## General Physics II (PHY 140)

## Fall 2022, Dr. Pfeil, Section 03

**Course Description:** Physics 140 is a continuation of Physics 130, which covers electricity, magnetism, electrical circuits, optics, and quantum physics. We will cover electric forces, fields, and potentials, circuits, ray optics, wave optics, and modern physics.

*Physics 140 is primarily a service course for students in biological and health science fields, so we will emphasize applications to these fields.*

A laboratory portion of this course will provide hands-on experience with these phenomena and give a glimpse into how scientists discovered the physical laws covered in the lecture.

**Prerequisites**: PHY 130

**Student Learning Objectives (slos):**

1. Students will demonstrate an ability to analyze problems involving electrical forces and fields.
2. Students will synthesize the new concepts of electrical potential energy and electric potential (voltage) with their knowledge and understanding of mechanical energy.
3. Students will demonstrate an ability to both categorize and analyze electrical circuits.
4. Students will demonstrate an ability to analyze problems involving magnetic forces and fields.
5. Students will demonstrate an ability to synthesize magnetic forces with their understanding of uniform circular motion.
6. Students will demonstrate an ability to summarize and interpret Faraday’s and Lenz’s laws.
7. Students will demonstrate an ability to synthesize the electromagnetic wave description of light with their understanding of mechanical waves.
8. Students will demonstrate an ability to analyze problems from geometric optics involving thin lenses and mirrors.
9. Students will demonstrate an ability to synthesize their understanding of mechanical wave interference with interference of electromagnetic waves.
10. Students will demonstrate an ability to analyze problems using the uncertainty principle.

*This set of student learning outcomes will be assessed via performance on exams, and homework sets. Please see course schedule for details.*

## 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 four hours a week for lecture/recitation. Additionally, it has an associated 2 hour lab.

|  |  |
| --- | --- |
| Meeting Time | Location |
| MoWeFri 11:00 – 11:50 AM | SECC 208 |
| Mo 8:00 – 8:50 AM | SECC 208 |

Please note that rather than using the fourth hour as a separate “problem solving session,” we use the extra hour to reduce the pace of coverage and allow integrated problem solving. All course meeting times are equally important!

## Office Hours:

My published office hours are listed in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Monday | Tuesday | Thursday | Friday |
|  9-10 AM | 8:15-9:15 AM | 8:15-9:15 AM | 8:15-10:15 AM |

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

**Mechanics of How to Succeed in this Course:**

* Read the material for the day before the course meeting:
	+ Identify the key terms. *Learn them. Don’t let any vocabulary slide. It all builds.*
	+ Make sure you can define each term and state each formula we derive in clear English.
	+ Work the examples. (Read with a pencil in hand).
	+ Make a note of what questions you have.
* Make optimal use of course meetings:
	+ Come with the slides printed or downloaded to a tablet. ***Note any slides that cover material you did not really get from the reading.*** Make sure your questions get answered.
	+ Try to actively solve the example problems with me. Don’t worry about getting all the steps written down. You’ll have my annotated notes later.
	+ You’ll have more chances to work problems in class. Do this.
* Attempt the homework on today’s material immediately. You’ll need to budget a couple of hours for this. *Don’t look up answers*. Wrestling with the material is when we learn.
	+ Make sure to work neatly. If you must rewrite a problem, do so.
	+ You are practicing your form. Practice does not make perfect…it makes permanent.
	+ Make sure you can say in clear language how you solved each problem.
* If you get stuck, go to office hours.

## Required Course Materials

 ***Textbook***

*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 took PHY 130, with inclusive access, in the last 24 months, then you should still have access.

If you did not take PHY 130 in the last 24 months:

* 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.
* *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** (15%): **It is your responsibility to check Modified Mastering Physics periodically** for assignment updates. Solutions to all homework problems are available on the online system immediately after the assignment is due. Because solutions are available immediately late homework is not accepted for credit. ***Homework is dues Sunday night by 11:59 pm.***
* **Regular Exams:** (50%): We will have four (4) regular exams. ***Your lowest regular exam score will be dropped.*** This means each exam which is kept will count for 16.67% of your final grade.
* **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. The final will not cover any of the material from Exam four.

