classical physics. In depth study of classical mechanics including Newton's laws, conservation laws, and introduction to special relativity. For students majoring in Astronomy & Astrophysics, Engineering Physics, or Physics.
Semester Credit Hours/Units Fixed: 5

Offering Information

Length Of Course 14 Week
Flexibly Scheduled Course Never
Does any section of this course have a distance education component? No
Grading Basis Letter Grade
Repeatable No
Course Components Laboratory, Lecture, Recitation
Grade Roster Component Recitation
Credit Available by Exam No
Admission Condition Course No
Off Campus Never
Campus of Offering Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites Concurrent with: Math 1141, 1151, 1161, 1181H, or 4181H or above. Enrollment in Astronomy & Astrophysics major, Engineering Physics major or pre-major, or Physics major.
Exclusions
Electronically Enforced Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code 40.0801
Subsidy Level Baccalaureate Course
Intended Rank Freshman, Sophomore

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

Course Details

Course goals or learning objectives/outcomes

- Students understand the basic facts, principles, theories and methods of modern science.
- Students understand key events in the development of science and recognize that science is an evolving body of knowledge.
- Students describe the interdependence of scientific and technological developments.
- Students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.
- Student develop skills in problem solving and analysis that establish a foundation for further study in the area of physics.

Content Topic List

- Mechanics: Units, ID Motion, Acceleration, Projectile Motion, Forces, Free-Body Diagrams, Coupled Forces, Friction, Momentum, Collisions, Center of Mass, Circular Motion, Gravity, Rotation, Angular Momentum, Torque
- Conservation Laws: conservation of momentum, force, work, power, and energy
- Relativity and Relativistic Mechanics: Principle of Relativity, the nature of time, the metric equation, Lorentz Contraction, four-momentum

Sought Concurrence

No

Attachments

- Physics 1250-Syllabus.pdf: Physics 1250 Syllabus
(Syllabus. Owner: Thaler, Lindsey Nicole)
- Justification.pdf: Explanation for course request
(Cover Letter. Owner: Thaler, Lindsey Nicole)
- Phy1270Syllabus_2022_v4.pdf: Syllabus
(Syllabus. Owner: Thaler, Lindsey Nicole)

Comments

- Thank you for the detailed feedback. I believe we've addressed the committee's concerns in the newest syllabus (attached). *(by Thaler, Lindsey Nicole on 04/14/2022 11:57 AM)*
- See Feedback email sent to department 4-4-22 RLS *(by Steele, Rachel Lea on 04/04/2022 07:46 PM)*

COURSE REQUEST
1270 - Status: PENDING

Last Updated: Vankeerbergen, Bernadette
Chantal
04/18/2022

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Thaler, Lindsey Nicole	03/10/2022 08:56 AM	Submitted for Approval
Approved	Humanic, Thomas John	03/10/2022 09:52 AM	Unit Approval
Approved	Vankeerbergen, Bernadette Chantal	03/27/2022 01:23 PM	College Approval
Revision Requested	Steele, Rachel Lea	04/04/2022 07:46 PM	ASCCAO Approval
Submitted	Thaler, Lindsey Nicole	04/14/2022 11:57 AM	Submitted for Approval
Approved	Humanic, Thomas John	04/14/2022 01:49 PM	Unit Approval
Approved	Vankeerbergen, Bernadette Chantal	04/18/2022 12:48 PM	College Approval
Pending Approval	Cody, Emily Kathryn Jenkins, Mary Ellen Bigler Hanlin, Deborah Kay Hilty, Michael Vankeerbergen, Bernadette Chantal Steele, Rachel Lea	04/18/2022 12:48 PM	ASCCAO Approval

Justification:

The Physics Department is creating an introductory physics course that is tailored to meeting the needs of students majoring in Physics, Engineering Physics, and Astronomy. In the past, these students having taken 1250/1251, a calculus-based course taken by many different majors across campus, primarily in the College of Engineering. This course, proposed numbering 1270/1271, would provide content that largely overlaps with 125X but that is designed specifically for our majors.

In other words, we are looking to create a freshman course sequence for our majors that mirrors Physics 1250-1251. Similar to the Chemistry 1610-1620 sequence that Chemistry has available to their majors and covers the same topics as Chemistry 1210-122.

Certain topics, that are critical for these majors, would be covered more in depth thus preparing them for more advanced study. In addition, we will include the development of “soft skills” such as problem-solving skills, working in groups, and study skills. Finally, we seek to improve retention among our majors, especially among underrepresented groups.

By collecting these students into a cohort and emphasizing these soft skills, we hope that students will develop both the skills and the personal relationships that are critical for success in the field.

We also want to note that we will use the same textbook as Physics 1250-1251H, not Physics 1250-1251. The reason for this is because the Physics 1250-1251H textbook, *Six Ideas that Shaped Physics*, covers topics in an order that does not require students to be proficient in calculus until later in the semester. This will allow students who have not previously learned calculus the opportunity to see the relevant material in Math 1151 before being required to apply that knowledge in Physics 1270.

