

# Purdue University Physics 221, Spring 2025 Syllabus

## Course description

Electricity, light, and modern physics for non-physics major students. Credit Hours: 4.00  
Website: <https://purdue.brightspace.com/>

## Instructors

### **Lecturers:**

Prof. Mia Liu,

Office: PHYS 376, Email: [liu3173@purdue.edu](mailto:liu3173@purdue.edu), Office Hours: by appointment

Email instructions and response hours:

**Please put PHYS221 in the subject line of your email. I will address emails on Sundays and Wednesdays from 4 to 5 pm. Emails received during other times will be answered with delays. For urgent response, title your message with PHYS221, URGENT in the subject.** Emails not following the appropriate format will not be addressed.

Dr. Matthew Route

Office: PHYS 290C, Email: [mroute@purdue.edu](mailto:mroute@purdue.edu), Office Hours: T 1:30-3:30 pm

### **Lab Coordinator:**

Dr. Andrzej Lewicki,

Office: PHYS 142, Phone: 494-5516, Email: [lewicki@purdue.edu](mailto:lewicki@purdue.edu)

### **Coordinator of Digital Instruction:**

Mr. David Huckleberry

Office: Remote, E-Mail: [dhuckleb@purdue.edu](mailto:dhuckleb@purdue.edu)

## Who to contact:

- For questions regarding lectures and materials, please contact Prof. Mia Liu ([liu3173@purdue.edu](mailto:liu3173@purdue.edu)), Matthew Route ([mroute@purdue.edu](mailto:mroute@purdue.edu))
- For all questions relating to the lab, please contact Dr. Andrzej (Andrew) Lewicki ([lewicki@purdue.edu](mailto:lewicki@purdue.edu)).
- For questions about homework, lab assignments, or recitations, contact Your TAs. TA information on Brightspace: Content/Meet your TAs section. If your TAs can't solve the problem, contact your instructors.

- For registration or other issues with MasteringPhysics, contact Pearson Technical Support.
- For Brightspace-related issues, please contact [itap@purdue.edu](mailto:itap@purdue.edu) .

## **Textbook**

Etkina, Gentile, and van Heuvelen: College Physics with modified MasteringPhysics® Access Code, 2nd Ed., (Pearson). We will cover material from Chapters 17-25, 27-29.

This course will use MasteringPhysics for Homework. In the Brightspace course website, under In the content/Mastering Physics section on the left, you will find instructions on registering and the link to the MasteringPhysics® website. Please use your Purdue email for your Pearson account unless you already have one.

The access code for MasteringPhysics is valid for any course on MasteringPhysics that uses the same edition of the book (College Physics by Etkina, 2nd Edition). If you have taken Phys 220 or Phys 221 previously had the same edition of the book. You do not need to pay for another access code this semester.

Please follow up with Pearson customer service for registration or technical issues with MasteringPhysics.

## **Course Calendar Overview**

### ***Lectures:***

Session 1. PHYS 221

Days/Time: MW 8:30am-9:20am

Location: PHYS 112

Session 2. PHYS 221

Days/Time: MW 9:30am-10:20am

Location: PHYS 112

### **Refer to registration for your section times.**

- Lecture slides from each section will be posted on Brightspace in the Content/Course.
- Content/Week\*/Learning Materials section.
- Recorded lectures by BoilerCast will be available on Brightspace in the Course Tools/Kaltura Media Gallery section.
- In-class iClicker questions: We will use the iClicker Cloud response system during lectures for real-time feedback. The questions will typically be multiple-choice and related to the current material. Students can earn up to 10 points per lecture based on their participation in the polls and performance. Eight points are awarded if they answer at

least 50 % of the polls, and up to two points are awarded if they answer all polls correctly. Your lowest three iClicker grades will be dropped.

- Find information on how to set up your iClicker Cloud account for the course on Brightspace under START HERE.

<b>PHYS 221 Spring 2025 Lecture Schedule</b>					
	<b>Lecture</b>	<b>Date</b>	<b>Topics</b>	<b>Chapter</b>	<b>HW due Monday</b>
1	L01	1/13	Course overview, Electric charge	17.1 - 17.3	
	L02	1/15	Coulomb's Law	17.4	
2	No class	1/20	MLK Day (no classes)		
	L03	1/22	Electric Potential Energy	17.5 - 17.6	
3	L04	1/27	Electric Field	18.1- 18.2	HW 1
	L05	1/29	Electric potential; Materials in far electric field	18.3 - 18.5	
4	L06	2/03	Capacitors	18.5 - 18.7	HW 2
	L07	2/05	Ohm's law; DC Circuits	19.1 - 19.5	
5	L08	2/10	Kirchhoff's Rules	19.5 – 19.7	HW3
	No class	2/12	<b>Midterm exam 1 on 2/13</b>	NO CLASSES	
6	L09	2/17	Circuits with resistors and capacitors	19.7- 19.9	
	L10	2/19	Magnetic field; B field from currents	20.1 - 20.2; 20.5	
7	L11	2/24	Magnetic interaction - Lorentz force	20.3 – 20.4	HW 4
	L12	2/26	Magnetic Induction	21.1 – 21.4	

