

Course Information

- PHY 220 “General Physics”
- Credit hours: 4
- Prerequisites: College algebra and trigonometry
- Meeting days and times:

Lecture:

PHYS 114

Monday and Wednesday

9:30 – 10:20 Section 1 (001)

10:30 – 11:20 Section 1 (002)

11:30 – 12:20 Section 2 (003)

Recitation:

PHYS 114

Friday

19:30 – 10:20 Section 1 (004)

10:30 – 11:20 Section 1 (005)

11:30 – 12:20 Section 2 (006)

Instructors and Contact Information

Each course component is overseen by its respective instructor, and each lab session by its assigned lab TA. All lecture and recitation sessions are overseen by the Course Coordinator and all lab sessions by the Lab Coordinator. If any concern arises, first contact your respective instructor or lab TA (reference Brightspace for contact information) as soon as possible. Then, if needed, follow-up or seek additional clarification from the Course or Lab coordinators. **Include “PHY 220” in your email subject line.**

Lecturers:

Prof. Tiancong Zhu (Section 1) Course coordinator Office: PHYS 54 E-mail: zhu1242@purdue.edu Office hours: Wednesday 2:00-3:00pm	Dr. Matthew Route (Section 2 & 3) Office: PHYS 290C E-mail: mroute@purdue.edu Office hours: Tuesday 1:30-3:30pm
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Recitation Instructor:

Alex Whitman Office: PHYS 316 E-mail: whitman4@purdue.edu	Pavani Devabathini Office: PHYS 040 E-mail: pdevabat@purdue.edu
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Lab Coordinator:

Dr. Andrzej (Andrew) Lewicki

Office: PHYS 142

Phone: 765 494-5516

E-mail: lewicki@purdue.edu

Course Description

This course covers the topics of mechanics, heat, and waves, and is designed for students not specializing in physics.

There are three components to the course: Lecture, Recitation, and Laboratory. Lectures concentrate on instilling basic concepts through presentation, discussion, and demonstration. Recitations build on this foundation and develop problem-solving skills needed to apply concepts. Student participation in class discussion, both lecture and recitation, is facilitated with the use of

iClickers. Students are expected to bring a registered and functioning device to each class. Laboratory demonstrates lecture concepts in a hands-on manner through observation and analysis of physical phenomenon. Finally, homework and pre-lab assignments are completed through MasteringPhysics® from Pearson.

Learning Resources, Technology & Texts

- Required Textbook:
 - *College Physics*, Etkina, Planinsic, Van Heuvelen, 2nd Ed. (Pearson Custom Publishing) with MasteringPhysics®
- Software
 - MasteringPhysics® access is required to complete homework and lab assignments to earn associated points
 - Purchase access and register following instructions in Brightspace.
- Brightspace
 - Course content is organized into weekly modules. In each module, you will find lecture materials, videos, and links to assignments.
- Tutoring Support
 - Physics Help Center: Room PHYS 290
 - Speak with a TA for assistance with homework or lab assignments.
 - Help Center schedule is posted in Brightspace under Course Help or at
 - Supplemental Instruction (SI) Sessions
 - These interactive peer-led sessions are informal. Attendance is voluntary, but extremely beneficial for those who attend regularly. Anyone enrolled in this course is welcome.
 - Students work with peers as they compare notes, demonstrate, and discuss pertinent problems and concepts, and share study and test-taking strategies. Students need to bring their student ID card, lecture notes and questions.
 - Times and locations for the help sessions are found here: www.purdue.edu/si or in Brightspace.

Learning Outcomes

Students will be able to perform and demonstrate the following tasks.

- Describe motion using sketches, motion diagrams, graphs, and algebraic equations, and look for consistency between different representations.
- Explain *why* objects move the way they do.
- Apply Newton's laws in situations where objects exert forces on an object of interest.
- Analyze situations in which the rotational velocity of rigid bodies changes.
- Analyze vibrational motion using motion, forces, and energy approaches.
- Describe wave motion using a sinusoidal function of two variables
- Understand the ideal gas model and use it to explain the behavior of gases
- Connect the microscopic understanding of gas processes to work-heating-energy concepts.