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 do 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 OSSD. Please see the “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:**

I will be using 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

This course does not require you to purchase anything other than the license for MasteringPhysics (the homework system.) However, we do use a couple of different online resources.

## D2L:

We use BrightSpace by D2L as our course portal. What you will find in D2L:

* VitalSource: This is the link to the inclusive access portal for the textbook. You will use this to do homework using the online homework system, to see a calendar of when assignments are due, and to access the electronic textbook.
* D2L announcements – the landing page for D2L has an announcements tool, which I will use to communicate with you.
* D2L gradebook – The gradebook feature will allow you to see your current grade in the course. (However, please note the laboratory grade updates infrequently since it is calculated by your lab instructor independently.)
* Microsoft OneDrive Link to Lecture Slides: You have a link to my lecture slides, which I will annotate in class. I strongly suggest printing/downloading a copy before lecture and annotating it. My own annotations will be available in the same location after class. Past exams will also be posted in a OneDrive link.

## 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.*

## Physics Tutoring:

Physics tutoring is available through LARC (610) 436-2535. In the past peer tutoring has also been available from SPS (the Society of Physics Students). If SPS tutoring becomes available this semester I will make an announcement. **These should be considered in addition to my office hours, which are the first place you should stop for additional help.**

## 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](http://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.

**STUDENTS WITH DISABILITIES**

If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University’s Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is ossd@wcupa.edu, and their website is at [www.wcupa.edu/ussss/ossd](http://www.wcupa.edu/ussss/ossd). In an effort to assist students who either receive or may believe they are entitled to receive accommodations under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, the University has appointed a student advocate to be a contact for students who have questions regarding the provision of their accommodations or their right to accommodations. The advocate will assist any student who may have questions regarding these rights. The Director for Equity and Compliance/Title IX Coordinator has been designated in this role. Students who need assistance with their rights to accommodations should contact them at 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>

**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](http://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** | **#** | **Reading** | **Lab**  |
| 08/29 | M1 | Introduction to the Course. How to do well in PHY 140 | 0 | None | Intro. Meeting |
| Week 1 | M2 | Review of Force | R2 | CH 5-6 |
| W | Review of Energy/Kinematics | R3 | CH 1-4, CH 7-8 |
| F | Electric Charge, Insulators and Conductors | 1 | 19.1-19.2 |
| 09/05 | M1 | **LABOR DAY** |  |  | No Lab. |
| Week 2 | M2 | **LABOR DAY**  |  |  |
| W | Coulomb’s Law | 2 | 19.3 |
| F | The Electric Fields | 3 | 19.4 |
| 09/12 | M1 | Field Lines | 4 | 19.5 | Electron Charge |
| Week 3 | M2 | Conductors and Gauss’ Law | 5 | 19.6-19.7 |
| W | Electric Potential Energy | 6 | 20.1 |
| F | Energy Conservation & Potential of a Point Charge | 7 | 20.2-20.3 |
| 09/19 | M1 | Equipotential and Capacitance | 8 | 20.4-20.5 | Equi-potential |
| Week 4 | M2 | Dielectric Constant and Energy Stored in a Capacitor | 9 | 20.5-20.6 |
| W | Current, Ohm’s Law, Resistivity | 10 | 21.1-21.2 |
| F | Power and Resistor Circuits Part I | 11 | 21.3 |
| 09/26 | M1 | Power and Resistor Circuits Part II | 12 | 21.4 | Ohm’s Law |
| Week 5 | M2 | *Review for Exam 1* |  |  |
| W | **Exam 1: Forces, Fields, Potentials (CH 19-20)** |  |  |
| F | Kirchhoff’s Laws, Series and Parallel Capacitors | 13 | 21.5-21.6 |
| 10/03 | M1 | Capacitors Networks | 14 | 21.6 | No Lab. |
| Week 6 | M2 | RC Circuits | 14 | 21.7 |
| W | Magnetic Fields and Magnetic Force on Charges | 15 | 22.1-22.2 |
| F | Motion of Charged Particles in B-Fields | 16 | 22.3 |
| 10/10 | M1 | Force on a Current Carrying Wire | 17 | 22.4 | Resistors in Series |
| Week 7 | M2 | Currents Make B-Fields | 18 | 22.6 |
| W | B-fields from Wires and the Force Between Wires  | 19 | 22.6 |
| F | **Exam 2 Circuits (CH 21)**  |  |  |
| 10/17 | M1 | **Fall Break** |  |  | **NO LAB** |
| Week 8 | M2 | **Fall Break** |  |  |
| W | Solenoids | 20 | 22.7 |
| F | Magnetic Flux and Faraday’s Law | 21 | 23.1-23.3 |
| 10/24 | M1 | Lenz law and Motional EMF | 22 | 23.4 | Resistors in Parallel |
| Week 9 | M2 | Motional EMF: what is doing the work? | 23 | 23.5 |
| W | Inductance and Inductor Circuits | 24 | 23.7-23.8 |
| F | Energy Stored in Fields | 25 | 23.9 |
| 10/31 | M1 | Electromagnetic Waves Part I | 26 | 25.1-25.3 | RC circuits |
| Week 10 | M2 | Electromagnetic Waves Part II: Energy and Intensity | 27 | 25.4 |
| W | Momentum in EM Waves & Polarization | 28 | 25.5 |
| F | *Review for Exam 2* |  |  |