8	L13	3/03	Generators, motors, AC circuits, etc.	20.6; 21.5 – 21.7	HW 5
	L14	3/05	Ray optics; Reflection of Light	22.1 – 22.2	
9	L15	3/10	Refraction of Light	22.3 – 22.6	HW 6
	L16	3/12	Mirrors; Lenses	23.1 – 23.5	
10	No class	3/17	Spring break (no classes)		
	No class	3/19			

11	L17	3/24	Thin Lenses; Intro to Wave Optics	23.4 - 23.8	HW 7
	No class	3/26	<b>Midterm Exam 2 on 3/27</b>	NO CLASSES	
12	L18	3/31	Double slit interference; Thin film	24.1 – 24.4	
	L19	4/2	Single slit diffraction; gratings	24.5 – 24.7	
13	L20	4/7	Electromagnetic waves; EM spectra	25.2 – 25.5	HW 8
	L21	4/9	Intensity, energy density & polarization	25.1; 25.5- 25.6	
14	L22	4/14	Photoelectric effect; Quantum optics	27.1 - 27.4	HW 9
	L23	4/16	Atomic structure: the Hydrogen atom	28.1 - 28.4	
15	L24	4/21	Hydrogen Atom, de Broglie wave	28.5 – 28.8	HW 10
	L25	4/23	Nuclear structure	29.1 - 29.7	

16			TBD (Office hour, Problem Solving)	STUDY WEEK	
	<b>Final Exam</b>				

**Homework:** Homework is usually uploaded by the end of the day, Monday every week, and is due by 10:59 am on Monday of the subsequent week. (Note that the due date is in the morning.)

Detailed schedules of the *help center and recitation hours* can be found on the Brightspace course website.

A detailed *lab schedule* is provided in the lab module on the website. For questions regarding the lab schedule, please contact Dr. Andrzej (Andrew) Lewicki ([lewicki@purdue.edu](mailto:lewicki@purdue.edu)).

### **Exams**

There will be two cumulative midterm online assignments and one Final Exam.

#### **Midterm exams:**

**Midterm 1:** Thu 02/13 08:00p - 09:30p

**Midterm 2:** Thu 03/27 08:00p - 09z:30p

The final exam schedule can be found at the following link:  
<https://roomschedule.mypurdue.purdue.edu/Timetabling/exams.do>

#### **Exam format:**

- In-person and closed-book,
- essential formulas and physical constants will be provided.
- Scientific or graphic calculators are allowed.
- Any device that can access the internet is not allowed.

### **Homework Assignments**

Homework is usually uploaded by the end of the day, Monday every week, and is due by 10:59 am on Monday of the subsequent week. (Note that the due time is in the morning.)

The modified MasteringPhysics® from Pearson will be used to assign credit for homework completed this semester. General instructions can be found on Brightspace in the

Content/Mastering Physics section.

Please read the rules carefully before you begin your homework and for each question. The homework assignment for each week typically consists of about 10 problems. Using the The MasteringPhysics® web-based system lets you enter answers to homework problems using your personal Pearson account. Detailed grading policies on the assignments can be viewed in the Mastering Physics window for each assignment. Late Homework Policy: One day late is %25 off, two days late is %50, and three days late is %75 off.

### **Laboratory, Recitations, and Help Center**

All labs are done on campus in room PHYS 150. For detailed lab information, please refer to the separate lab syllabus on Brightspace is in the Content/Course Content/Week\*/Lab section.

In-person recitations are on Fridays. Schedule and materials can be found on Brightspace in the Content/Course Content/Week\*/Recitation section.

Detailed schedules of Help Center hours can be found in the Content/Help Center Schedule section on Brightspace.

### **Grading scheme**

- Homework: 20%
- Lecture Participation: 5%
- Recitation Participation: 3%
- Lab: 22%
- Midterm 1: 15%
- Midterm 2: 15%
- Final exam: 20%

We will use an absolute scale to set the grades as given in the table below. At the end of the semester, if the grades are lower than we think is fair, we may lower the grade thresholds, but we will not raise the thresholds. (If you get at least 89%, you will get an A- or better.)

