

General Physics I (PHY 130)

Spring, 2024, Dr. Pfeil

COURSE DESCRIPTION: Physics 130 (General Physics 1) is the first semester of an introductory, algebra based, physics sequence. Topics covered include kinematics, dynamics, the mechanics of solids and fluids, wave motion, heat and temperature, and kinetic theory. In less technical language, we will cover the mathematical description and modeling of motion (kinematics), how forces give rise to changes in motion (dynamics), and several applications on the macroscopic and microscopic world. A laboratory portion of this course will provide experience with these phenomena discussed in lecture and provide hands on experience. *PHY 130 is an approved science distributive course in the WCU general education program (details provided later in the syllabus.)*

Prerequisites: This course has no formal prerequisites but assumes a good working knowledge of Algebra. If you have mastered the material in either of WCU's Algebra offerings (MAT 113 or MAT 115), or the topics covered in a High School Algebra course, you should be in good shape. *If you feel your high school algebra class did not adequately prepare you for this course, due to COVID disruptions, please see me to discuss your plans to address any gaps.*

INSTRUCTOR INFORMATION:

Dr. Shawn H. Pfeil (*last name pronounced "file"*)

e-mail: spfeil@wcupa.edu (please identify which course you are contacting me about)

phone: (610) 430-4084

office: SECC 363

COURSE MEETING TIME AND PLACE:

This course meets for slightly more than four hours Monday-Thursday. Lecture/discussion meetings are in Merion 113 for the 8 am meetings and Brandywine 031 for the afternoon meeting on Wednesdays. Lab meets in SEC 356. Homework is due Sunday nights by 11:59 pm. *Please note office hours are subject to change. Please see D2L for any updates.*

	Monday	Wednesday	Friday
8:00-8:55 am	Merion 113	Merion 113	Merion 113
2:00-2:50 pm	No Meeting	Brandywine 031	No Meeting

OFFICE HOURS

	Monday	Tuesday	Wednesday	Thursday	Friday
SECC 363 (my office)	10-11 am	10-11 am	11 am – 1 pm	10-11 am	Research Day NO OFFICE HOURS

Office hours are available by appointment for students with an ongoing conflict with my scheduled hours.

OPEN DOOR POLICY:

- If it is office hours, and I am not helping another student, I will stop whatever I am doing and help you.
- If it is not office hours and my office door is open, I will finish whatever task I am engaged in (the e-mail I am writing etc.) and then I will help you.
- If my door is closed, I have a deadline and cannot help you right now. Please come back.

- You might find a note on my door saying I am in my research space. It is one floor down...come find me.

OTHER PLACES TO GET HELP (TUTORING):

If you need help beyond office hour, The LARC, (610) 436-2535, usually provides tutoring for this course.

(<https://www.wcupa.edu/universityCollege/larc/students.aspx>) Peer tutoring is also typically provided by the Society of Physics Students (SPS). I will post their schedule once it is available. They are a student organization, and it typically takes them several weeks to organize. If you need help brushing up on a mathematical tool, the Department of Mathematics also offers tutoring at the Math Center located in UNA 105. Please note, this last resource is for mathematics only.

HOW TO SUCCEED IN THIS COURSE:

A successful Physics student...

- *is organized.*
 1. Knows when all homework assignments are due (by checking the homework system calendar).
 2. Knows when each exam is scheduled (from the course calendar).
 3. Has printed the student learning objectives (from D2L) and checks off each one as they are achieved.
 4. Has a copy of the notes either printed or electronically on a tablet which can be annotated for the days lecture.
 5. Has read the reading for the lecture before lecture (so they know what questions they have).
 6. Has scheduled time to work on Physics outside of class either every day, or every other day.
- *keeps up with the material.*
 1. Learns each piece of technical vocabulary the day it is presented. (Otherwise, the lectures quickly unintelligible).
 2. Does the homework problems associated with each lecture within a day of the end of lecture (to allow plenty of time to get to office hours with questions.)
- *actively engages with the material.*
 1. Work the book examples. (Read with a pencil in hand).
 2. Notes down any questions they have from the reading.
 3. Works the practice problems given in class.
 4. Does not worry about copying down example solutions, they are available after class, but rather tries to thin through the example solutions with the professor.
- *is not afraid to get help.* Introductory Physics is a lot. We are covering insights developed over 200+ years of human endeavor in a semester. You will have questions. Find me in office hours. Don't let anything slide.

