Professor:	Scott M. LaBrake, Ph.D.	Course:	Physics 110 – Spring 2025
Email:	labrakes@union.edu	Phone:	6053 & 6562
Office Hours:	M: 12:00pm – 3:00pm	Office:	ISEC 119 & 072
	T: 10:00am – 1:00pm		
	W: 12:00pm – 2:00pm		
	F: 11:50am – 12:30pm		
	By Appointment		
Web:	http://minerva.union.edu/labrakes		
Text:	College Physics: a strategic approach, Vol. 1, 4th Ed., by Knight, Jones, & Field		

Suggested Texts/References:

Physics for the Life Sciences, by J. Newman
Physics, 7th Ed., by J. Cutnell & K. Johnson
Life Science Applications for Physics, by J. Faughn
Physics of the Body, 2nd Ed., by J Cameron, J. Skofronick, & R. Grant
Biomedical Applications of Intro. Physics, by J. Tuszynski & J. Dixon
Physics in Biology and Medicine, by P. Davidovits

Course:

This course serves as an introduction to those basic concepts of physics that form the foundation of all the natural sciences. The first of a two-course sequence in Physics for the Life Sciences, this course serves to introduce the student to the fundamental laws of classical mechanics and these laws are applied to a variety of simple systems including many from the biological sciences. Throughout the course the conservation laws serve as unifying physical principles. Mathematics, a powerful tool in the understanding of natural phenomena, assumes its natural role.

Attendance:

While attendance is not mandatory, it is expected that you will attend class and participate in the lectures on a regular basis. Material will be covered in a rapid fashion over the spring term, covering about one chapter per week. Experience dictates that your success in this class is directly proportional to your attending and engagement with the material. Attendance at all scheduled exams and labs are mandatory and the instructor reserves the right to lower a grade due to excessive absences and/or lack of participation.

Course Grade:

Your course grade will be determined based on a professional judgment of your work on the following scale:

Homework	10%
Quizzes	10%
Three In-Class Exams	30%
Final Exam	30%
Lab	20%

The overall class average at the end of the term will ***generally*** be set to a ***B***$^{-}$ letter grade. ***No letter grades will be assigned to any individual work.*** An attempt will be made after every exam to give you a ***rough idea*** of an ***overall*** grade based on all work completed to date. This does not mean that your grade is exactly what will be written in pencil on your exam; it could be higher or lower.

Learning Objectives

This course aims to provide students with a strong foundation in the fundamental principles of physics and the skills necessary to apply these principles to solve problems and make informed decisions in their academic and professional pursuits. Specific course objectives are as follows:

- Develop an understanding of the fundamental principles of physics and how they apply to other disciplines such as biology, chemistry, medicine and society.
- Develop critical thinking and problem-solving skills that can be applied to physics and other disciplines such as biology, chemistry, medicine and society.
- Apply mathematical tools to solve problems including algebraic manipulation and graphical analysis.
- Develop effective laboratory skills and an ability to design and conduct experiments to test hypotheses.
- Work collaboratively and communicate scientific ideas both verbally and in writing.
- Appreciate the role of physics in modern society and its contribution to technology and innovation.

Textbook Reading Assignments

- Readings will generally be assigned every class, and you should check the homework webpage to see what the days reading assignment will be.
- The readings listed should be done before each class lecture so that you have some idea about what will be covered.
- You will get more out of the lecture if you have looked over (not necessarily understood) to be covered.
- This way you can also come to class with questions about the material being covered and more actively participate in the lecture.

Homework:

- The homework assignments are representative of the topics that will be highlighted throughout the term. It is strongly advised that you do the suggested homework as noted in class and other relevant problems, of your choosing, on the covered topics from the text. ***Variations*** of the assigned and unassigned homework are highly probable candidates for the quizzes and the exams.
- The homework will be assigned and graded using an online homework grading system called Mastering Physics and to sign up please visit: https://mlm.pearson.com/enrollment/labrake84503 and you will need the class ID in order to register for the class you need the class key: ***labrake84503***.
- Homework assignments will be given on Monday, Wednesday, and Friday and you will have access from 8:00^{am} the day the assignment is made, and the assignment will close at 10:00^{pm} the next class day. Adjustments may be made throughout the term to this schedule. I will keep you advised.
- No extensions are given on the homework as the close date/time for the homework is not a hard limit. You may still work on the homework after the close day/time. There is a 2% late penalty per day assessed after the close date/time for late work submitted.

- Hints for the homework: I would advise you talk to me, your classmates, the Physics Crisis Center (which is open on Tuesday and Thursday evenings from 7^{pm} – 10^{pm} throughout the term), or just ponder the question for a day or so. ***Too often students confuse reading the solution to the problem with their actual understanding of the problem***. The mathematical complexity of this course is limited to your ability to do algebra as well as basic mathematical operations.
- ***You cannot learn classical mechanics by simply reading a text, going to class, copying problem solutions, or watching videos.*** You need to actively participate in the learning process. This takes time, not only in class, but outside of class as well. All the learning does not happen in the 65 minutes we're in class together. If you want to get better, then you must put in the necessary time and practice! Read that paragraph again and let it sink in!

