Term Information

Effective Term	Spring 2023

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	1271
Course Title	E&M, Thermal Physics, Waves, and Quantum Physics for Majors
Transcript Abbreviation	E&MThermoWavesQM
Course Description	Calculus-based introduction to classical physics. In depth study of electromagnetism, waves, quantum mechanics, and thermodynamics. 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	[Prereq: Physics 1270; Prereq or concur: Math 1152, 1155, 1161, 1172, 1181H, or 4181H] or [prereq: Physics 1250, 1250H, or 1260; Prereq or concur: Math 1152, 1155, 1161, 1172, 1181H, or 4181H; and enrollment in Astronomy & Astrophysics major, Engineering Physics major or pre-major, or Physics major.] Note: We are requesting two ways for students to meet the prerequisites to account for possible major-changers between first and second semester (1270 and 1271).
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

- Electricity & Magnetism: Electric Fields, Charge Distributions, Electric Potential, Static Equilibrium, Current, Dynamic Equilibrium, Analyzing Circuits, Magnetic Fields, Gauss's Law, Ampere's Law, Integral Forms, Maxwell's Equations, Faraday's Law
- Waves and Quantum: Wave Models, Standing Waves and Resonance, Interference and Diffraction, the Wave Nature of Particles, Spin, the Rules of Quantum Mechanics, the Wave function, Simple Quantum Models, Spectra, the Schrodinger Equation
- Thermodynamics: Introduction to Nuclei, Temperature, Macrostates and Microstates, Entropy and Temperature, The Boltzmann Factor, the Ideal Gas, Distributions, Gas Processes, Calculating Entropy Changes, Heat Engines

Sought Concurrence No

Attachments

- Physics 1251-Syllabus.pdf: Physics 1251 Syllabus (for comparison)
  (Syllabus. Owner: Thaler,Lindsey Nicole)
- Justification.pdf: Justification/explanation for request
  (Cover Letter. Owner: Thaler,Lindsey Nicole)
- Phy1271Syllabus_2023_V2.pdf: Physics 1271 Syllabus
  (Syllabus. Owner: Thaler,Lindsey Nicole)

Comments

- note: we've updated the syllabus and made changes to the prerequisites since our original request. *(by Thaler,Lindsey Nicole on 06/13/2022 11:50 AM)*
- See feedback email sent to department 4-4-22 RLS *(by Steele,Rachel Lea on 04/04/2022 07:46 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Thaler,Lindsey Nicole	03/10/2022 10:36 AM	Submitted for Approval
Approved	Humanic,Thomas John	03/10/2022 11:13 AM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	03/21/2022 04:17 PM	College Approval
Revision Requested	Steele,Rachel Lea	04/04/2022 07:46 PM	ASCCAO Approval
Submitted	Thaler,Lindsey Nicole	06/13/2022 11:50 AM	Submitted for Approval
Approved	Humanic,Thomas John	06/17/2022 12:58 PM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	08/31/2022 01:09 PM	College Approval
Pending Approval	Cody,Emily Kathryn Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Vankeerbergen,Bernadette Chantal Steele,Rachel Lea	08/31/2022 01:09 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 1271
Electromagnetism, Quantum Mechanics and Thermodynamics

Spring 2023

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:** Prof. 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 (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Course Prerequisites

[Prereq: Physics 1270; Prereq or concur: Math 1152, 1155, 1161, 1172, 1181H, or 4181H] or [prereq: Physics 1250, 1250H, or 1260; Prereq or concur: Math 1152, 1155, 1161, 1172, 1181H, or 4181H; and enrollment in Astronomy & Astrophysics major, Engineering Physics major or pre-major, or Physics major.]