### **Grade Percentage**

- A+ 95%
- A 92%
- A- 89%
- B+ 85%
- B 82%
- B- 79%
- C+ 75%
- C 72%
- C- 69%
- D+ 65%
- D 62%

D- 59%

F <59%

Please check your scores at any time. It is your responsibility to ensure that the grades are accurate. Report any errors to your recitation instructor and the professor after 48 hours and within 2 weeks of recording the grades.

### **Extension of Deadlines and Excused Grade**

If you have a valid reason, you may request an extension.

- For a lab/recitation excuse, email the corresponding TA providing documented proof of the reason for the excuse within 48 hours of the missed lab/recitation. Excuses requested after 48 hours of the missed lab/recitation will not be considered.
- For recitation: The lowest three scores will be dropped.
- For IClicker quizzes: The three lowest scores will be dropped.

The following are a few examples of valid reasons:

- In case of illness, emergencies, or grief, contact the ODOS. The ODOS will verify these and send us an email.
- In case of required attendance at an official Purdue activity, notify your TA and instructors via email at least a week before the event, including documentation.

### **DRC Accommodations**

If you receive notification from the Dean of Students that you are entitled to accommodation supported by a DRC Letter, please inform your instructor(s) as soon as possible. They will then confirm that they have received notification from DRC regarding your accommodation and if needed, schedule a meeting to determine proper actions.

If your accommodations include **EXAM TAKING**, please note the following responsibilities to receive those correctly:

1. **You must schedule a testing session with Purdue Testing Services (PTS)** for each exam listed on the course schedule.

NOTE: **PTS requires 7 days lead time for scheduling.** They will deny any request made within 7 days of an exam. **You should immediately** schedule the exam testing sessions you need on the day you get approved for exam accommodation, as they have limited availability.

2. Course personnel will then provide the Exam (in proper format) to the PTS before your scheduled test session and coordinate scoring.

3. If you do not properly secure an accommodated exam with PTS, you may still take the exam without accommodation with the rest of the class.

4. If you do not show up for your accommodated exam with PTS, you will not be allowed a makeup exam unless for a documented reason.

### **Use of artificial intelligence (AI) or Large Language Models (LLM)**

This course prohibits using artificial intelligence (AI) and Large Language Models (LLMs).

Violations of this policy may result in academic penalties at the instructor's discretion. Instructors

may initiate an investigation if unauthorized use of AI or LLMs is suspected. Students are required to cooperate fully with any such investigation.

### **Possible Changes**

In a significant campus emergency, course requirements, deadlines, and grading percentages are subject to changes that a revised semester calendar may necessitate or other circumstances. You can get information about changes in this course at Brightspace Website.

### **Learning Outcomes**

The expected outcomes of this course are to develop an ability to identify, formulate, and solve simple problems requiring electricity, magnetism, optics, and modern physics concepts. Specifically, a student should develop:

- a broad appreciation of issues (both theoretical and experimental) that led to the development of the modern theory of electricity and magnetism.
- an ability to calculate electric and magnetic forces and fields in one and two dimensions.
- a quantitative understanding of DC and AC current flow in simple circuits containing resistors, capacitors, and inductors.
- a quantitative understanding of how lenses and mirrors influence visible light.
- a quantitative understanding of the consequences of interference and diffraction.
- an understanding of the quanta of light – photons.
- an appreciation for de Broglie matter waves.
- an understanding of the electronic energy levels of atoms based on early models of quantum mechanics.

### **Getting Help**

Here are some ways to get a better grade:

- Go to the Physics Help Center, Room 290, in the physics building. It is staffed during regular hours all day by Teaching Assistants trained in this material.
- Ask your instructor during lab, recitation, or lecture.
- See the instructor or TA's during office hours. We are happy to work through physics problems with you.
- Use the buddy system: study with a friend in class. You are encouraged to work on homework together – discussing ideas and concepts reinforces the material for everyone involved in the conversation. Just be sure that what you turn in is your own work that you fully understand.

### **Course Office**

The place to go for organizational information on the course is the Physics Undergraduate office in PHYS 144 (telephone 494-2970).

### **Academic Integrity**



The emphasis of this course is on learning basic physics materials and critical problem-solving skills that will be beneficial regardless of your future career choices, not on competing to see who scores highest on the assignments. Dishonesty will not be tolerated. Please refer to Purdue's Code of Honor, and Purdue Honor Pledge. The following are examples of dishonesty: Any effort to present somebody else's work as your own or allowing your work to be presented as somebody else's. Having somebody else solve problems assigned for you. Entering iClicker responses for somebody else. Have someone sign attendance for you (or sign for an absent student) in a Lab or Recitation.