Assignments

The course is structured in 17 weeks. During this time, there will be 27 lectures with quizzes, 13 homework assignments, 10 labs, two exams, and one cumulative final exam.

Learning is an active process. Success in this course requires utilizing the following strategies.

1. Attend and participate in lecture.
2. Read relevant sections of the text before and after lecture.
3. Take notes during lecture and while reading the textbook. Notetaking aids in retention.
4. Solve more than just homework questions. Work through textbook examples and attempt additional end of chapter problems.
5. Form peer study groups.
6. Reflect as you study. Can you explain what you are reading or doing? If not, attend Supplemental Instruction sessions, Help Center hours, or your lecturer's office hours.

Lectures

You will participate in the lecture discussion by responding to posed during class. When prompted, input a response using *iClicker Cloud* that best answers the posed question. Participation points are earned by earnestly attempting questions and are not graded for accuracy.

- To receive points, your iClicker Cloud account must
 - Be registered in the course.
 - Be in the room for lecture..
- The lowest 6 lecture participation scores are dropped.
 - Reference Absence and Missed Deadlines Section

Quizzes

For each lecture, there will be a corresponding timed quiz over its material. In general, you will complete two quizzes each week. Links to quizzes are posted in the Assignment portion of the corresponding week's module in Brightspace. Both are due by **11:59pm ET the Friday** of the week in which its lecture was held.

- Quizzes are 20 minutes in duration and consist of 3 questions. You are permitted to reference any personal notes and the textbook while taking a quiz.
- The lowest 4 quiz scores are dropped.
 - Reference Absence and Missed Deadlines Section

Recitations

You will practice problem solving and participate in the recitation discussion by responding to questions posed during class. When prompted, input a response using your *iClicker Cloud* account that best answers the posed question. Participation points are earned by earnestly attempting questions and are not graded for accuracy.

- The lowest 2 recitation participation scores are dropped.
 - Reference Absence and Missed Deadlines Section

Homework

You will complete 13 weekly homework assignments during the semester. Assignments are due by **11:59pm Eastern Time each Monday**. Thus, you have Monday to seek help addressing any issues or concerns from the weekend before final submission that evening.

- Homework assignments consist of about 10 questions.
- Late work is accepted, but a late penalty of 20% is applied for each day late.
- The lowest 2 homework scores are dropped.
 - Reference Absence and Missed Deadlines Section

The web-based MasteringPhysics® system from Pearson will be used to assign homework credit. **Purchase access and register** using links under the “Mastering Physics” section of Brightspace after unlocking course content. **Links to homework** are posted in the Assignment portion of the corresponding week’s module.

For each assignment, there is a list of questions to solve. Multiple-choice questions permit one attempt to get a correct response. Numeric questions are based on randomly generated values so that each student has a unique answer. Once solved, enter your final answer rounded as directed. Your answer must be within $\pm 1\%$ of the correct answer to receive credit. So, you are advised to carry at least 4 significant figures throughout your calculations. Be sure to use non-rounded final answers if a question consists of multiple parts that depend on each other. MasteringPhysics® will inform you when an answer is correct or wrong. In general, you are allowed five attempts for each numeric problem to earn full credit. *No credit is given for correct answers after the 5th attempt.*, but you are encouraged to find the correct answer for practice.

Exams

There will be two 1.5-hour exams during the semester and a 2-hour cumulative final exam, see the schedule for dates. Exam details, material covered, formula sheet, and preparation resources will generally be announced at least one week before the exam date. Exams consist of roughly 20 multiple choice numerical calculations and conceptual questions.

- No exam scores will be dropped. Reference the Absence and Missed deadlines section for details concerning exam absences.