Course Description

Calculus-based introduction to classical and modern physics. In depth study of electromagnetism, the principles of quantum mechanics, and thermodynamics. 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 electromagnetism, quantum mechanics, and thermodynamics. The electromagnetism will include an understanding of Maxwell's Equations and how to apply these concepts to make predictions of physical systems. The introduction to quantum mechanics will include the foundational principles, the basic implications, and applications to atomic phenomena such as the structure of the hydrogen atom. Thermodynamics will include a mixture of classical physics and quantum physics to develop models for thermodynamic processes, such as the ideal gas law. Using statistical methods students will understand how certain processes are irreversible in nature.
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 that includes lecture, laboratory, and recitation components. According to Ohio State bylaws on instruction (go.osu.edu/credit hours), students should expect 6 hours of in-class work per week (this includes 3 hours of lecture, 2 hours of lab, and 1 hour of recitation) in addition to 9 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, 4th Edition by Thomas Moore, Units E, Q, T.
- **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 (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 (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 (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) 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 (go.osu.edu/canvasstudent)
- CarmenZoom virtual 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) as well as Newtonian mechanics and conservation laws (covered in Physics 1250, 1260, 1270).

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)
- **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	10%
Quizzes	10%
Unit Exams (three total)	30% (10% each)

For each component, other than the Unit Exams, the lowest grade of the component will be dropped. For example, there will be thirteen homework assignments. The lowest score will be dropped and the other twelve 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. The purpose of the TopHat questions is for students to engage with the material so the participation grade is entirely based on you responding to the TopHat questions, not whether or not you respond correctly.

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 (10%): Weekly homework can be accessed through the CARMEN Assignments or Modules tabs. These will normally be due Friday nights at 11:59pm.

Quizzes (10%): There will be six quizzes. These will be given during recitation via CARMEN.

Unit exams (30%): There will be three unit exams after the completion of each book unit (E = electromagnetism, Q = Quantum Mechanics, and T = Thermodynamics). Each exam is worth 10% of the grade for a total of 30%. These exams will be completed during recitation.

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 unit exams) 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 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 others 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 (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 (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)
- Eight Cardinal Rules of Academic Integrity (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 (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 (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 (go.osu.edu/ccsondemand) are available. You can reach an on-call

counselor when CCS is closed at 614- 292-5766**. 24-hour emergency help** is available through the National Suicide Prevention Lifeline website (suicidepreventionlifeline.org) or by calling 1-800-273-8255(TALK). The Ohio State Wellness app (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
- 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 (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- CarmenZoom 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*, 4th 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, "E1" is the first chapter from Unit E. As indicated above, we will use the books for Units E, Q, and T this semester (1271).

Week 1 Lab topic: Electric Fields

E1: Electric Field
E2: Charge Distributions

Week 2 (No class Monday), Lab topic: Electric Potential

E3: Potential
E4: Static Equilibrium
Lecture Preparation Quiz #1 due Wednesday
Quiz #1 (during recitation)
Homework assignment #1 due Friday

Week 3 Lab topic: Moving Charge

E5: Current
E6: Dynamic Equilibrium
E7: Analyzing Circuits
Lecture Preparation Quiz #2 due Monday
Homework assignment #2 due Friday

Week 4 Lab topic: Magnetic Fields – Python Simulations

E8: Magnetic Fields
E9: Currents Respond to Magnetic Fields
Lecture Preparation Quiz #3 due Monday
Quiz #2 (during recitation)
Homework assignment #3 due Friday

Week 5 Lab topic: Magnetic Fields

E10: Currents Create Magnetic Fields
E11: The Electomagnetic Field
Lecture Preparation Quiz #4 due Monday
Homework assignment #4 due Friday

Week 6 Lab topic: Magnetic Energy

E12: Gauss' Law
E13: Ampere's Law
E15: Maxwell's Equations
Lecture Preparation Quiz #5 due Monday
Quiz #3 (during recitation)
Homework assignment #5 due Friday

Week 7 Lab topic: Magnetic Induction

E16: Faraday's Law
E17: Induction
E18: Electromagnetic Waves
Lecture Preparation Quiz #6 due Monday
Homework assignment #6 due Friday

Week 8 Lab topic: Standing Waves

Q1: Wave Model
Q2: Standing Waves and Resonance
Q3: Interference and Diffraction
Lecture Preparation Quiz #7 due Monday
Unit E Exam (Thursday in recitation)
Homework assignment #7 due Friday