Syllabus:
Physics 1270
Classical Mechanics, Conservation Laws,
and Special Relativity
Autumn 2022

Course Information

- **Course times:**
Lecture: Monday, Wednesday, Friday at 3:00-3:55pm
Lab: Tuesday 3:00-5:05pm
Recitation: Thursdays 3:00-3:55pm or 4:10-5:05pm
- **Credit hours:** 5
- **Mode of delivery:** In person.

Instructor

- **Name:** Brian L Winer
- **Email:** winer.12@osu.edu
- **Office location:** PRB 3042
- **Office hours:** Monday 7:30-8:30pm (Zoom), Thursday 1:30-2:30pm (in-person)
- **Preferred means of communication:**
 - My preferred method of communication for questions is **email**.
 - My class-wide communications will be sent through the Announcements tool in CarmenCanvas. Please check your [notification preferences](https://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to be sure you receive these messages.



Course Prerequisites

Concurrent with: Math 1141, Math 1151 (152), 1161 (161), 1181H (161H), or 4181H (191H) or above. Enrollment in Astronomy & Astrophysics major, Engineering Physics major or pre-major, or Physics major. Or instructor permission

Course Description

Calculus-based introduction to classical physics. In depth study of classical mechanics including Newton's laws, conservation laws, and introduction to special relativity. For students majoring in Astronomy & Astrophysics, Engineering Physics, or Physics.

Learning Outcomes

1. Successful students are able to explain basic facts, principles, theories and methods of modern natural sciences; and describe and analyze the process of scientific inquiry.
2. Successful students are able to identify how key events in the development of science contribute to the ongoing and changing nature of scientific knowledge and methods.
3. Successful students are able to employ the processes of science through exploration, discovery, and collaboration to interact directly with the natural world when feasible, using appropriate tools, models, and analysis of data.
4. Successful students are able to analyze the inter-dependence and potential impacts of scientific and technological developments.
5. Successful students are able to evaluate social and ethical implications of natural scientific discoveries.
6. Successful students are able to critically evaluate and responsibly use information from the natural sciences.
7. Student develop skills in problem solving and analysis that establish a foundation for further study in the area of physics.
8. Students will develop hard skills including developing a foundation in classical mechanics and special relativity. The classic mechanics will include an understanding of Newtonian Mechanics, Conservation Laws, and how to apply these concepts to make predictions of physical systems. The introduction to Special Relativity will include the foundational principles, the basic implications, such as length contraction and time dilation, and the mathematical tools for describing the theory, such as Lorentz Transformations.
9. Students will develop soft skills, such a good study habits, ability to work well in a group, and good problem-solving skills.



How This Course Works

Mode of delivery: This course expected to be delivered in person. If University policy requires a change in the delivery method due to COVID restrictions, then arrangements will be made to deliver instruction via Zoom or equivalent. If you have University sponsored events that might cause you to miss a one or more classes, discuss it with me *as soon as possible*.

Pace of activities: This course is divided into approximately **weekly modules**. These modules are presented on CARMEN (carmen.osu.edu) and typically include pre-lecture review, problems solved in small groups during recitation, homework, and laboratory exercises.

Credit hours and work expectations: This is a 5 credit-hour course. According to [Ohio State bylaws on instruction](#) ([go.osu.edu/credit hours](http://go.osu.edu/credit%20hours)), students should expect around 5 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 10 hours outside of class (reading and assignment preparation, for example) to receive a grade of [C] average.

Attendance and participation requirements:

- **Class Attendance: required**
Lecture participation will involve discussion of topics and answering TopHat questions presented during lecture.
- **Laboratory: required**
Laboratory participation involves attending the laboratory meeting where you will be conducting experiments and analyzing data from those experiments.
- **Recitation: required**
Recitation will involve working in small groups to solve complex problems.
- **Office hours: optional**
Office hours are optional and are attended as needed by students.



Course Materials, Fees and Technologies

Required Materials and/or Technologies

- **Text:** Six Ideas that Shaped Physics, 3rd Edition by Thomas Moore, Units C, N, R.
- **Laboratory Workbook:** Will be provided.

Required Equipment

- **Webcam:** Required for Zoom office hours. Built-in or external webcam, fully installed and tested
- **Microphone:** Required for Zoom office hours. Built-in laptop or tablet mic or external microphone

CarmenCanvas Access

You will need to use [BuckeyePass](https://buckeyepass.osu.edu) (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the [BuckeyePass - Adding a Device](https://go.osu.edu/add-device) (go.osu.edu/add-device) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- [Install the Duo Mobile application](https://go.osu.edu/install-duo) (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at [614-688-4357 \(HELP\)](tel:614-688-4357) and IT support staff will work out a solution with you.

Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- [Navigating CarmenCanvas](https://go.osu.edu/canvasstudent) (go.osu.edu/canvasstudent)
- [CarmenZoom virtual meetings](https://go.osu.edu/zoom-meetings) (go.osu.edu/zoom-meetings)

Other Skills Needed for This Course

- Basic knowledge of calculus (such as would be obtained in Math 1151, 1141, or 1181H).

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat:** go.osu.edu/it
- **Phone:** [614-688-4357 \(HELP\)](tel:614-688-4357)
- **Email:** servicedesk@osu.edu



Grading and Faculty Response

How Your Grade is Calculated

Assignment Category	Points
Lecture Preparation (Quiz)	10%
Lecture Attendance/Participation	10%
Laboratory Experiments and Exercises	20%
Group Work in Recitation	10%
Homework	20%
Unit Exams (three total)	30% (10% each)

For each component, other than the Unit Exams, the lowest grade of component will be dropped. For example, there will be fourteen homework assignments. The lowest score will be dropped and the other thirteen will count for 20% of your total grade.

See [Course Schedule](#) for due dates.

Descriptions of Major Course Assignments

Lecture participation (10%): Lecture is where we will review concepts and put them to work in practice problems. Participation is assessed based on participation in TopHat questions in class or small group assignments.

Lab work (20%): See physics happening in front of your eyes, and build skill in experimental methods. Activities for credit will be checked by TA prior to departing lab.

Group work (10%): Build your problem-solving muscles by working on harder problems in groups, in an environment where you can phone a friend for help (i.e., talk with your expert TA!).

Lecture Preparation (10%): Prior to the Lectures each week, there will be a reading assignment from the book with a simple CARMEN "quiz" to provide responses, either a simple multiple choice or a short written response. These will be due on Mondays at 1pm and can be accessed through the CARMEN Assignments or Modules tabs. The material covered by the reading assignment is the reading for that current week. The exception is the first reading assignment, which will cover the material from this syllabus in addition to the Week 2 reading. You can take the reading assignment quiz twice, and we'll keep the higher score.

Homework (20%): Weekly homework can be accessed through the CARMEN_Assignments or Modules tabs. These will normally be due Friday nights at 11:59pm.

Unit exams (30%): There will be three unit exams after the completion of each book unit (C = conservation, N = Newtonian Mechanics, and R = Relativity). Each exam is worth 10% of the grade for a total of 30%. These exams will be completed during a lecture session.

Academic integrity and collaboration: Your submitted assignments should be your own original work. We do encourage students to help each other understand the material. However, the bulk of each assignment should be - unambiguously - each student's own work. Science is a collaborative field and so working together is important, but one must be careful to distinguish one's own contributions from those of others.

Regrades

If you think there's been a mistake in the grading of any individual assignment, please fill out and submit the regrade form via Carmen within two weeks of getting your graded assignment back. The process is described in the "Useful links for course information" Module on Carmen.

What to do if you miss an assignment or get sick

Drop policy: One week's worth of each element (except for the final exam) will be dropped, no questions asked. This can be either a missed assignment (e.g., if you get sick), or your lowest grade (if you complete all assignments in the category). We will not count the first week's lecture participation toward the final lecture participation grade in acknowledgment of the flux in enrollment, in addition to a week's worth of other lectures.

Late work: Late Hand-in homework will be accepted after the assignment deadline for 50% credit if it's in within 24 hours of the deadline.

Late/incomplete work beyond the drop policy: If you have an issue that causes you to miss assignments beyond this, please contact your instructor (Prof. Winer in the 3 pm section, Prof. Peter in the 4:10 pm section) ASAP, as soon as the issue arises.

What to do if you feel like you are falling behind

Reach out! Contact an instructor or TA, and we can help you develop strategies to help. We also strongly recommend that you form study groups--interacting with other humans helps solidify concepts. Everyone in the group brings a different perspective and skillset to the table.

Grading Scale

93–100: A
90–92.9: A-
87–89.9: B+
83–86.9: B
80–82.9: B-
77–79.9: C+
73–76.9: C
70–72.9: C-
67–69.9: D+
60–66.9: D
Below 60: E

Instructor Feedback and Response Time

- **Preferred contact method:** If you have a question, please contact me first through my Ohio State email address. I will reply to emails within **24 hours on days when class is in session at the university**.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check [your notification preferences](https://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **seven days**.

Other Course Policies

Discussion and Communication Guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across to others.

Academic Integrity Policy

See [Descriptions of Major Course Assignments](#) for specific guidelines about collaboration and academic integrity in the context of this online class.

Ohio State's Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's [Code of Student Conduct](#) (studentconduct.osu.edu), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- [Committee on Academic Misconduct](http://go.osu.edu/coam) (go.osu.edu/coam)
- [Ten Suggestions for Preserving Academic Integrity](http://go.osu.edu/ten-suggestions) (go.osu.edu/ten-suggestions)
- [Eight Cardinal Rules of Academic Integrity](http://go.osu.edu/cardinal-rules) (go.osu.edu/cardinal-rules)

Copyright for Instructional Materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on Title IX

All students and employees at Ohio State have the right to work and learn in an environment free from harassment and discrimination based on sex or gender, and the university can arrange interim measures, provide support resources, and explain investigation options, including referral to confidential resources.