Students eligible for a DRC documented testing accommodation must schedule an appointment with Purdue Testing Services (PTS) as soon as possible but no less than 7 days before the exam date. That is a hard, strict deadline set by PTS but if you do not adhere to their deadline, you are always able to take the exam with the rest of the class, but without any accommodations. Due to extremely limited seating on some exam dates, failure to schedule sufficiently early may prevent you from taking your exam with PTS. Failure to attend your scheduled PTS appointment is considered an unexcused, as discussed in the Absence and Missed deadlines section.

Laboratory

Physics 220 laboratory is not a separate course. Rather, the lab is a Physics 220 course component. The exact schedule of experiments is located at the end of this lab syllabus. You **DO NOT** need a lab manual this semester.

Before completing each lab assignment, you must answer prelaboratory questions scheduled for that week. These questions are closely related to the activities and measurements you will do in the lab. The prelaboratory questions typically require 20-30 minutes of effort. The prelaboratory questions are your individual work, so everyone is expected to complete them. **The prelaboratory questions must be answered on-line** using *MasteringPhysics* (the same online software that you are going to use for homework assignments). If you exceed the number of allowed attempts for a prelab question, then you will not get credit for that question. **The deadline for prelaboratory questions is on Tuesday, 9:30 AM for all lab sections.** Check the lab schedule at the end of the lab syllabus for exact dates. If you submit answers to the prelaboratory questions after the posted deadline, then your score will be lowered by 20% for each day that it is late. The prelaboratory questions are graded by computer and the scores will be posted in the course gradebook on Brightspace, but not instantaneously. **It usually takes a few hours** before the scores are transferred from MasteringPhysics to Brightspace. Use at least **4 significant figures** in your calculations.

During the two-hour laboratory period, you will observe phenomena, manipulate the lab apparatus, collect data and ask questions. Your lab TA will briefly review the theory behind the experiment and describe the lab equipment to be used. Next, you will follow the lab procedures described in the lab files, collect data, calculate results and prepare required graphs. In the Physics 220 lab, you will work with lab partner.

Students are expected to **complete the lab report and return it to the lab TA before the end of the scheduled lab time.** Only one lab report is required for two lab partners. We have lab make-ups scheduled for students who missed labs for a valid reason (e.g., illness). All lab make-ups are done in the same room at the same day of the week and the same time as regular classes.

In case of a long illness, (e.g., a week or more in a hospital) you need to get permission from the **lab coordinator** to make up the missed labs. If you have any questions concerning the lab policies, please ask the **lab coordinator**.

Each laboratory report (***including prelabs***) is worth up to 10 points. We have ten labs scheduled for this semester. Ten labs times 10 points = 100 points). The perfect score is 100 points for the lab (or 100%). The lab contribution to the total grade is 20%, so the perfect lab score will give you 20% of the total perfect score for Physics 220.

Grading and Assignments

Your final grade will be derived as follows:

Lecture participation	5%
Recitation participation	5%
Quizzes	5%
Homework	20%
Laboratory	20%
Two Semester exams (each 15%)	30%
Cumulative final exam	15%
Total	100%

Grades will be assigned according to the grade ranges listed in the table below. Before final grades are assigned, a course wide assessment of performance is performed. If performance is below reasonable expectation, grade range thresholds will be lowered to account for issues. Grade thresholds will never be raised above those listed below. Thus, if you get at least 90%, you are **guaranteed to get an A- or possibly better** no matter what else happens.

Grade	Percentage
A+	96%
A	93%
A-	90%
B+	86%
B	83%
B-	80%
C+	76%
C	73%
C-	70%
D+	66%
D	63%
D-	60%
F	<60%

The requirements for passing the lab are given in the separate page on lab policies and work. During the semester, you should regularly check that your exam, lab, homework, and participation grades have been correctly entered into your Gradebook. **It is your responsibility to bring any problems with your assigned grades to the attention of your instructor immediately.** *Report any errors to your lab TA or instructor within 2 weeks from when the grades are recorded.*

Absences and Missed Deadlines

In accordance with the University Academic Regulations regarding class attendance, students are expected to attend every meeting of a class in which they are enrolled. Further, this course has a robust presence in Brightspace to facilitate the on-time submission of assignments without needing a physical campus presence. However, a variety of valid reasons could interfere with these expectations. Examples include but are not limited to illness, technical problems, personal issues, and official Purdue club or sporting events. Consequently, the “lowest score drop policy” discussed in the Assignments section is utilized to automatically excuse such an absence or missed deadline without the need of documentation. Absences or missed deadlines due to the above listed reasons in excess of the values listed in the Assignments section will not be excused.