MY PROMISE TO YOU:

I cannot promise that this course will be easy. College Physics just is not easy, and I can't make it easy. **I can, and do, promise that I will do everything in my power to make this course straight-forward.** It is my goal that you never be surprised by the kind of problems you see on an exam, that you always know what is most important to study, and that the path to success is always well marked. If you have any questions, ask me. Find me in office hours, find me out of office hours, or e-mail me.

REQUIRED COURSE MATERIALS

Textbook

The textbook and homework system we are using Physics 5/e by Walker with Modified Mastering Physics, are through inclusive access. This means that you should see a \$112.93 charge for the show up on your Bursar's account for the book. This is a discounted from the online purchase price of \$124.99. Both are for 24-month access which is typically long enough to complete PHY 130 and PHY 140.

Gaining Access: You will be able to register for Modified Mastering Physics with the e-book included directly from the courses D2L (course management) website.

If You Drop the Course: You can opt-out of inclusive access until the drop/add deadline. You should have received an e-mail with a link to do this. If you opt-out you receive a refund.

If You Are Retaking the Course: During the registration process in D2L, opt-out of inclusive access, and use your old login for Physics 5/e.

If You Want a Paper Copy: You can order a loose-leaf copy of the book directly from the publisher while logged into Modified Mastering Physics. There is a "Purchase Option" link on this website. The cost from Pearson is \$44.99.

Calculator

You will want a basic scientific calculator for this course. Something at the level of a Ti-30 or nicer is recommended. You don't need anything fancy or expensive. For example, a Ti-30Xa, retail price \$8.99, is perfectly sufficient.

Please note you will never be able to use your cellphone, tablet, etc., as a calculator in class. If you own a fancier calculator, with a memory function, you may use it provided you clear the memory prior to each exam.

GRADED COURSE COMPONENTS, WEIGHTS, POLICY ON MISSED EXAMS

I will be using the D2L grade-book feature to post course grades. Please check it periodically. *(Please note that I reserve the right to change the weights of course components in the event of unforeseen circumstance.)*

- **Laboratory** (15%): You will be assigned a percentage in lab by your lab instructor. I will use this to calculate the laboratory portion of your grade.
- **Homework** (10%): Approximately 220 problems are assigned for the course. **It is your responsibility to check Modified Mastering Physics periodically** for assignment updates. **Due dates will not be moved forward but may be pushed back.** Homework is due Sunday at 11:59 pm. **Don't wait to do your homework. Try to finish each section as soon as we have covered it in class.** Late homework is assessed a 5% penalty up to a maximum reduction of 25%.
- **Regular Exams**: (55%): We will have four (4) regular exams each at 13.75%. *An explicit list of all the things you need to be able to do for each exam, student learning objectives (SLOs), is available on D2L. No exam scores are dropped.*
- **Final**: (20%): We will have a cumulative final worth 20%. All students are required to take the final exam. The final exam score may not be dropped. This exam covers all of the material and student learning objectives (SLOs) for the course.

I will give a make-up exam, or provide other adjustment, such as weighting your final more heavily, under the following conditions:

- You missed the exam for a **University Sanctioned Event**, notified me in advance, and provide some form of documentation (performing arts program with you listed as cast, competition schedule signed by your coach etc.)