If you or someone you know has been harassed or discriminated against based on your sex or gender, including sexual harassment, sexual assault, relationship violence, stalking, or sexual exploitation, you may find information about your rights and options on [Ohio State's Title IX website](http://titleix.osu.edu) (titleix.osu.edu) or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu. Title IX is part of the Office of Institutional Equity (OIE) at Ohio State, which responds to all bias-motivated incidents of harassment and discrimination, such as race, religion, national origin and disability. For more information, visit the [OIE website](http://equity.osu.edu) (equity.osu.edu) or email equity@osu.edu.

Commitment to a Diverse and Inclusive Learning Environment

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, [on-](#)

[demand mental health resources](http://go.osu.edu/ccsondemand) (go.osu.edu/ccsondemand) are available. You can reach an on-call counselor when CCS is closed at [614- 292-5766](tel:614-292-5766). **24-hour emergency help** is available through the [National Suicide Prevention Lifeline website](http://suicidepreventionlifeline.org) (suicidepreventionlifeline.org) or by calling [1-800-273-8255\(TALK\)](tel:1-800-273-8255). [The Ohio State Wellness app](http://go.osu.edu/wellnessapp) (go.osu.edu/wellnessapp) is also a great resource.



Accessibility Accommodations for Students with Disabilities

Requesting Accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with [Student Life Disability Services \(SLDS\)](#). After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

Disability Services Contact Information

- Phone: [614-292-3307](tel:614-292-3307)
- Website: slds.osu.edu
- Email: slds@osu.edu
- In person: [Baker Hall 098, 113 W. 12th Avenue](#)

Accessibility of Course Technology

This online course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [CarmenCanvas accessibility](http://go.osu.edu/canvas-accessibility) (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- [CarmenZoom accessibility](http://go.osu.edu/zoom-accessibility) (go.osu.edu/zoom-accessibility)
- Collaborative course tools

Course Schedule

The following is a preliminary schedule. If adjustments are needed during the semester, as revised schedule will be posted to the Carmen page and a notice will be made using the Announcements tool in CarmenCanvas. Refer to the CarmenCanvas course for up-to-date due dates.

This course uses the textbook series *Six Ideas that Shaped Physics*, 3rd Edition by Thomas Moore. This book series consists of the following book units:

C = Conservation Laws (*Conservation Laws Constrain Interactions*) – covered in 1270

N = Newton's Laws (*The Laws of Physics are Universal*) – covered in 1270

R = Relativity (*The Laws of Physics are Frame-Dependent*) – covered in 1270

E = Electromagnetism (Electric and Magnetic Fields are Unified) – covered in 1271

Q = Quantum Mechanics (*Particles Behave like Waves*) – covered in 1271

T = Thermodynamics (*Some Processes Are Irreversible*) – covered in 1271

Below lists the chapters that will be covered each week. The letter indicates the book unit above and the number indicates the chapter. For example "C1" is the first chapter from Unit C.

Week 1 Lab topic: Introduction

C1: Introduction to Interactions

C2: Vectors

Week 2 (No class Monday), Lab topic: Vectors & Forces

C3: Interactions Transfer Momentum

C4: Particles and Systems

Lecture Preparation Quick #1 due Monday

Homework assignment #1 due Friday

Week 3 Lab topic: Momentum

C5: Applying Momentum Conservation

C6: Introduction to Energy

C7: Some Potential Energy Functions

Lecture Preparation Quick #2 due Monday

Quiz #1 (Thursday in recitation)

Homework assignment #2 due Friday

Week 4 Lab topic: Momentum & Energy

C8: Force and Energy

C9: Rotational Energy

C10: Thermal Energy

Lecture Preparation Quick #3 due Monday

Homework assignment #3 due Friday

Week 5 Lab topic: Rotational Energy

C11: Energy in Bonds



C12: Power, Collisions
C13: Angular Momentum
Lecture Preparation Quick #1 due Monday
Quiz #2 (Thursday in recitation)
Homework assignment #4 due Friday

Week 6 Lab topic: Angular momentum

C14: Conservation of Angular Momentum
Unit C Review
N1: Newton's Laws
Unit Exam #1 (unit C) this week in lecture
Lecture Preparation Quick #5 due Monday
Homework assignment #5 due Friday

Week 7 Lab topic: Motion

N2: Vector Calculus
N3: Forces from Motion
N4: Motion from Forces
Lecture Preparation Quick #6 due Monday
Quiz #3 (Thursday in recitation)
Homework assignment #6 due Friday

Week 8 Lab topic: Friction

N5: Statics
N6: Linearly Constrained Motion
N7: Coupled Objects
Lecture Preparation Quick #7 due Monday
Homework assignment #7 due Friday

