

# PHYS 234: Physics for Life Sciences 2

## Syllabus Spring 2025

### Course Information

- **Course number and title:** PHYS 23400 – Physics for Life Sciences II
- **CRN:** 13216
- **Meeting day(s) and time(s).**
  - **Lecture** TR 9:30-10:20am in PHYS 112 (in person)
  - **Recitations:** all in PHYS 154 (in person)

REC 1	004	W	9:30-10:20	154	SULLIVAN-WOOD, JONATHAN
REC 1	005	W	10:30-11:20	154	SULLIVAN-WOOD, JONATHAN
REC 1	006	W	11:30-12:20	154	SULLIVAN-WOOD, JONATHAN
REC 1	002	W	12:30-1:20	154	MOHANTY, JIGNESH
REC 1	007	W	1:30-2:20	154	MOHANTY, JIGNESH
REC 1	003	W	2:30-3:20	154	SULLIVAN-WOOD, JONATHAN
REC 1	015	W	4:30-5:20	154	SULLIVAN-WOOD, JONATHAN

- **Labs:** all in PHYS 154 (in person)

LAB 2	009	Th	1:30-3:20	154	BALIVADA, AISHWARYA
LAB 2	008	Th	4:30-6:20	154	BALIVADA, AISHWARYA
LAB 2	011	F	7:30-9:20	154	SUBEDI, ANANDA
LAB 2	010	F	9:30-11:20	154	SUBEDI, ANANDA
LAB 2	012	F	11:30-1:20	154	SUBEDI, ANANDA
LAB 2	013	F	1:30-3:20	154	MOHANTY, JIGNESH
LAB 2	014	F	3:30-5:20	154	MOHANTY, JIGNESH

- **Instructional Modality:** All lectures, recitations, and labs will be face-to-face in class
- **Course credit hours:** 4

### Instructor Contact Information

**Lecturer:** Prof. Ian Arnold  
E-mail: [iarnold@purdue.edu](mailto:iarnold@purdue.edu)  
Office: PHYS 227  
Office hours: TBA

#### Teaching Assistants:

**Aishwarya Balivada:** [abalivad@purdue.edu](mailto:abalivad@purdue.edu)  
**Jignesh Mohanty:** [jmohanty@purdue.edu](mailto:jmohanty@purdue.edu)  
**Jonathan Sullivan-Wood:** [sulli391@purdue.edu](mailto:sulli391@purdue.edu)  
**Ananda Subedi:** [subedi3@purdue.edu](mailto:subedi3@purdue.edu)

#### Help Center TAs:

**Sheng-Wen Huang:** [huan1780@purdue.edu](mailto:huan1780@purdue.edu)  
**Varadrajan (Rajan) Muruganandam:** [vmuruga@purdue.edu](mailto:vmuruga@purdue.edu)

### Course Description

PHYS 234 is intended for biology majors, other life science majors, and pre-health care professionals. The physics topics chosen are selected for these students and the contexts emphasize authentic biological examples. While physics, chemistry, and biology are well

established fields, some of the scientific questions you will explore in this class have only recently been tackled. You will focus on physics at the convergence with biology, where physical, chemical and biological principles all come into play.

The course is structured in 16 weeks. There will be 27-28 lectures with quizzes and 5 labs. Discussion forums are provided for each course component: lecture, homework, and lab. Please post your questions in the corresponding forum.

## Learning Resources, Technology & Texts

- **The textbook: Knight, "College Physics: A Strategic Approach"**
- **A Mastering Physics account** -- Homework and the Reading Questions will be done through the online service, *Mastering Physics*. Access to Mastering Physics comes with the purchase of the E-Text with Mastering Physics. You can also buy a bundle package of the E-Text and a looseleaf print version. (Buying directly from Pearson can save you some money.)
- You can access the course via Brightspace. It is strongly suggested that you explore and become familiar not only with the site navigation, but with content and resources available for this course. See the Help tab for resources.

## Lectures

Lectures are carefully designed to introduce new material. A tentative reading and homework assignment schedule can be found in Brightspace in the Lectures module. You are encouraged to prepare for each lecture by reading assigned sections.