- You missed an exam due to a truly unavoidable commitment and you let me know in advance. You must let me know in advance, so that we can make sure that we agree the commitment is truly unavoidable. (This is the category that includes family weddings and funerals etc.) Again, you'll need to provide documentation.
- You missed the exam due to some completely unforeseeable event which is completely out of your hands. For example, you are driving to the exam and get into a car accident, get admitted to the hospital, your roommate tells you they have COVID the night before the exam and you must quarantine. In this case you need to tell me as soon as it is feasible and safe to do so

If you have or need an accommodation under the ADA for an exam: You are responsible for making the appropriate arrangements **at least a week prior** to the exam date and time. These arrangements must include getting a letter from OEA. Please see the “accommodations for Students with Disabilities” statement. ***This is also the proper way to deal with temporary disabilities.*** For example, if you break your writing-hand and need more time on exams because you must write with your non-dominant hand.

GRADE CALCULATION:

The standard WCU scale for grades (see table below). I round your course-grade up at 0.5 and calculate them to the tenths place. For example, 92.5% rounds to 93% so it is an A not an A-.

Letter	Grade Points	Percentage	
A	4.000	93 - 100	Excellent
A-	3.670	90 - 92	
B+	3.330	87 - 89	Superior
B	3.000	83 - 86	
B-	2.670	80 - 82	
C+	2.330	77 - 79	Average
C	2.000	73 - 76	
C-	1.670	70 - 72	
D+	1.330	67 - 69	Below Average
D	1.000	63 - 66	
D-	0.670	60 - 62	
F	0.000	59 or lower	Failure

SOFTWARE AND WEB RESOURCES

We use two web-based resources in this class.

MasteringPhysics the homework system from the textbook publisher. This is included with the textbook license. Please note that this system works best with the Chrome or FireFox web browsers (both freely available). ***It can have compatibility issues with Apple's Safari Browser.***

Used For:

- Accessing the electronic textbook.
- Doing online homework.

Bright Space (by D2L) a course management software environment. (This is the same class of online software as Canvas or Moodle).

Used For:

- Providing a link to the homework system (MasteringPhysics).
- Providing a link to the lecture notes (Shared via a OneDrive Folder).
- Providing links to exam student learning objective sheets (SLOs)
- Providing a link to the equation sheet provided for exams.

- Providing access to past semester exams and exam solutions.
- Providing links to this semester's exam solutions (after exams).
- Providing an electronic version of the syllabus.
- Announcements.
- Online gradebook.

WEST CHESTER UNIVERSITY GENERAL EDUCATION LEARNING OUTCOMES:

PHY 130 is approved as a WCU General Education Science Distributive course, and as such meets the following General Education Goals:

Gen Ed Goal #1: Communicate effectively.

Gen Ed Goal #2: Think critically and analytically.

Gen Ed Goal #3: Employ quantitative concepts and mathematical methods.

More specifically, after successfully completing this course, a student will be able to:

1. Mathematically describe mechanical systems using the language of kinematics.
2. Recognize and distinguish between the concepts of physics in action within mechanical systems, including force, energy, momentum, harmonic motion, and wave phenomena.
3. Analyze mechanical systems through visualization, modeling, algebra, as well as diagrammatic and graphical techniques.
4. Assemble the above elements in order to solve multi-part problems and formulate quantitative predictions for physical experiments.

Student learning outcomes will be met and assessed through the following activities:

- **Communicate effectively:** This course develops a student's ability to express oneself effectively in common college-level written forms (Gen Ed SLO #1a). In class, peer instruction specifically in recitation, give students practice communicating physical concepts in plain language. Homework assignments develop a student's ability to describe physical systems in the mathematical language of kinematics. Laboratory activities, performed in groups of 2-3 students, provide further practice explaining physical systems with brevity and mathematical precision. Effective written communication is assessed through short-answer conceptual questions on exams, as well as Post-Lab Assignments.
- **Think critically and analytically:** This course develops a student's ability to construct and/or analyze arguments in terms of their premises, assumptions, contexts, conclusions, and anticipated counterarguments (Gen Ed SLO #2b), as well as reach sound conclusions based on a logical analysis of evidence (Gen Ed SLO #2c). In mechanics, critical thinking most often takes the form of identify/analyze/predict: (i) identify the aspects of physical system which determine its motion, (ii) analyze the system using physical concepts and mathematical relations, and (iii) develop a quantitative prediction for the system's behavior. Lecture, in-class activities, and homework problems all work to develop a student's skill in this process. For example, a common in-class activity is to propose a brief experiment and ask students to formulate a prediction for the outcome of that experiment. The experiment is then performed, and students are asked to analyze the assumptions and logic that led to their prediction. Student achievement in this critical thinking process is assessed through multiple choice questions and analytic free-response problems on exams. Critical and analytical thinking is also developed in the lab. Laboratory exercises ask students to synthesize experimental results and physical reasoning in order to construct explanations of observed behavior, formulate predictions for future experiments, and critically assess the quality of their data. Student achievement in these skills is assessed through written Lab Exercises and Post-Lab Assignments.
- **Employ quantitative concepts and mathematical methods:** This course develops a student's ability to employ quantitative methods to examine a problem in the natural or physical world (Gen Ed SLO #3a), as well as apply the basic methods and thought processes of the scientific method for natural/physical

science in a particular discipline (Gen Ed SLO #3b). As a course in mechanics, essentially every element of this course involves quantitative methods and problem-solving. Quantitative tools such as algebra, trigonometry, and vectors are employed in every aspect of the course. Lecture presentation and textbook material train students in the following problem-solving skills: organizing information, visualizing and diagramming, recognizing concepts, strategizing solutions, combining mathematical relations, and assessing results. Weekly laboratory sessions allow students to actively apply the scientific method in order to explore physical phenomena and verify their predictions. For instance, in a lab on projectile motion students are tasked with predicting the distance a ball will travel when shot out of a launcher. Students determine the initial launch speed of the ball empirically, then utilize their measurement to model the ball's flight and ultimately predict the ball's landing position. Students then critique and refine their analysis based upon the accuracy of their result. While quantitative problem-solving is an ingredient in every aspect of the course, it is primarily assessed through exam questions and through written Lab Exercises.

ATTENDANCE POLICY:

Attendance is taken for this course. Attending lecture, while highly correlated with success in this course is not graded. *Please note that I am required to report attendance to the University, and that this attendance can have financial aid implications.*

INTELLECTUAL PROPERTY STATEMENT:

I, the instructor, utilize copyrighted materials under the “Freedom and Innovation Revitalizing the United States Entrepreneurship Act of 2007” (Fair Use Act). Apart from such copyrighted materials, all other intellectual property associated with this course is owned and copyrighted by the instructor, including, but not limited to, lectures, course discussions, course notes, slides, assessment instruments such as exams, and supplementary materials posted or provided to students authored by the instructor. No recording, copying, storage in a retrieval system, or dissemination in any form by any means of the intellectual property of the instructor, in whole or in part, is permitted without prior written permission of the instructor. When such permission is granted, it must specify the utilization of the intellectual property and all such permissions and waivers shall terminate on the last day of finals of the semester in which this course is held.

ACADEMIC & PERSONAL INTEGRITY

It is the responsibility of each student to adhere to the university's standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another's work and/or using ideas of another and presenting them as one's own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Undergraduate Handbook, the Undergraduate Catalog, the Ram's Eye View, and the University website at www.wcupa.edu.

ONLINE RESOURCES AND ACADEMIC INTEGRITY:

Posting of any of the homework or exam questions from this course to Chegg, Course Hero, or any other site where solutions are made available for a fee is a violation of the academic integrity policy. Copying solutions to problems from these websites is a form of plagiarism since any student that does so passes off others' work as their own. Solutions from any website which charges fees counts as buying solutions. Posting any materials which I have written, i.e., any exam questions in the course, is a violation of both academic integrity and a misuse of my intellectual property. Posting or accessing any exam course exam questions on these sites, at any time, will result in sanctions up to and including an F in the course.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