In accordance with the University Academic Regulations regarding class attendance, students are expected to be in attendance for exams. However, a variety of valid reasons could interfere with this expectation. Due to the high-stakes nature of exams, absence from an exam can be excused and an opportunity to complete it provided. Excusable absences include but are not limited to illness, personal emergency on the exam day, conflicts with other courses, and official Purdue club or sporting activities. Such absences will be excused only when accompanied by proper documentation in an appropriate time frame. For example, course conflicts and club/sporting activities should be brought to your lecturer’s attention as far in advance as possible but never after the exam date. Illness or unexpected circumstances interfering with exam attendance should be brought to your lecturer’s attention as soon as possible via email. You must then follow-up with documentation within 48 hours of the missed exam date. Failure to meet these requirements will result in the exam being considered unexcused and a score of zero earned. If an exam absence is excused, your lecturer will provide options for completing it. Arranging an opportunity to complete the exam will require flexibility on your part.

In accordance with the University Excused Absence regulations, absences or missed deadlines in relation to religious observance, grief/bereavement, military service, jury duty, parenting leave, and medical excused absences will be given special consideration. Specifically, students will not be penalized and provided an opportunity to earn missed credit. To be eligible, your lecturer must receive proper documentation from Office of the Dean of Students concerning the absence. Students are responsible for contacting the Office of the Dean of Students and taking all required actions for this documentation to be delivered. Your lecturer will discuss options for earning equivalent credit once documentation is received.

Academic Integrity

Academic integrity encompasses the core values and basic principles of honesty and responsibility that govern our practices as scholars, researchers, and creative artists at Purdue. *Purdue prohibits dishonesty in connection with any University activity.* Acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and is not tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest.

Do not let the anonymity of a large class lull you into a false confidence that cheating is acceptable. Cheating compromises yourself, your classmates, and the University, and instances will be handled sternly. If you are aware of someone who is cheating do not hesitate to let me know. Be discrete but confident that it is the right thing to do. Alternatively, individuals may alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

Purdue's Honor Pledge: "As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue."

Nondiscrimination Statement

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. More details are available on our course Brightspace table of contents, under University Policies.

Accessibility

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, first contact your respective instructor to start a dialogue on the situation. Afterward, you or your instructor can include the course coordinator in the discussion for additional information or clarification. Additionally, you are encouraged to include a representative from the Disability Resource Center into the discussion as well: email drc@purdue.edu or phone 765-494-1247. The goal is to create an open and clear discussion involving all relevant parties to address your concerns in a timely manner. More details are available on our course Brightspace under Accessibility Information.

Mental Health Statement

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.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. 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 of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

Emergency Preparation

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 on a frequent basis.

Disclaimer

Course requirements, deadlines and grading percentages are subject to changes that may be necessitated in the event of major campus emergency or other circumstances. You can get information about changes in this course in Brightspace. Notes are considered to be derivative works of the instructor's presentations and materials, and thus are subject to the instructor's copyright in such presentations and materials.