The Dean of Students will thoroughly investigate incidents of dishonesty, and appropriate disciplinary actions will be taken. In serious cases the Dean may suspend or expel the student from the university.

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing [integrity@purdue.edu](mailto:integrity@purdue.edu) or by calling 765-494-8778. While the information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

### **Emergency Response**

In the event of a major campus emergency, course requirements, deadlines, and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email daily.

- To report an emergency, call 911.
- To obtain updates regarding an ongoing emergency, sign up for Purdue Alert text messages, view [www.purdue.edu/ea](http://www.purdue.edu/ea).
- There are nearly 300 Emergency Telephones outdoors across campus and in parking garages that connect directly to the PUPD. If you feel threatened or need help, push the button, and you will be connected immediately.
- If we hear a fire alarm during class, we will immediately suspend class, evacuate the building, and proceed outdoors. Do not use the elevator.
- If we are notified during class of a Shelter in Place requirement for a tornado warning, we will suspend class and shelter in the basement.
- If we are notified during class of a Shelter in Place requirement for a hazardous materials release, or a civil disturbance, including a shooting or other use of weapons, we will suspend class and shelter in the classroom, shutting the door and turning off the lights.

Please review the Emergency Preparedness website for additional information.

[http://www.purdue.edu/ehps/emergency\\_preparedness/](http://www.purdue.edu/ehps/emergency_preparedness/)

### **Diversity and Inclusion**

Purdue's Nondiscrimination Policy Statement:

[https://www.purdue.edu/purdue/ea\\_eou\\_statement.php](https://www.purdue.edu/purdue/ea_eou_statement.php)

### **Disability Support and Religious Observance**

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let us know as soon as possible so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: [drc@purdue.edu](mailto:drc@purdue.edu) or by phone: 765-494-1247.

If you anticipate missing exams/assignments due to participation in religious holidays or days of religious, ethnic, or civic observances, please notify us in advance to discuss alternative arrangements.

### **Title IX Resources**

The purpose of Title IX is to help foster safe and respectful university environments that better protect students, faculty and staff from incidents of sex-based discrimination and sexual harassment, including sexual violence, relationship violence and stalking. Resources for West Lafayette campus: [https://www.purdue.edu/sexual\\_assault/titleix/overview.php](https://www.purdue.edu/sexual_assault/titleix/overview.php)

### **Counseling and Psychological Services**

- If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack. Sign in and find information and tools at your fingertips, available to you at any time.
- If you need support and information about options and resources, please contact or see the Office of the Dean of Students. Call 765-494-1747. Hours of operation are M-F, 8 am-5 pm.
- If you find yourself struggling to find a healthy balance between academics, social life, stress, etc. sign up for free one-on-one virtual or in-person sessions with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is completely free and can be done on BoilerConnect. If you have any questions, please contact Purdue Wellness at [evans240@purdue.edu](mailto:evans240@purdue.edu).
- If you're struggling and need mental health services, Purdue University is committed to advancing its students' mental health and well-being. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours. CAPS also offers resources specific to COVID-19 on its website. Topics range from "Adjusting to the New Normal" to "How to Talk with Professors about Personal Matters."

### **Basic Needs Security**

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Students may submit requests for emergency assistance from the Critical Needs Funds.

[1] for the textbook purchasing link - go to 'Content' in the Brightspace menu up top, and select 'Mastering Physics'

the link there will take you to the purchasing page.

**IF YOU NEED HELP --- YOU MUST CONTACT PEARSON -  
COURSE STAFF CANNOT ACCESS YOUR ACCOUNT. DO  
NOT EMAIL COURSE STAFF**

For assistance please read this message from the publisher:

*If you are having issues with your Mastering online homework, please do the following. First completely shut down your computer, wait a minute and turn it back on. Make sure you are on Chrome and try again. If that doesn't work then run a browser check, then clear your cache. Once you do that, you'll want to close your browser and then bring it back up and try again. Chrome is the preferred browser.*

*Browser Check:*

<https://support.pearson.com/getsupport/s/article/Browser-Settings>

*Clear Cache:*

<https://support.pearson.com/getsupport/s/article/Deleting-Browser-Cached-Files-and-Cookies>

*For other issues related to Mastering Physics and the textbook, please contact Pearson at <https://support.pearson.com/getsupport/s/>.*

Some useful links:

### **Pearson Technical Support**

[Student Registration for MyLab and/or Mastering through your Brightspace Course](#)

[Tech Tips from Pearson Students](#)

[Pearson Students YouTube Channel](#) – has lots of resources to help students throughout the semester on how to get adjusted to College Life, Professional development and more.