West Chester University is committed to providing equitable access to the full WCU experience for Golden Rams of all abilities. Students should contact the Office of Educational Accessibility (OEA) to establish accommodations if they have had accommodations in the past or if they believe they may be eligible for accommodations due to a disability, whether or not it may be readily apparent. There is no deadline for disclosing to OEA or for requesting to use approved accommodations in a given course. However, accommodations can only be applied to future assignments or exams; that is, they can't be applied retroactively. Please share your letter from OEA as soon as possible so that we can discuss accommodations. If you have concerns related to disability discrimination, please contact the university's ADA Coordinator in the Office of Diversity, Equity, and Inclusion: https://www.wcupa.edu/_admin/diversityEquityInclusion/ or 610-436-2433.

EXCUSED ABSENCES POLICY

Students are advised to carefully read and comply with the excused absences policy, including absences for university-sanctioned events, contained in the WCU Undergraduate Catalog. In particular, please note that the "responsibility for meeting academic requirements rests with the student," that this policy does not excuse students from completing required academic work, and that professors can require a "fair alternative" to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

REPORTING INCIDENTS OF SEXUAL VIOLENCE

West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to comply with the requirements of Title IX of the Education Amendments of 1972 and the University's commitment to offering supportive measures in accordance with the new regulations issued under Title IX, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. **Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University Protection of Minors Policy.** Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at: https://www.wcupa.edu/_admin/diversityEquityInclusion/sexualMisconduct/default.aspx

INCLUSIVE LEARNING ENVIRONMENT AND ANTI-RACIST STATEMENT

Diversity, equity, and inclusion are central to West Chester University's mission as reflected in our [Mission Statement](#), [Values Statement](#), [Vision Statement](#) and [Strategic Plan: Pathways to Student Success](#). We disavow racism and all actions that silence, threaten, or degrade historically marginalized groups in the U.S. We acknowledge that all members of this learning community may experience harm stemming from forms of oppression including but not limited to classism, ableism, heterosexism, sexism, Islamophobia, anti-Semitism, and xenophobia, and recognize that these forms of oppression are compounded by racism.

Our core commitment as an institution of higher education shapes our expectation for behavior within this learning community, which represents diverse individual beliefs, backgrounds, and experiences. Courteous and respectful behavior, interactions, and responses are expected from all members of the University. We must work together to make this a safe and productive learning environment for everyone. Part of this work is recognizing how race and other aspects of who we are shape our beliefs and our experiences as individuals. It is not enough to condemn acts of racism. For real, sustainable change, we must stand together as a diverse coalition against racism and oppression of any form, anywhere, at any time.

Resources for education and action are available through WCU's [Office for Diversity, Equity, and Inclusion](#) (ODEI), DEI committees within departments or colleges, the student [ombudsperson](#), and centers on campus committed to doing this

work (e.g., [Dowdy Multicultural Center](#), [Center for Women and Gender Equity](#), and the [Center for Trans and Queer Advocacy](#)).

Guidance on how to report incidents of discrimination and harassment is available at the University's [Office of Diversity, Equity and Inclusion](#).

EMERGENCY PREPAREDNESS

All students are encouraged to sign up for the University's free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

ELECTRONIC MAIL POLICY

It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.

ALL OTHER ACADEMIC POLICIES

For any university wide academic policy not explicitly covered in this document, such as No Grade policies. Please consult your major advising handbook, the Undergraduate Catalog, the Ram's Eye View, or the University Website.

TENTATIVE COURSE SCHEDULE: (next page): A tentative schedule for the course follows. Although I will endeavor to stick closely to the schedule as posted below, I reserve the right to modify it as needed over the course of the semester.