Course Schedule

	Date	Class	Topics Discussed	Deadline
Week 1	Jan 13	Lec. 01	Introduction, Ch 1: Measurement, Ch2: Reference Frame	
		Lab	Introduction and Math Self-Diagnostic Test	
	Jan 15	Lec. 02	Ch 2: Displacement, velocity, and acceleration	
	Jan 17	Rec. 01		Quiz 1,2
Week 2	Jan 20		No Class – Dr. Martin Luther King Day	HW 01
		Lab	M1 - Measurements and Experimental Errors	Pre-Lab
	Jan 22	Lec. 03	Ch 2: Kinematics	
	Jan 24	Rec. 02		Quiz 3,4
Week 3	Jan 27	Lec. 04	Ch 4: Vectors and Projectile Motion	HW 02
		Lab	Make-up for Experiment M1	
	Jan 29	Lec. 05	Ch 3: Newtonian Mechanics	
	Jan 31	Rec. 03		Quiz 5
Week 4	Feb 3	Lec. 06	Ch 4: Applying Newton's Laws	HW 03
		Lab	M2 - Newton's Laws of Motion	Pre-Lab
	Feb 5	Lec. 07	Ch 4: Applying Newton's Laws	
	Feb 7	Rec. 04		Quiz 6,7
Week 5	Feb 10	Lec. 08	Ch 5: Circular Motion	HW 04
		Lab	M3B - Projectile Motion	Pre-Lab
	Feb 12	Lec. 09	Ch 5: Planetary Motion	
	Feb 14	Rec. 05		Quiz 8,9
Week 6	Feb 17	Lec. 10	Ch 6: Impulse and Linear Momentum	HW 05
		Lab	M4 - Circular Motion	Pre-Lab
	Feb 19		No Class – Midterm 1 at 8pm in ELLT 116	
	Feb 21	Rec. 06		Quiz 10
Week 7	Feb 24	Lec. 11	Ch 7: Work and Energy	HW 06
		Lab	M5 - Impulse and Momentum	Pre-Lab
	Feb 26	Lec. 12	Ch 7: Energy Conservation	
	Feb 28	Rec. 07		Quiz 11,12
Week 8	Mar 3	Lec. 13	Ch 7: Collisions	HW 07
		Lab	M6 - Work and Energy	Pre-Lab
	Mar 5	Lec. 14	Ch 8: Torque and Extended Object motion	
	Mar 7	Rec. 08		Quiz 13
Week 9	Mar 10	Lec. 15	Ch 9: Rotational Kinematics	HW 08
		Lab	Make-up for experiments M2-M6	
	Mar 12	Lec. 16	Ch 9: Rotation and Angular Momentum	
	Mar 14	Rec. 09		Quiz 14,15
Week 10	Mar 17-22	No Class, Lab or Rec - Spring Break		

Week 11	Mar 24	Lec. 17	Ch 9: Rotation and Energy	HW 09
		Lab	M7 - Rotational Motion	Pre-Lab
	Mar 26	Lec. 18	Ch 10: Simple Harmonic Motion (SHM)	
	Mar 28	Rec. 10		Quiz 16,17
Week 12	Mar 31		No Class – Midterm 2 at 8pm in ELLT 116	HW 10
		Lab	M9 - Pendulum	Pre-Lab
	Apr 2	Lec. 19	Ch 10 & Ch 11: SHM & Waves	
	Apr 4	Rec. 11		Quiz 18,19
Week 13	Apr 7	Lec. 20	Ch 12: Gases	
		Lab	M10 - Standing Waves	Pre-Lab
	Apr 9	Lec. 21	Ch 12: Gases	
	Apr 11	Rec. 12		Quiz 20,21
Week 14	Apr 14	Lec. 22	Ch 13: Static Fluids	
		Lab	Make-up for experiments M7, M9, M10	Pre-Lab
	Apr 16	Lec. 23	Ch 13 & Ch 14: Static and Moving Fluids	HW 11
	Apr 18	Rec. 13		Quiz 22
Week 15	Apr 21	Lec. 24	Ch 14: Moving Fluids	
		Lab	M8 - Archimedes Principle	
	Apr 23	Lec. 25	Ch 15: First Law of Thermodynamics	HW 12
	Apr 25	Rec. 14		Quiz 23-25
Week 16	Apr 28	Lec. 26	Ch 15 & 16: Thermodynamics	
		Lab	Make-up for experiments M8	
	Apr 30	Lec. 27	Ch 16: Second Law of Thermodynamics	
	May 2	Rec. 15		
Week 17	May 5- May 10	Final Exam: Time and Location TBA		

* Schedule and assignments subject to change. Any changes will be posted in Brightspace