Considerable material will be covered so it is important to not fall behind. To be successful in this course it is recommended that you strive to faithfully complete the following:

1. Attend the lecture, observe lecture demos and read the lecture notes.
2. Take notes during lecture and as you read the textbook. The very act of notetaking aids in your ability to remember the material.
3. Read and keep up to date with the text.
4. You are encouraged to not limit yourself to homework and attempt as many problems as possible. Always write down units and carry the units through all of the calculations.
5. As you study, stop and ask yourself if you understand what you are reading. If not, review the material until you understand it or make arrangements to have it explained either in class, by the TA, in Help Center, or during office hours.

Lecture quizzes will be assigned in Brightspace, due most weeks of the semester. They will review material covered in the prior week's lectures and reading assignments. Lecture quizzes are worth 5% of your final grade

## Laboratory

Physics 23400 laboratory is not a separate course. It is a component of Physics 23400 course. The exact schedule of experiments is located on Brightspace. You **DO NOT** need to buy a lab manual this semester. Your lab credit will be worth 20% of your final grade in the course.

You will work together in small groups on the experiments. You may use Purdue's Office 365 link to install Microsoft Word

(<https://www.itap.purdue.edu/shopping/software/product/office365.html>) and utilize Microsoft OneDrive to collaborate on your documents. Once you have Office 365 installed you can use the Word Online service to collaborate on the document in real time (<https://www.office.com/launch/word>) making sure to log in with your Purdue ID and password (not BoilerLink protected).

There are five labs, three of them lasting 3 weeks, two lasting 2 weeks. At the end of each experiment you will work in the lab to finish a laboratory report. Reports are to be turned in on **Gradescope**, which can be accessed through the appropriate link in Brightspace.

Each lab report is equally weighted.

You may not copy answers, lab reports, use “files”, or allow your answers to be copied, by any other students. Any violation of the above standards will subject the offender to penalties allowed by the Purdue University. If you wonder whether a course of action violates this policy, simply ask in advance.

In a 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**.

## Recitations

Working through problems is critical towards correctly understanding and applying concepts. Recitations are opportunities to get feedback and advice on how to solve such problems. During weeks when exams or holidays occur, a recitation may be substituted with a review or lecture. Attendance and participation in recitation is mandatory, worth 5% of your final grade. An additional 5% of your final grade will be derived from recitation quizzes which will be due the week following each recitation on Brightspace.

## Homework

The modified **MasteringPhysics® from Pearson** will be used to assign credit for homework completed this semester. The homework assignment for each week typically consists of approximately 10 problems. There will be approximately 11 homework assignments during the semester and your final homework score will be scaled to equal 15% of your final grade.

Using the MasteringPhysics® web-based system you can enter answers to homework problems by using your personal Pearson account. For most problems, you will receive several attempts for 100% credit. Usually, no credit will be given for correct answers after the 5<sup>th</sup> attempt. **The time**

**cutoff for answering homework for full credit will be 5 PM on the Friday that the homework problems are due.** After you use your five tries for 100% credit, you are still encouraged to submit answers until you correctly solve the problem. MasteringPhysics® will inform you if your answer is correct. However, once the number of attempts exceeds the five attempts no credit will be assigned. Each homework problem has randomly generated input values so each student will have a unique answer. Make sure that you use your own input values when solving each problem. To receive credit your answer must be within  $\pm 1\%$  of the correct answer, so you are advised to carry at least 4 significant figures in your calculations. The homework grading policy is as follows:

- Multiple choice problems have only one attempt for full credit.
- Numerical problems have a maximum of 5 attempts before the deadline to obtain 100% credit.
- *Your lowest homework assignment score will be dropped.*

There will also be 3 homework assignments assigned at regular intervals that are to be completed with work shown and submitted via **Gradescope** at 5pm on the day they are due. These are referred to as the “Handwritten” homework assignments”. They will be worth an additional 10% of your final grade.

## Exams

There will be two 50-minute exams in class during the semester and a 2-hour final exam. The material covered on each exam will be announced during the semester. All exams are closed book and will provide a formula sheet for each exam. Cheaters will be given an F in the course and will be reported to the Dean of Students. Those with adaptive learner status should email or speak with their lecturer before the first exam. The exams will take place on:

Exam 1: Thursday Feb 13<sup>th</sup>, 2025

Exam 2: Tuesday April 1<sup>st</sup>, 2025

Final exam: TBA – The registrar posts the final exam schedule independently.