Date (mm/dd)	Day	Topic	Lecture #	Reading	Lab (Wed or later)
01/22	M	Syllabus, Math Prerequisites, Resources	0	None	NO LAB
Week 1	W1	Units, Dimensions, SI multipliers, Scalars and Vectors	1	1.1-1.3,1.5-1.7	
	W2	Position, Displacement, Avg. Velocity, Avg. Speed	2	2.1-2.2	
	F	Instantaneous Velocity and Acceleration	3	2.3-2.5	
01/29	M	The velocity and position relationships	4	2.5	Lab 1: Single Measurement
Week 2	W1	When we don't care about Δt , more examples	5	2.5-2.6	
	W2	When Objects are free to Fall	6	2.7	
	F	Vectors Part I	7	3.1-3.5	
02/05	M	Vectors Part II	8	3.1-3.5	Lab 2: Repeated measurements
Week 3	W1	Kinematics in 2D – General Concerns	9	4.1-4.2	
	W2	Projectile Motion – Horizontal Launch	10	4.2-4.3	
	F	Projectile Motion – Launch at an Angle	11	4.4-4.5	
02/12	M	Newton's 1 st and 2 nd Laws	12	5.1-5.3	Lab 3: 1D Kinematics
Week 4	W1	Newton's 3 rd Law, Forces as Vectors	13	5.4-5.5	
	W2	Weight	14	5.6	
	F	<i>Review for Exam 1</i>			
02/19	M	Exam 1: Kinematics and Vectors (CH 1-4)			Lab 4: Free fall
Week 5	W1	Normal Force	15	5.7	
	W2	Friction	16	6.1	
	F	Tension and Elastic Force	17	6.2	
02/26	M	Translational Equilibrium	18	6.2	Lab 5: Projectile motion
Week 6	W1	Centripetal Acceleration	19	6.3	
	W2	Force Problems with Centripetal Acceleration	20	6.5	
	F	Catch-Up			
03/04	M	Work and Kinetic Energy	21	7.1	Lab 6: Projectile motion
Week 7	W1	Work-Energy Theorem	22	7.2	
	W2	<i>Review for Exam 2</i>			
	F	Exam 2: Forces (CH 5-6)			
03/11	M	SPRING BREAK			NO LAB
Week 8	W1	SPRING BREAK			
	W2	SPRING BREAK			
	F	SPRING BREAK			
03/18	M	Work Done by a Variable Force	23	7.3	TBA
Week 9	W1	Power	25	7.4	
	W2	Conservative and Nonconservative Forces, Potential Energy	26	8.1-8.2	
	F	Conservation of Mechanical Energy, Work Done by Non-Conservative forces	27	8.3-8.4	
03/25	M	Momentum and Impulse	28	9.1-9.3	Lab 7: Energy Conservation
Week 10	W1	Applying Momentum Conservation	29	9.4-9.5	
	W2	Finishing up Momentum	30	9.6-9.7	
	F	Rotational Kinematics Part I	31	10.1-10.3	

04/01	M1	Rotational Kinematics Part II	32	10.3-10.5	Lab 8: Momentum
Week 11	W1	Catch-Up			
	W2	<i>Review for Exam 3</i>			
	F	EXAM 3: Energy and Momentum (CH 7-9)		CH 7-9	
04/08	M	Rotational Energy and Inertia	33	10.5-10.6	Lab 9: Angular Dynamics Law
Week 12	W1	Torque	34	11.1-11.2	
	W2	Static Equilibrium	35	11.3-11.4	
	F	Periodic Motion	36	13.1-13.4	
04/15	M	Catch-Up			Lab 10: Simple harmonic motion
Week 13	W1	Simple Harmonic Motion	37	13.4-13.8	
	W2	Introduction to Waves and Waves on a String	38	14.1-14.2	
	F	Sound Waves and Intensity	39	14.4-14.5	
04/22	M	The Doppler effect	40	14.6	Lab 11: Standing Waves
Week 14	W1	Superposition and Interference	41	14.7	
	W2	Standing Waves	42	14.8	
	F	<i>Review for Exam 4</i>			
04/29	M	Exam 4: Rotation, SHM, Waves			TBA
Week 15	W1	Fluids	43	TBA	
	W2	Fluids	44	TBA	
	F	<i>Review</i>			
05/06	M	Final Exam 8 am – 10 am, same location as <u>lecture</u>		All Chapters	