PHY 100-04: Elements of Physical Science

West Chester University – Spring 2017

COURSE SYLLABUS

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Instructor

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Office hours

Day	Time
Monday	10:30-11:30 am
Wednesday	10:30-11:30 am, 2:00-3:00 pm
Friday	10:30-11:30 am, 2:00-3:00 pm

Additional office hours are available by appointment on Mondays, Wednesdays, and Fridays.

Course section details

Section	Time	Days	Location	Final Exam
100-04	1:00-1:50 pm	MWF	Merion 109	Friday, 5/12, 10:30am-12:30pm

Course description

Physics 100: Elements of Physical Science is an introductory course in physical science intended for non-science majors. Our ultimate goal is to gain an understanding of the scientific process and how the physical sciences help us comprehend the world around us. This course introduces the mathematical description of motion (kinematics), the explanation of motion through forces (dynamics), and the concepts of energy and momentum. The final unit of the course explores an area of modern physics (e.g., special relativity, quantum mechanics, or particle physics). Throughout the course, we will develop analytical reasoning and problem solving skills which are widely applicable to modern life.

Prerequisites

This course assumes no previous experience with physics. Throughout the course we will use high school mathematics, including algebra, analysis of graphs, and a little geometry. It is okay if your math is rusty; we will review the necessary mathematics at the start of the term.

If you have taken a course in physics before, or if you have moderate-to-strong mathematical skills (i.e., you have taken a calculus course), then PHY130 or PHY170 may be a better fit for you.

Student learning outcomes

This course (PHY100) is an approved general education course in the Sciences (see the WCU Undergraduate Catalog) and as such meets the following general education goals:

- General Education Goal #2: Ability to employ quantitative concepts and mathematical methods. (Secondary Goal of Science General Education Courses)
- General Education Goal #3: Ability to think critically and analytically. (Primary Goal of Science General Education Courses)

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** concepts of physics in action in mechanical systems, including force, energy, momentum, and relativity.
3. **Analyze** mechanical systems through visualization, modeling, algebra, as well as diagrammatic and graphical techniques.
4. Combine the above elements in order to **solve** multi-part problems as well as formulate **quantitative predictions** for physical experiments.

These goals will be met through the following activities:

- Class presentation and readings introduce the mathematical tools, physical concepts, and problem-solving strategies needed for physical analysis.
- Collaborative in-class exercises and homework assignments develop and practice analysis and problem-solving in a low-risk setting.
- Frequent quizzes and exams will test for gaps in understanding as well as provide critical feedback.

In addition, this course aims to instill understanding of and appreciation for the physical sciences.

- A course blog will serve as an active forum in which students will relate the concepts of physics studied in class to daily life, film and media, and society.
- Big picture days place course material in the larger context of the scientific method and ongoing scientific research. These days are denoted with **BP** on the course schedule.

Course materials

- Textbook: The course textbook is *Physics: Principles and Problems* by Paul W. Zitzewitz, David G. Haase & Kathleen A. Harper. Link to iTunes: https://itun.es/us/NkYrD.n

  This is an interactive e-textbook available on iTunes. It costs about $20. If needed, physical copies of the textbook are also available from the publisher and online retailers, though they lack the interactive features and cost about $100.

- Calculator: For exams you will need a stand-alone calculator with no internet or communication capabilities. You will want a calculator that can compute powers and operate in scientific notation. You may not use your mobile phone.

Assessment

This course follows the official WCU scale for grades (see the WCU Undergraduate Catalog):

Grade	Quality Points	Percentage	Interpretation
A	4.00	93–100	Excellent
A−	3.67	90–92	
B+	3.33	87–89	Superior
B	3.00	83–86	
B−	2.67	80–82	
C+	2.33	77–79	Average
C	2.00	73–76	
C−	1.67	70–72	
D+	1.33	67–69	Below Average
D	1.00	63–66	
D−	0.67	60–62	
F	0.00	<60	

Refer to the WCU Undergraduate Catalog for description of NG (No Grade), W, Z, and other grades. Elements of the course will contribute to the course grade as follows:

Percent	Category
10%	In-class participation
10%	Course blog
10%	Quizzes (2 highest scores)
20%	Homework
30%	In-class exams (3 highest scores)
20%	Final exam

10% In-class participation: Your participation grade is based on your level of interaction in class. Attendance by itself is not participation.