Week 9 Lab topic: Forces & Motion

N8: Circularly Constrained Motion
N9: Noninertial Reference Frames
N10: Projectile Motion
Lecture Preparation Quick #8 due Monday
Quiz #4 (Thursday in recitation)
Homework assignment #8 due Friday

Week 10 Lab topic: Projectiles

N11: Oscillatory Motion
N12: Introduction to Orbits
Lecture Preparation Quick #9 due Monday
Homework assignment #9 due Friday

Week 11 Lab topic: Oscillations

N13: Planetary Motion
Unit N Review

R1: The Principle of Relativity
Unit Exam #2 (Unit N) this week in lecture
Lecture Preparation Quick #10 due Monday
Homework assignment #10 due Friday

Week 12 Lab topic: Gravity & Light

R2: Synchronizing Clocks
 R3: The Nature of Time
Lecture Preparation Quick #11 due Monday
Quiz #5 (Thursday in recitation)
Homework assignment #11 due Friday

Week 13 Lab Topic: Special Adventures

R4: The Metric Equation
 R5: Proper Time
 R6: Coordinate Transformation
Lecture Preparation Quick #12 due Monday
Quiz #6 (Thursday in recitation)
Homework assignment #12 due Friday

Week 14 No Lab

R6: Coordinate Transformation (cont.)
 R7: Lorentz Contraction
Lecture Preparation Quick #13 due Monday
Homework assignment #13 due Friday

Week 15 Lab Topic: Time & Space

R8: The Cosmic Speed Limit
 R9: Four-Momentum
 R10: Conservation of Four-Momentum
Lecture Preparation Quick #14 due Monday
Quiz #7 (Thursday in recitation)
Homework assignment #14 due Friday

Week 16 No Lab

Unit R Review and Contingency
Unit Exam #3 (Unit R) this week in lecture

provisional**Lectures**

12:40 TWF	Dr. Tom Barrett	SM 1106E	614-292-3856	barrett.3@osu.edu
1:50 TWF	Dr. Tom Barrett	SM 1106E	614-292-3856	barrett.3@osu.edu
3:00 TWF	Dr. Marc Bockrath	PRB 2054		bockrath.31@osu.edu
4:10 TWF	Dr. Marc Bockrath	PRB 2054		bockrath.31@osu.edu
5:20 TWF	Dr. Lei Bao	PRB 1016	614-292-2450	bao.15@osu.edu
6:30 TWF	Dr. Lei Bao	PRB 1016	614-292-2450	bao.15@osu.edu

Course Materials: Pdf copies of course handouts are provided on CARMEN on the Modules page. For the lab manual, or for a hard copy of the textbook, please contact the Barnes & Noble bookstore on High Street. An eBook version of the Textbook is provided on WebAssign: see *CarmenBooks* below.

Technology Requirements: You will need an iPad to be able to upload written solutions during exams. When you work in groups in recitation, you will need to use *OneNote* (a digital notebook), which is provided by OSU.

Text Book: *Physics for Scientists and Engineers with Modern Physics, 10th edition* by Serway & Jewett. Reading Assignments in textbook: Indicated by [Chapter.Section] in **Course Schedule** below.

Lab Book: *Physics 1250 Activities & Worksheets, 6th edition.*

Websites

Carmen: <http://carmen.osu.edu/> – Course Specific Information; all course documents and handouts are available on the Carmen Home and Modules pages.

WebAssign Access: See *OSU PHYSICS CarmenBooks WebAssign Student instructions* on the Carmen/Modules page.

- **Online Homework and Prelabs are available on WebAssign.** Please check WebAssign for up-to-date date and time deadlines for prelab and homework.
- **Hand-in HW (HiHW) assignments and other documents and information are available on the Carmen/Modules page.**
- **Policy documents:** “SUMMARY OF COURSE POLICY” and “GENERAL COURSE POLICY AND INFORMATION” (for more detail) are available on the Carmen/Modules page.
- **Links to Essential Skills assignments are available on the Carmen/Modules page. For any issues regarding Essential Skills, contact physics-essential-skills@lists.service.ohio-state.edu.**

Support

WebAssign help: <http://webassign.com/support/student-support/>

Homework (HW) help: For homework help, please contact your TA or lecturer.

WebAssign Issues (access and technical): Dr. Bolland (SM 1106D), 614-292-8065, bolland@physics.osu.edu.

For Excuses or Permission for anything: Course manager Dr. Ziegler – SM 1036A, 614-292-2067, ziegler.2@osu.edu

Tutoring: Offered during TA office hours; also, see <https://physics.osu.edu/physics-tutoring>.

Special Quizzes (on the Carmen/Quizzes page)

Quiz 0: Available 8:00 AM Monday, August 30. This quiz may be done as often as you wish. The intent of this quiz is to give you practice uploading a file to Carmen (Version A) [or to Gradescope (Version B)]. Failure to do Quiz 0 before the first time an upload is required for an exam may result in a penalty. Quiz 0 will count as a graded quiz.