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| --- | --- | --- | --- | --- | --- |
| 11/17 | M1 | **EXAM 2: B-Fields and EM Waves (CH 22,23,25)** |  |  | No Lab |
| Week 11 | M2 | Mirrors | 28 | 26.1-26.2 |
| W | Ray Tracing Spherical Mirrors & The Mirror Equation | 29 | 26.3-26.4 |
| F | Refraction and Snell’s Law | 30 | 26.5 |
| 11/14 | M1 | Total Internal Reflection and Introducing Lenses | 31 | 26.6-26.7 | EM Induction |
| Week 12 | M2 | The Lens Equation and Multiple Lens Systems | 32 | 27.1-27.2 |
| W | Optics of the Eye and Magnifying Glasses | 33 | 27.2-27.3 |
| F | Physical Optics I: Interference and the Double-Slit | 34 | 28.1-28.2 |
| 11/21 | M1 | Physical Optics II: Interference Phenomena | 35 | 28.3-28.4 | **NO LAB** |
| Week 13 | M2 | Physical Optics III: Resolution and Diffraction Gratings | 36 | 28.5-28.6 |
| W | **THANKSGIVING BREAK** |  |  |
| F | **THANKSGIVING BREAK** |  |  |
| 11/28 | M1 | Blackbody Radiation & The Photoelectric Effect | 37 | 30.1-30.2 | Snell’s Law |
| Week 14 | M2 | Wave-Particle Duality & The Uncertainty Principle | 38 | 30.5-30.6 |
| W | Early Models of the Atom & The Spectrum of Hydrogen | 39 | 31.1-31.2 |
| F | *Review for Exam 4* |  |  |
| 12/05 | M1 | **Exam 4: Wave Optics and Modern Physics (CH 28-30)** |  |  | Thin Lenses |
| Week 15 | M2 | The Bohr Model of Hydrogen | 40 | 31.3-31.4 |
| W | Molecular Absorption, Dye-Molecules & Lasers | 41 | TBA |
| F | Catch-Up/Review for Final |  |  |
| 12/12 | M1 | Catch-Up/Review for Final |  |  | No Lab |
|  | M2 | Catch-Up/Review for Final |  |  |
|  |  | **Friday 12/16, PHY 140 Final, 10:30 am – 12:30 pm** |  | All Chapters |