10% Course blog: Each student will contribute 1 blog entry and 4 comments to the course blog. Blog entries are due at scheduled times, with about two blog entries per week. Comments may be posted at any time, though at least 2 must be posted prior to spring break. More details of the course blog will be provided in a separate prompt near the start of the semester.

10% Quizzes: There will be occasional quizzes, with about 4 in total. Quizzes will be advertised in advance, and tentative dates for quizzes are listed on the course schedule. As the semester progresses, quizzes may become take-home exercises. **When calculating your course grade, I will drop your lowest 2 quiz grades.**

20% Homework: Homework assignments will typically be given as multiple choice "quizzes" on D2L. There will be two assignments per week, due **Sunday and Thursday evenings at 11:30 pm** – see the assignment schedule for details.

For multiple choice assignments, you will have 3 attempts to solve each problem for full credit; after these attempts the problem will close and you will receive no credit. Each problem is worth 1 point. Your total homework grade in the course is simply 100×(points earned)/(points available).

Solutions to all homework problems will be available on D2L shortly after the assignment is due.

30% In-class exams: There will be 4 exams administered in class during the semester. Exams are "closed book": the only aids allowed are a stand-alone calculator and the course equation sheet. The equation sheet is updated throughout the term; the most recent version is available on D2L.

Both in-class and final exam scores may be scaled ("curved") to conform to a standard distribution of grades. Failure to take an exam results in a 0 score. **When calculating your course grade, I will drop your lowest exam score.** Thus, each of your most successful exams is worth 10% of your course grade.

20% Final exam: The comprehensive final exam is tentatively scheduled for the time listed on page 1. This date is also listed on the course schedule. The final exam is "closed book" in the same manner as the in-class exams. Failure to take the exam results in a 0 score.

I will use the D2L grade-book feature to post grades for all aspects of the course.

Policy on late or missed work

In general, deadlines are strict and late work will not be accepted. In particular:

- There is no way to make up for missed class participation.
- I will not give individual extensions on homework assignments.
- I will not give quizzes or exams at alternate times. Note that when calculating course grades I drop the lowest two quiz scores as well as the lowest exam score.
- Late blog entries **will** be accepted, though I will subtract 10% from your score for each day the entry is late (without limit).

Personal emergencies: Rarely, a personal emergency can arise which prevents a student from meeting course expectations. In such a rare circumstance I am happy to work with the student in order to make appropriate arrangements. I require documentation which verifies the emergency. If necessary, the Office of the Assistant Dean of Students can act as a liaison and provide confidential verification of the emergency.

Attendance policy

Attendance in class is required. I will take attendance at the start of class. You may have three absences without penalty; after that, for each class you miss you will lose 1% from your course grade, up to a maximum of 10%.

Your attendance is excused for a documented University-Sanctioned Event or personal emergency. Illness, traffic, etc., may prevent you from coming to class, but these are not excused absences.

Electronic device policy

The only personal electronic devices that may be used in class are tablet-style computers which have a stylus. Other electronic devices such as mobile phones, ipods, and laptop computers are not conducive to the kind of note-taking necessary for this course. It's fine if you have these devices with you, but they must remain out of sight. If I see these devices then I will ask you to leave the class, and I will subtract from your participation grade.

Additional course policies

- D2L: All course documents are maintained on the course D2L site. I use the D2L announcement tool to make class-wide announcements.
- Email: Except in the event of a technical failure or an emergency, I will only correspond electronically via university email (mine and yours).

- Missed classes: If you miss a class it is your responsibility to make up the missed learning opportunity by reviewing the lecture notes. You are welcome to seek assistance in office hours, but I cannot reproduce an entire lecture outside of class.

- University-Sanctioned Events: If you will not be able to perform an aspect of the course due to a University-Sanctioned Event you must notify me in advance so that we can make arrangements. Official documentation verifying your participation in the event must be submitted **via D2L**.