Peer Review survey 1: available 8:00 AM Wednesday, October 6, to 11:59 PM Wednesday, October 13

Peer Review survey 2: available 8:00 AM Monday, November 29, to 11:59 PM Monday, December 6.

Midterms and Final Exam

Midterm 1: Monday, September 27, room TBA (during evening meeting: 6:30 – 7:30 PM)

Midterm 2: Monday, November 1, room TBA (during evening meeting: 6:30 – 7:30 PM)

Final Exam: Friday, December 10, 6:00-7:45 PM, room TBA

Course Activity Conflict: By university rules, a regularly scheduled quiz, midterm, lab, or final exam takes precedence over common exams. The conflicting course must offer you an alternate time.

Grades:

Item	Lab	Prelab	On-line Homework	Hand-in Homework	Recitation Participation*	Quizzes	Essential Skills	Midterms	Final Exam
Weight	10%	3%	12%	6%	6% = (5+1) %	16%	3%	(2×12%)	20%
Notes	NO DROPS	1 dropped	NO DROPS	1 dropped	2 dropped - IPG	2 dropped	1 dropped		

* Recitation Participation = IPG + PRP [IPG = Instructor Participation Grade; PRP = Peer Review Participation (survey)]. See Carmen/Modules for details.

SEI Participation bonus: If at least 65% of students enrolled in a lecture section participate in the on-line survey “Student Evaluation of Instruction” (SEI) for both lecturer and recitation instructor, then a bonus of 0.5 % will be added to every student’s percentage score in that lecture section after the grade scheme (curve) is determined.

Essential Skills Assignments (ES):

These are short weekly assignments to help improve your basic knowledge and skills critical for this physics course. To contact the ES team, send email to physics-essential-skills@lists.service.ohio-state.edu.

For each ES assignment, you will be given a number of skills to master. For each skill (designated by a segmented green circle) you will need to correctly answer several questions in a row, depending on the skill, in order complete the assignment. Often there are general explanations that you can access for some of the skills. Just a reminder: The intention of this assignment is to build fluency, not just accuracy. As a result, some skills will be repeated over the semester.

Grades will be input into Carmen by the end of the semester. You will receive full points for completing each unit, and you can check for completion on the ES page.

How to view grades correctly in Carmen:

To view your course average correctly, you must **unselect** the option "Calculate based only on graded assignments". This option appears on the upper right-hand side of the Grades page, under "Assignments weighted by Group". If the option "Calculate based only on graded assignments" is selected, the average you see will be calculated only from those items that show a grade in the grade book: blank items are ignored, but they are not ignored in determining your final grade.

“Health and safety requirements: All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (<https://safeandhealthy.osu.edu>), which includes following university mask policies and maintaining a safe physical distance at all times. Non-compliance will be warned first and disciplinary actions will be taken for repeated offenses.” (Updated: Aug. 14, 2020)

The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university’s [request process](#), managed by Student Life Disability Services. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

CarmenBooks

The textbook and/or courseware for this course is being provided via **CarmenBooks**. Through CarmenBooks, students obtain publisher materials electronically through CarmenCanvas, saving them up to 80% per title. The fee for this material is included as part of tuition and is listed as *CarmenBooks fee* on your Statement of Account. In addition to cost-savings, materials provided through CarmenBooks are available immediately on or before the first day of class. There is no need to wait for financial aid or scholarship money to purchase your textbook. Unless you choose to opt-out of the program, you do NOT need to purchase any materials for this course at the bookstore – **except the lab manual**. For more information on the program or information on how to opt out, [please visit the CarmenBooks website](#).

provisional**General Schedule:**

Lectures: Lectures meet online on Zoom on Tuesdays, Wednesdays, and Fridays (TWF).

Recitations: Recitations meet in-person on Mondays (M). On quiz days, students are expected to participate in a Group Work session (about 25 minutes) before the quiz (25 minutes).

Exams: Quizzes will be given during recitation. Students take midterms and the final exam in-person. Exams may contain multiple-choice and show-work problems.

Midterms are given during the recitation evening meeting (see schedule) – **evening meetings meet for midterms only.**

Hand-in Homework (HiHW) – HiHW assignments are due to be uploaded on the Carmen/Assignments page by 11:59 pm Sundays before a quiz day.

Students are advised to bring their BuckID cards during exams for identification.

Recitation Group Work (GW) – Group Work participation sessions meet during recitation. Students work in assigned groups of (usually) four members. **GW assignments are due to be uploaded on the Carmen/Assignments page by 11:59 pm that evening (Monday).**

Prelabs – Prelabs, available in WebAssign, are due by 11:59 pm Sunday, the week of a lab. Each numbered Experiment has a Prelab.

Labs – Labs meet in-person. Students work together in assigned groups of (usually) four members.

Online Homework (HW) – Usually due in WebAssign by 11:59 pm Fridays – check Course Schedule below for variations. Extensions of deadlines will be posted in WebAssign.