Week 9 Lab topic: Interfering Waves

Q4: The Particle Nature of Light
Q5: The Wave Nature of Particles
Q6: Spin
Lecture Preparation Quiz #8 due Monday
Quiz #4 (during recitation)
Homework assignment #8 due Friday

SPRING BREAK Week

Week 10 Lab topic: Duality of Light

Q7: The Rules of Quantum Mechanics
Q8: Quantum Weirdness
Q9: The Wavefunction
Lecture Preparation Quiz #9 due Monday

Homework assignment #9 due Friday

Week 11 Lab topic: Duality of Matter

Q10: Simple Quantum Models
Q11: Spectra
Q12: The Schrödinger Equation
Lecture Preparation Quiz #10 due Monday
Quiz #5 (during recitation)
Homework assignment #10 due Friday

Week 12 Lab topic: Temperature and Entropy

T1: Temperature
T2: Microstates and Macrostates
T3: Entropy and Temperature
Lecture Preparation Quiz #11 due Monday
Unit Q Exam (Thursday in recitation)
Homework assignment #11 due Friday

Week 13 Lab Topic: Temperature and Energy

T4: The Boltzmann Factor
T5: The Ideal Gas
Lecture Preparation Quiz #12 due Monday
Homework assignment #12 due Friday

Week 14 Lab Topic: Gas Processes

T7: Gas Processes
T8: Calculating Entropy Changes
Lecture Preparation Quiz #13 due Monday
Quiz #6 (during recitation)
Homework assignment #13 due Friday

Week 15 No Lab

Unit T Review and Contingency
Unit T Exam during Exam Week

PHYSICS 1251 **SYLLABUS/ASSIGNMENT SHEET** **Autumn 2021**

provisional

Lectures

8:00 TWF	**Dr. G. Lafyatis**	**PRB 4144**	**614-292-2286**	**lafyatis.2@osu.edu**
9:10 TWF	**Dr. R. Sooryakumar**	**PRB 2040**	**614-292-3130**	**sooryakumar.1@osu.edu**
10:20 TWF	**Dr. Tom Barrett**	**SM 1106E**	**614-292-3856**	**barrett.3@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 1251 Activities & Worksheets, 7th edition, 1st Revision* (preferred) – (acceptable: *7th 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.

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, rooms TBA (during evening meeting: 7:45 – 8:45 PM)

Midterm 2: Monday, November 1, rooms TBA (during evening meeting: 7:45 – 8:45 PM)

Final Exam: Friday, December 10, 8:00-9:45 PM, rooms 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	Midterms	Final Exam
Weight	12%	4%	12%	6%	6% = (5+1) %	16%	(2×12%)	20%
Notes	NO DROPS	1 dropped	NO DROPS	1 dropped	2 dropped	2 dropped		

*** Recitation Participation = IPG + PRP (IPG = Instructor Participation Grade; PRP = Peer Review Participation). 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.

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.

PHYSICS 1251 **SYLLABUS/ASSIGNMENT SHEET** **Autumn 2021**

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.

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

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.

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.

Summary of P1251 Course Activities:

Activity	**Meeting Times**	**Where to Meet**	
Lecture	TWF	Zoom	
Recitation	M	Recitation room	
Lab	WRF	Lab room	
Assignment	**Due**	**Where to Find**	**Where graded/to upload**
Quizzes	See Course Schedule	Carmen/ or TBA	Carmen/ or TBA
Midterm	See Course Schedule	Carmen/ or TBA	Carmen/ or TBA
Final Exam	See Course Schedule	Carmen/ or TBA	Carmen/ or TBA
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.

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

Note: A chapter section placed within parentheses () contains supplementary material for other chapter sections.