- Accommodation: If you require additional accommodation for any aspect of the course you must notify me in advance so that we can make arrangements. Depending on the accommodation, you may need to provide documentation.

  If you have an ongoing medical condition which effects your ability to meet the course expectations then you should register with the Office of Services for Students with Disabilities (OSSD). If you suffer an acute condition which causes you to miss at least three consecutive school days then you may seek accommodation from the Office of the Assistant Dean of Students. Letters of accommodation from these offices must be submitted **via D2L**.

- Inappropriate behavior: Rarely, we have to deal with students who misbehave in class or send inappropriate emails. After the first instance I will issue a warning. After the second instance the student will lose their full participation grade (10% of the course grade). If there is a third instance the student will be removed from the course.

Expectations

You are responsible for your learning (and your grade!) in this course, not me. Here is what I expect from you:

- D2L: Regularly check the course site on D2L. I may not announce in class changes to course content on this platform. As with all technology, D2L can have glitches and unscheduled service outages. For this reason, check the site frequently and do not leave homework assignments to the last minute.

- Email: Regularly access, read, and respond to course communications sent to your university email account.

- Textbook reading: I expect you to complete the assigned textbook reading listed on the course schedule **prior** to class.

- Assignments: I expect you to complete every assignment. In previous courses I have taught at WCU the vast majority students (over 90%) have completed every assignment.

- Course blog: I expect you to read the course blog regularly. **Content on the course blog is eligible for examination.**
- In class: Attend class on time prepared to be an active learner. Interact, ask questions, take notes.
- When confused: Every student struggles at some point in this course. When you become stuck I expect you to initiate the process of getting unstuck. Ask questions in class, attend office hours, correspond with me via email, ask your lab instructor, confer with your peers, obtain a tutor.
- Final Exam Period: The final exam time and date are arranged the by the Registrar's Office and can change. You should plan to be available the entire Final Exam Period (May 9-12, 2017).

Academic integrity

Students are expected to follow all WCU rules and guidelines on academic integrity as described in the WCU Undergraduate Catalog. Here are a few relevant issues for this class:

- Online platforms: D2L and the course blog are extensions of the classroom and as such all WCU rules regarding student behavior apply on these platforms. Do not violate the copyrights of these sources or misrepresent your identity on these platforms.
- Collaboration: Students are encouraged to study together and collaborate on assignments. However, you should go through the process of solving each homework problem yourself. Submitting solutions which you have not yourself obtained is fraud.
- Online resources: Students are welcome to use online resources to help them complete assignments. A list of commonly-used resources is included on page 8. However, "resources" does not include specific solutions to assigned problems, whether found online or elsewhere. Submitting solutions which you have not yourself obtained is fraud.
- Text recognition software: Students agree that by taking this course any written assignment may be submitted for textual similarity review to Turnitin for the detection of plagiarism. Any assignment submitted will be included as source documents in the Turnitin reference database solely for the purpose of detecting plagiarism of such papers. If requested in advance, identifiers (student name, ID#, etc.) can be removed from the assignment before it is uploaded into Turnitin. Use of Turnitin page service is subject to the Usage Policy and Privacy Pledge posted on the Turnitin site.

Students who violate WCU rules of academic integrity will receive a failing grade (F) in the course and an Academic Integrity Violation Report. These actions will adversely affect your academic career and could result in expulsion from the University.

Additional resources

- Physics tutoring: Physics tutoring is available through the Learning Assistance & Resource Center. 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.

- Alternate texts:

  - *OpenStax College: College Physics*, an open source, algebra-based physics textbook from OpenStax. Free and available for download at https://openstax.org/details/books/college-physics.
  - *College Physics*, by Etkina et. al. This modern, algebra-based physics textbook is full of problem-solving strategies and approaches for conceptual understanding. I believe this is the best text for the typical WCU student and I highly recommend it.
  - *Conceptual Physics*, by Hewitt. In my opinion this is the best "conceptual physics" textbook.
  - *Physics: A Conceptual World View*, by Kirkpatrick and Francis. This textbook is used in some of the other PHY100 sections.