Essential Skills assignments, available through the Assignments pages, are due 11:59 pm Sundays.

Summary of P1250 Course Activities:

Activity	Meeting Times	Where to Meet	
Lecture	TWF	Zoom	
Recitation	M	Recitation room	
Lab	TWR	Lab room	
Assignment	Due	Where to Find	Where graded/to upload
Quizzes	See <u>Course Schedule</u>	Carmen/ or TBA	Carmen/ or TBA
Midterm	See <u>Course Schedule</u>	Carmen/ or TBA	Carmen/ or TBA
Final Exam	See <u>Course Schedule</u>	Carmen/ or TBA	Carmen/ or TBA
Essential Skills (ES)	11:59 pm Sunday	Carmen/Assignments page (ES link)	NA
Hand-in Homework (HiHW)	11:59 pm Sunday	Carmen/Modules page	Carmen/ or TBA
Prelabs	11:59 pm Sunday	Carmen/Assignments page (WebAssign link)	NA
Group Work Participation	11:59 pm Monday	Carmen/Modules page	Carmen/ or TBA
Lab Work	During lab	Lab Manual	Lab room
Lab Group Work	During lab	Lab Manual	Lab room
Online Homework (HW)	11:59 pm Friday	Carmen/Assignments page (WebAssign link)	NA

Please Access WebAssign through the Carmen/Assignments page.

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Course Schedule

Reading Assignment: [chapter, section], L = Lecture, R = Recitation, GW = Group Work (recitation), HW = Homework, HiHW = Hand-in HW, ↓ = assignment moved to later date

Week	Day	Date	Activity	Reading [Chapter.Section]	Lab	Work due 11:59 pm
1	SUN	8/22				
	M	8/23	No classes			
	T	8/24	L1: Introduction; Units	[1]	Lab/Recitation Introduction	
	W	8/25	L2: Motion in One Dimension	[2]		
	R	8/26				
	F	8/27	L3: Acceleration	[2]		Online HW 0
2	SUN	8/29	ES01 due 11:59 PM			ES01; prelab 1
	M	8/30	R1: groups assigned; GW 0, Quiz 0			GW 0
	T	8/31	L4: Vectors	[3]	Lab: Exp. 1 – 1-D Kinematics	
	W	9/01	L5: Projectile Motion	[4.1-3]		
	R	9/02				
	F	9/03	L6: Forces	[5.1-5]		Online HW 1
3	SUN	9/05	ES02 due 11:59 PM			ES02; prelab 3
	M	9/06	Labor Day HOLIDAY – no classes			
	T	9/07	L7: Forces – free body diagrams	[5.5-7]	LAB: Exp. 3 – 2-D Kinematics	
	W	9/08	L8: Forces and coupled motion	[5.7]		
	R	9/09				
	F	9/10	L9: Forces – Friction	[5.7-8]		Online HW 2
4	SUN	9/12	ES03 due 11:59 PM			ES03; prelab 4 HiHW 1
	M	9/13	R2: GW 1, Quiz 1 (HW 1 and 2)			GW 1
	T	9/14	L10: Friction and Motion	[5.8]	LAB: Exp. 4 – Dynamic Forces	
	W	9/15	L11: Circular Motion	[4.4-5; 6.1-3]		
	R	9/16				
	F	9/17	L12: Circular Motion and Gravity <i>Last day to drop without a W</i>	[13.1-3; 6 circular orbits] <i>(end of MT 1 material)</i>		Online HW 3
5	SUN	9/19	ES04 due 11:59 PM			ES04; prelab 5 HiHW 2
	M	9/20	R3: GW 2, Quiz 2 (HW 3)			GW 2
	T	9/21	L13: Work & Energy	[7.1-5]	LAB: Exp. 5 – Static Friction	
	W	9/22	L14: Energy – potential energy	[7.6-9; 13.5]		
	R	9/23				
	F	9/24	L15: Conservation of Energy	[8.1-4; 13.6 Escape Velocity]		Online HW 4
6	SUN	9/26	ES05 due 11:59 PM			ES05; prelab 6
	M	9/27	R4: Midterm 1 [Ch. 1-6, 13]			
	T	9/28	L16: Energy & Power	[8.5]	LAB: Exp. 6 – Conservation of Energy	
	W	9/29	L17: Momentum	[9.1-7]		
	R	9/30				
	F	10/01	L18: Collisions	[9.1-7]		Online HW 5
7	SUN	10/03	ES06 due 11:59 PM			ES06; prelab 8 HiHW 3
	M	10/04	R5: GW 3, Quiz 3 (HW 5)			GW 3
	T	10/05	L19: Center of Mass of Systems	[9.1-7]	LAB: Exp. 8 – Energy and Momentum	
	W	10/06	L20: Rotational Kinematics <i>Peer Review survey 1: available 8:00 AM</i>	[10.1-3]		
	R	10/07				
	F	10/08	L21: Rotation and Torque	[10.3-5]		Online HW 6