Quizzes:

- Quizzes will be given every Friday in which there is no exam scheduled.
- The quizzes are designed to ensure that you are keeping up with the material by doing the readings and the homework.
- The quizzes will always be given in the last 15 minutes of class.
- Copies of previous quizzes and their solutions can be found on the quiz webpage for you to practice.

Exams:

- There will be three in-class exams, approximately one hour each, and a cumulative two-hour final exam. The in-class hour exams are scheduled for Friday, April 18 (week #3), Wednesday, May 7 (week 6), and Friday, May 30 (week #9). Each hour exam will not be cumulative; however, they will be based on your prior knowledge, which includes material covered at earlier times in Phy110.
- Copies of previous years exams and solutions for you to practice can be found on the exam webpage.
- The hour exams are given on the dates listed and will not be changed for any reason. Please plan accordingly in your other classes.
- ***Emphasis will be placed on demonstration of the ability to apply the concepts and techniques learned in class to new situations.***
- ***All problem types and/or examples tested on quizzes or exams may not be done explicitly in class.***
- If you cannot make a scheduled exam, then it is your responsibility to contact the instructor ***in person a minimum of at least 24 hours in advance of the exam.***
- ***Make-up exams may be granted only in exceptional circumstances, as determined solely by the instructor, and may be oral and will be given at the discretion and convenience of the instructor and subject to a 10% penalty if you contact the instructor in the 24 hours prior to the exam.***
- ***You should discuss you intended absence with the instructor well in advance of the exam and provide appropriate documentation to support your absence.***
- The final exam will be cumulative, and no make-up exam will be given for any reason. The date and time of the final is set by the Registrar and is tentatively scheduled for Monday, June 9, 2025, in Wold 128. ***This is the only time that the final exam will be given***.

Labs:

All labs must be attended and completed. Everyone in Physics 110 must complete the laboratory sequence. ***College and Department policy state that you cannot pass a course with a laboratory component without having passed the laboratory portion of the course, which means earning a minimum grade of 70%.*** The format for the lab write-ups will be discussed in the laboratory class, which will start on Thursday, April 10, 2025 (week #2).

Some Comments and Notes:

1. This course is heavily dependent on geometry, as well as some algebra and trigonometry. It is expected that the student is familiar with these mathematical topics. For a review of algebra/trig please see the notes from Lamar University. Calculus will be used very infrequently, only by the instructor, and only to speed up a derivation. It will not be required for you to know or be able to do any calculus.
2. You will need to bring a calculator (one that does basic mathematics, like trigonometry and logarithms, is fine) to class every day. ***I don't in general have any extra calculators and you will not be allowed to share calculators or use your phone during quizzes or exams.***
3. Please realize that the instructor is human, just as you the student and I will occasionally make mistakes. To that end, on exams & quizzes if I have made a mistake, please bring it to my attention and I will correct it. However, if you are just seeking to get more points back without any substantive argument as to why you disserve the points, I will be happy to re-grade the entire quiz/exam. This may result in raising or lowering the present grade on the quiz/exam.
4. All grading must be contested within twenty-four (24) hours after the original assignment was returned, whether you were in class to receive the assignment back. ***Contestations should be accompanied by a written explanation of how your solution was incorrectly penalized.*** I will not look in general look at anyone's appeal without a written explanation. I will return the appeal and the decision of points after 24 hours. I will only consider grade changes during this twenty-four-hour period. This does not apply to arithmetic errors.
5. This course is going to be very demanding on you. It will be one of the most challenging courses you will take at Union College.
6. ***You cannot sit idly by and assume that you know or will learn the material the night before the quiz/exam. You need to engage with and actively work with the material every day.*** It will require a lot of work on your part, as well as mine. If we work together, I hope, by the end of the term the beauty and applicability of physics will be evident in your everyday lives.
7. For ***exams and quizzes only***, you will not be allowed to use personal phones for any reason. Please shut them off and/or hide them away in your bags. Quizzes and exams may be removed from you for using a phone.
8. Please know that I am aware that the homework solutions do exist out in the universe, and you can get copies of them should you choose. I would strongly advise you not use ill-gotten homework solutions as this will not prepare you for the exams and quizzes and will leave you with a feeling of why can I not do the quiz and exam problems?

Students with Disabilities: If you have a specific disability that qualifies you for academic accommodations, please provide appropriate documentation from Disability Services well before the first assessment (generally within the first week of the term and before the first timed assignment) and then we can meet to discuss any necessary special arrangements or needs.

Academic Honesty Issues: Union College recognizes the need to create an environment of mutual trust as part of its educational mission. Responsible participation in an academic community requires respect for and acknowledgment of the thoughts and work of others, whether expressed in the present or in some distant time and place.