## Grading and Assignments

Your final grade will be derived as follows:

2 midterm exams (each worth 10%)	20%
Final Exam	20%
Homework	25%
Recitation	10%
Lecture Quizzes	5%
Labs	20%

We will use an absolute scale to set the grades as given in the table below. However, if the letter grades are lower than we think is reasonable at the end of the semester, then we may lower the grade thresholds, but we will not raise the thresholds. (This means if you get at least 90%, you are **guaranteed to get an A- or possibly better.**)

Grade	Percentage
A+	97%

A	93%
A-	90%
B+	87%
B	83%
B-	80%
C+	77%
C	73%
C-	70%
D+	67%
D	63%
D-	60%
F	<60%

**You must pass the lab (i.e., achieve at least 50%) in order to pass the course.** 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.*

## Course Schedule

Available for download on Brightspace.

## Attendance Policy

This course follows the [University Academic Regulations regarding class attendance](#), which state that students are expected to be present for every meeting of the classes in which they are enrolled. Attendance will be taken at the beginning of each class and lateness will be noted. When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, you should inform me of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification is not possible, contact me as soon as possible by email or phone. For absences that do not fall under excused absence regulations (see below), this course follows the following procedures:

1. Do not come to class if you are feeling ill, but DO email me at [iarnold@purdue.edu](mailto:iarnold@purdue.edu), with the subject line: [PHYS 234] absence. I do not need details about your symptoms. Just let me know you are feeling ill and cannot come to class. If it is an emergency situation, please follow the University regulations on emergent medical care (see below).
2. Unless it falls under the University excused absence regulations (see below), any work due should be submitted on time via our course Brightspace.
3. If that day's class involves assessed work such as a test or presentation, you and I will plan if and how you can make up the work, following the assignment guidelines. This plan must be done before the next class period, so again, email me immediately when you know that you will miss class.
4. The most important consideration in any absence is how it will affect your achievement of the assignment objectives and the course learning outcomes.

For cases that fall under **excused absence regulations**, you or your representative should contact or go to the [Office of the Dean of Students \(ODOS\) website](#) to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted by ODOS for cases of grief/bereavement, military service, jury duty, parenting leave, or emergent medical care. The processes are detailed, so plan ahead.

## **Academic Integrity & Copyright**

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 information may be submitted anonymously, the more information is submitted the greater the opportunity for the university to investigate the concern. More details are available on our course Brightspace under University Policies and Statements.

See the University Policies and Statements section of Brightspace for guidance on Use of Copyrighted Materials. Effective learning environments provide opportunities for students to reflect, explore new ideas, post opinions openly, and have the freedom to change those opinions over time. Students and instructors are the authors of the works they create in the learning environment. As authors, they own the copyright in their works subject only to the university's right to use those works for educational purposes. Students may not copy, reproduce, or post to any other outlet (e.g., YouTube, Facebook, or other open media sources or websites) any work in which they are not the sole or joint author or have not obtained the permission of the author(s).

## **Nondiscrimination Statement**

Purdue University is committed to maintaining a community that 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 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. A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies and Statements.

## **Accessibility**

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know 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. 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 [Therapy Assistance Online \(TAO\)](#), a new web and app-based mental health**

resource available courtesy of Purdue Counseling and Psychological Services (CAPS). TAO is available to students, faculty, and staff 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 a.m.- 5 p.m.

**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 free and can be done on BoilerConnect.

**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 on the second floor of the Purdue University Student Health Center (PUSH) during business hours.

### 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.

### 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.

A link to Purdue's Information on [Emergency Preparation and Planning](#) is located on our Brightspace under "University Policies and Statements." This website covers topics such as Severe Weather Guidance, Emergency Plans, and a place to sign up for the Emergency Warning Notification System. I encourage you to download and review the *Emergency Preparedness for Classrooms* document ([PDF](#)) or ([Word](#)).

The first day of class, I will review the **Emergency Preparedness plan for our specific classroom**, following Purdue's required [Emergency Preparedness Briefing](#). Please make note of items like:

- The location to where we will proceed after evacuating the building if we hear a fire alarm.
- The location of our Shelter in Place in the event of a tornado warning.
- The location of our Shelter in Place in the event of an active threat such as a shooting.

### 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.