Week	Day	Date	Activity	Reading [Chapter.Section]	Lab	Work due 11:59 pm
8	SUN	10/10	ES07 due 11:59 PM			ES07; HiHW 4
	M	10/11	R6: GW 4, Quiz 4 (HW 6)			GW 4
	T	10/12	L22: Net Torque and Motion	[10.5-6]	NO LAB	
	W	10/13	L23: Rotational Energy and Motion	[10.7-9]		Peer Review 1
	R	10/14	Autumn Break – no classes			
	F	10/15	Autumn Break – no classes			Online HW 7
9	SUN	10/17	ES08 due 11:59 PM			ES08; prelab 9 HiHW 5
	M	10/18	R7: GW 5, Quiz 5 (HW 7)			GW 5
	T	10/19	L24: Angular Momentum	[11.1-4]	LAB: Exp. 9 – Rotational Dynamics	
	W	10/20	L25: Conservation of Angular Momentum	[11.4-5] (end of MT 2 material)		
	R	10/21				
	F	10/22	L26: Static Equilibrium	[12.1 - 3]		Online HW 8
10	SUN	10/24	ES09 due 11:59 PM			ES09; no prelab HiHW 6
	M	10/25	R8: GW 6, Quiz 6 (HW 8)			GW 6
	T	10/26	L27: Oscillations	[15.1-2]	Lab: Worksheet – Angular Momentum	
	W	10/27	L28: Oscillations	[15.3-5]		
	R	10/28				
	F	10/29	Review <i>Last day to drop without petition</i>			Online HW 9
11	SUN	10/31	ES10 due 11:59 PM			ES10; prelab 10
	M	11/01	R9: Midterm 2 [Ch. 7-11]			
	T	11/02	L29: Oscillations – damping & forcing	[15.6-7]	LAB: Exp. 10 – Vibrations	
	W	11/03	L30: Fluids – statics	[14.1-4]		
	R	11/04				
	F	11/05	L31: Fluids - dynamics	[14.5-6,8]		Online HW 10
12	SUN	11/07	ES11 due 11:59 PM			ES11 HiHW 7
	M	11/08	R10: GW 7, Quiz 7 (HW 10)			GW 7
	T	11/09	L32: Temperature and Matter	[18.1-5]	NO LAB	
	W	11/10	L33: Heat and Work; 1 st Law of Thermodynamics	[19.1-4;5]		
	R	11/11	Holiday (Veteran's Day)			
	F	11/12	L34: Kinetic Theory of Gases; Equipartition of Energy	[20.1-2;3]		Online HW 11

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Week	Day	Date	Activity	Reading [Chapter.Section]	Lab	Work due 11:59 pm
13	SUN	11/14	ES12 due 11:59 PM			ES12; prelab 12 HiHW 8
	M	11/15	R11: GW 8, Quiz 8 (HW 11)			GW 8
	T	11/16	L35: Processes of an Ideal Gas on the PV plane	[19.5; 20.4]	No lab today	
	W	11/17	L36: Heat Engines and the 2 nd Law of Thermodynamics; Carnot Engine	[21.1-2;3-4]	LAB: Exp. 12:A – Specific Heat;	
	R	11/18			Exp. 12:B – Ideal Gas	
	F	11/19	L37: Entropy and the 2 nd Law of Thermodynamics	[21.6-8]		Online HW 12
14	SUN	11/21	ES13 due 11:59 PM			ES13 HiHW 9
	M	11/22	R12: GW 9, Quiz 9 (HW 12)			GW 9
	T	11/23	L38: Inertial Reference Frames, and the Relativity of Time and Space	[4.6; 5.2; 38.1-4 (ignore Doppler)]	LAB: Exp. 12:A – Specific Heat;	
	W	11/24	Thanksgiving Break – no classes		Break	
	R	11/25	Thanksgiving Break – no classes		Break	
	F	11/26	Thanksgiving Break – no classes			(HW 13 ↓)
15	SUN	11/28				Online HW13 prelab 13: [read 38.5]
	M	11/29	R13: GW10, Quiz 10 (HW13) <i>Peer Review survey 2: available 8:00 AM</i>			GW 10
	T	11/30	L39: Relativity and Velocity	[38.6; 4.6]	No lab today	
	W	12/01	L40: Relation of Inertial Frames	[38.5]	No lab today	
	R	12/02			LAB: Exp. 13 – Special Relativity	
	F	12/03	L41: Momentum and Energy	[38.7-8]		(HW 14 ↓)
16	SUN	12/05	ES14 due 11:59 PM			Online HW 14 ES14
	M	12/06	R14: Review Group Work			Review GW Peer Review 2
	T	12/07	L: TBA		LAB: Exp. 13 –	
	W	12/08	L: TBA		Special Relativity	
AUTUMN SEMESTER FINAL EXAMS 12/10– 12/16 (F – R)						

This syllabus/assignment sheet is subject to change at any time.