Week	Day	Date	Lecture	Reading [Chapter.Section]	Lab	Work due 11:59 pm
1	SUN	8/22				
	M	8/23	**No classes**			
	T	8/24	**L1**: Electric charge and force; Conductors, insulators & induced charge	[22.1-3]		
	W	8/25	**L2:** Coulomb's Law	[22.3]	**Lab/Recitation Introduction**	
	R	8/26				
	F	8/27	**L3:** Electric field, field lines, and electric force	[22.4-6]		**Online HW 1**
2	SUN	8/29				**prelab 1**
	M	8/30	**R1: groups assigned; GW 0, Quiz 0**			**GW 0**
	T	8/31	**L4:** Electric fields from continuous charge	[23.1]		
	W	9/01	**L5:** (more) Electric fields		**Lab: Exp. 1 –** Electric Force	
	R	9/02				
	F	9/03	**L6:** Electric Flux; Gauss's law	[23.2-4]		
3	SUN	9/05				**prelab 2**
	M	9/06	**Labor Day HOLIDAY – no classes**			
	T	9/07	**L7:** Applications of Gauss's law	[23.4]		
	W	9/08	**L8:** Gauss's law, conductors		**LAB: Exp. 2 –** Electric Field	
	R	9/09				
	F	9/10	**L9:** Electric potentials & relation to electric fields	[24.1-3]		**Online HW 2**
4	SUN	9/12				**prelab 3 HiHW 1**
	M	9/13	**R2: GW 1, Quiz 1** (HW 1 and 2)			**GW 1**
	T	9/14	**L10:** Electric potential energy; electric force is conservative; conductors	[24.3,6] **(end of MT 1 material)**		
	W	9/15	**L11:** Parallel plate capacitor & energy storage	[25.1,2,4,5]	**LAB: Exp. 3 –** Electric Flux	
	R	9/16				
	F	9/17	**L12:** Capacitor Networks ***Last day to drop without a W***	[25.3]		**Online HW 3**
5	SUN	9/19				**prelab 4 HiHW 2**
	M	9/20	**R3: GW 2, Quiz 2** (HW 3)			**GW 2**
	T	9/21	**L13:** Charge carriers, current density, current	[26.1-2]		
	W	9/22	**L14:** Resistance, Ohm's law; power	[26.2;6]	**LAB: Exp. 4 –** Electric Potential	
	R	9/23				
	F	9/24	**L15:** Batteries, resistor networks	[27.1–2]		**Online HW 4**

PHYSICS 1251 **SYLLABUS/ASSIGNMENT SHEET** **Autumn 2021**

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Week	Day	Date	Lecture	Reading [Chapter.Section]	Lab	Work due 11:59 pm
6	SUN	9/26				prelab 6
	M	9/27	**R4: Midterm 1** [Ch. 22-24]			
	T	9/28	**L16:** Kirchhoff's Rules	[27.3]		
	W	9/29	**L17**: RC circuits	[27.4]	**LAB: Exp. 6 –** Qualitative Circuits	
	R	9/30				
	F	10/01	**L18:** Magnetic fields and forces	[28.1-4]		Online HW 5
7	SUN	10/03				prelab 7 HiHW 3
	M	10/04	**R5: GW 3, Quiz 3** (HW 4 and 5)			GW 3
	T	10/05	**L19:** Magnetic moments & torques	[28.5]		
	W	10/06	**L20:** Magnetic fields and forces from currents; Ampère's law ***Peer Review survey 1: available 8:00 AM***	[29.(1),2,3]	**LAB: Exp. 7 –** Quantitative Circuits	
	R	10/07				
	F	10/08	**L21:** Applications of Ampère's law; Gauss's Law in Magnetism	[29.3,4;5]		Online HW 6
8	SUN	10/10				HiHW 4
	M	10/11	**R6: GW 4, Quiz 4** (HW 6)			GW 4
	T	10/12	**L22:** Induced emf; Lenz's Law	[30.1-2; 3]		
	W	10/13	**L23:** Faraday's law in integral form; applications of induction	[30.4,5]	**NO LAB**	*Peer Review 1*
	R	10/14	**Autumn Break – no classes**			
	F	10/15	**Autumn Break – no classes**			Online HW 7
9	SUN	10/17				prelab 8 HiHW 5
	M	10/18	**R7: GW 5, Quiz 5** (HW 7)			GW 5
	T	10/19	**L24:** Inductors, inductance and RL circuits	[31.1,2]		
	W	10/20	**L25**: Magnetic energy, LC & RLC circuits	[31.3,5; 6] ***(end of MT 2 material)***	**LAB: Exp. 8 –** Magnetic Torque	
	R	10/21				
	F	10/22	**L26:** Wave basics; wave equation for a string	[16.1,2,5]		Online HW 8
10	SUN	10/24				prelab 11 HiHW 6
	M	10/25	**R8: GW 6, Quiz 6** (HW 8)			GW 6
	T	10/26	**L27:** Speed and power carried by wave on string	[16.3,4]		
	W	10/27	**L28:** Sound waves	[16.6-8]	**LAB: Exp. 11 –** Inductor Circuits	
	R	10/28				
	F	10/29	**Review** ***Last day to drop without petition***			Online HW 9
11	SUN	10/31				prelab 12, prelab 13: [read 17.5, 17.6, and 17.7]
	M	11/01	**R9: Midterm 2** [Ch. 25-31]			
	T	11/02	**L29:** Superposition, standing waves, reflection & transmission	[17.1–3]		
	W	11/03	**L30:** Boundary conditions, resonances	[17.4,5]	**LAB: Exp. 12&13** – Standing Waves // Wave Superposition	
	R	11/04				
	F	11/05	**L31:** More resonances; beats	[17.6;7]		Online HW 10