Matriculation at the College is taken to signify implicit agreement with the Academic Honor Code, available at *honorcode.union.edu*. It is each student's responsibility to ensure that submitted work is his or her own and does not involve any form of academic misconduct. Students are expected to ask their course instructors for clarification regarding, but not limited to, collaboration, citations, and plagiarism. Ignorance is not an excuse for breaching academic integrity.

Students are also required to affix the full Honor Code Affirmation, or the following shortened version, on each item of coursework submitted for grading: "*I affirm that I have carried out my academic endeavors with full academic honesty*." [Signed, Jane Doe]

Some general honor code comments:

1. For homework I assume that you will be working together on the homework problems. I consider the homework assignments as a pedagogical tool – one for you to learn, apply, and expand upon the techniques studied in class. ***The effort of learning the material from the homework is your own responsibility***. Thus, you can work together on the homework but should write up your own solutions so that you can learn it better and so that you will know how to approach the problems on the quizzes and exams.
2. For quizzes and exams, you are not allowed to work together. The quizzes and exams are closed book, and you are only allowed to use a calculator (specifically one that is not associated with any type of portable communication device) and the instructor provided equation sheet. You ***may not use*** your own equation sheet.

Tentative Course Outline

Week #1

Mon.	Mar. 31	Introduction/Policies/Course Outline/Chapter 1
Tues.	Apr. 1	Chs. 1 & 2 1D Motion Sections1.1 – 1.7 & 2.1 – 2.4
Wed.	Apr. 2	Ch. 2 1D Motion Sections 2.5 – 2.7
Fri.	Apr. 4	Ch. 2 1D Motion Section 2.7

Week #2

Mon.	Apr. 7	Ch. 3 2D Motion Sections 3.1 – 3.5
Tues.	Apr. 8	Ch. 3 2D Motion Sections 3.5 – 3.6
Wed.	Apr. 9	Ch. 3 2D Motion Sections 3.5 – 3.6
Fri.	Apr. 11	Ch. 4 Motion and Forces Sections 4.1 - 4.7

Week #3

Mon.	Apr. 14	Ch. 4 Motion and Forces Sections 4.1 - 4.7
Tues.	Apr. 15	Ch. 5 Motion and Forces Sections 5.1 – 5.5
Wed.	Apr. 16	Ch. 5 Motion and Forces Sections 5.1 – 5.5
Fri.	Apr. 18	Exam #1 Chapters 1 - 5

Week #4

Mon.	Apr. 21	Ch. 3 Circular Motion Sections 3.7 Ch. 5 Motion and Forces Sections 5.7 – 5.8
Tues.	Apr. 22	Ch. 6 Circular Motion Sections 6.1 – 6.3
Wed.	Apr. 23	Ch. 6 Circular Motion Sections 6.1 – 6.3
Fri.	Apr. 25	Ch. 10 Work and Energy Sections 10.1 – 10.5

Week #5

Mon.	Apr. 28	Ch. 10 Work and Energy Sections 10.1 – 10.5
Tues.	Apr. 29	Ch. 10 Work and Energy Sections 10.1 – 10.5 Ch. 8 Equilibrium & Elasticity Sections 8.3 – 8.4

Wed.	Apr. 30	Ch. 10 Work and Energy Sections 10.1 – 10.5 Ch. 8 Equilibrium & Elasticity Sections 8.3 – 8.4
Fri.	May 2	Ch. 9 Momentum Sections 9.1 – 9.6

Week #6

Mon.	May 5	Ch. 9 Momentum Sections 9.1 – 9.6
Tues.	May 6	Ch. 9 Momentum Sections 9.1 – 9.6
Wed.	May 7	Exam #2 Chapters 5 – 6 & 8 – 10
Fri.	May 9	No Class – Steinmetz Day

Week #7

Mon.	May 12	Ch. 7 Rotational Motion Sections 7.1 – 7.3
Tues.	May 13	Ch. 7 Rotational Motion Sections 7.5 – 7.6
Wed.	May 14	Ch. 7 Rotational Motion Sections 7.6
Fri.	May 16	Ch. 8 Statics Sections 8.1 – 8.2, 8.5

Week #8

Mon.	May 19	Ch. 8 Statics Sections 8.1 – 8.2, 8.5
Tues.	May 20	Ch. 8 Statics Sections 8.1 – 8.2, 8.5
Wed.	May 21	Ch. 13 Fluids Sections 13.1 – 13.3
Fri.	May 23	Ch. 13 Fluids Sections 13.4 – 13.5

Week #9

Mon.	May 26	Ch. 13 Fluids Sections 13.4 – 13.5

Tues.	May 27	Ch. 13 Fluids Sections 13.6 – 13.7
Wed.	May 28	Ch. 13 Fluids Sections 13.6 – 13.7
Fri.	May 30	Exam #3 Chapters 7 – 8 & 13

Week #10

Mon.	June 2	Ch. 15 Sound Sections 15.4 – 15.6
Tues.	June 3	Ch. 15 Sound Sections 15.4 – 15.6
Wed.	June 4	Ch. 16 Standing Sound Waves Sections 16.4 – 16.5
Fri.	June 6	Last Day of Class