Week	Day	Date	Lecture	Reading [Chapter.Section]	Lab	Work due 11:59 pm
12	**SUN**	**11/07**				**HiHW 7**
	M	**11/08**	**R10: GW 7, Quiz 7** (HW 10)			**GW 7**
	T	**11/09**	**L32:** Maxwell's equations and waves	[33.1,2]		
	W	**11/10**	**L33:** Electromagnetic waves; Index of refraction	[33.3,4,7; 34.4]	**NO LAB**	
	R	**11/11**	**Holiday (Veteran's Day)**			
	F	**11/12**	**L34:** Light interference: double slit experiment; gratings, & other applications	[36.1-3; 37.4,5]		**Online HW 11**
13	**SUN**	**11/14**				**prelab 15** **HiHW 8**
	M	**11/15**	**R11: GW 8, Quiz 8** (HW 11)			**GW 8**
	T	**11/16**	**L35:** Diffraction: Single slit	[37.1-3]		
	W	**11/17**	**L36:** Thin film interference; Michelson Interferometer	[36.4-5; 6]	**Prelab due 10:00 am** **LAB: Exp. 15 –** Light Interference	
	R	**11/18**				
	F	**11/19**	**L37:** Light as a particle	[39.2-4]		**Online HW 12**
14	**SUN**	**11/21**				**HiHW 9**
	M	**11/22**	**R12: GW 9, Quiz 9** (HW 12)			**GW 9**
	T	**11/23**	**L38:** Quantum particles: Wave-Particle duality	[39.5-7]		
	W	**11/24**	**Thanksgiving Break – no classes**		**NO LAB (Break)**	
	R	**11/25**	**Thanksgiving Break – no classes**			
	F	**11/26**	**Thanksgiving Break – no classes**			**(HW 13 ↓)**
15	**SUN**	**11/28**				**Online HW 13** **Prelab 16: [read 41.4 (subshells), and 41.8 (selection rules, p. 1131)]**
	M	**11/29**	**R13: Review Group Work** ***Peer Review survey 2: available 8:00 AM***			**Review GW**
	T	**11/30**	**L39:** Quantized energy levels – particle in a box; Bohr atom	[40. (1),2; 41.3]		
	W	**12/01**	**L40:** Energy levels & transitions; atomic orbitals	[41.1, (2), 3–5]	No lab today	
	R	**12/02**			**LAB: Exp. 16 –** Spectroscopy	
	F	**12/03**	**L41:** Electronic structure and Periodic Table	[41.6–8]		**(HW 14 ↓)**
16	**SUN**	**12/05**				**Online HW 14**
	M	**12/06**	**R14: GW 10, Quiz 10** (HW 13-14)			**GW 10** ***Peer Review 2***
	T	**12/07**	**L: TBA**			
	W	**12/08**	**L: TBA**		**LAB: Exp. 16 –** Spectroscopy	
		AUTUMN SEMESTER FINAL EXAMS			**F 12/10 – R 12/16**	

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