- Online references: You may also wish to consider researching course material on:

  - Wikipedia
  - HyperPhysics
  - Wolfram MathWorld
  - Youtube videos. Khan Academy is a student favorite.

  If you find yourself studying without your calculator, note that between google and Wolfram Alpha you can perform essentially any computation you need to complete your homework.

Intellectual property

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.

Course schedule

Attached to this syllabus is a tentative schedule of course activities. The precise course trajectory may be altered to better meet our needs as well as to accommodate unforeseen circumstances. I will maintain an up-to-date course schedule on D2L.

UNIVERSITY STATEMENTS

Updated: June 2016

The following required statements are common to undergraduate course syllabi. Further information regarding university-wide academic policies may be found in the WCU Undergraduate Catalog as well as your respective major department handbook.

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 Physics Department Undergraduate Handbook, the WCU Undergraduate Catalog, the Ram's Eye View, and the University website at www.wcupa.edu.

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 Office of Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. The OSSD hours of Operation are Monday – Friday, 8:30 a.m. – 4:30 p.m. 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.

Excused absences policy for University-sanctioned events

Students are advised to carefully read and comply with the excused absences policy 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 meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator, Ms. Lynn Klingensmith. 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 the webpage for the Office of Social Equity at http://www.wcupa.edu/_admin/social.equity/.

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.

Course Schedule

Updated: January 19, 2017

This schedule is a living document; the most recent version is available on the course D2L site.

#	Date	Day	Topic	Reading
1	01/23	M	Course intro; what is physics?	1.1
2	01/25	W	Physical quantities	Syllabus, 1.2,
3	01/27	F	Graphs	1.4
4	01/30	M	More graphs; course blog	–
5	02/01	W	Coordinates, position, motion diagrams	2.1, 2.2
–	02/03	F	**QUIZ: QUANTITIES & GRAPHS**	–
6	02/06	M	Velocity & speed	2.3, 2.4
7	02/08	W	Acceleration	3.1
8	02/10	F	Graphical integration	Suppl.
9	02/13	M	Motion with constant acceleration	3.2
10	02/15	W	Free-fall	3.3
11	02/17	F	**BP:** Physics and prediction; **QUIZ**	–
12	02/20	M	Inertia & equilibrium	4.1
13	02/22	W	Newton's 1st & 2nd	4.1
–	02/24	F	**EXAM 1: KINEMATICS**	–
14	02/27	M	Gravity	4.2
15	03/01	W	Normal force; Newton's 3rd	4.3
16	03/03	F	Tension; drag force	4.3
17	03/06	M	**BP:** Fundamental forces	–
–	03/08	W	Review for exam	–
–	03/10	F	**EXAM 2: FORCES**	–
–	03/13	M	SPRING BREAK	–
–	03/15	W	SPRING BREAK	–
–	03/17	F	SPRING BREAK	–
18	03/20	M	Work & kinetic energy	10.1
19	03/22	W	Machines	10.2
20	03/24	F	Gravitational potential energy; conservation	11.1, 11.2
21	02/27	M	Other forms of energy	11.1, 11.2
22	03/29	W	Linear momentum, impulse	9.1
23	03/31	F	Conservation of momentum; rockets; **QUIZ**	9.2
24	04/03	M	Collisions	9.2
25	04/05	W	**BP:** The physics of symmetry	–
26	04/07	F	Postulates of special relativity	Suppl.
–	04/10	M	**EXAM 3: MOMENTUM & ENERGY**	–
27	04/12	W	Time dilation	Suppl.
28	04/14	F	Length contraction	Suppl.

#	Date	Day	Topic	Reading
29	04/17	M	Invariant interval	Suppl.
30	04/19	W	Spacetime diagrams	Suppl.
31	04/21	F	Simultaneity & causality; **QUIZ**	Suppl.
32	04/24	M	Paradoxes	Suppl.
33	04/26	W	Addition of velocities	Suppl.
34	04/28	F	Relativistic energy & momentum	Suppl.
35	05/01	M	**BP:** The physics of spacetime	–
–	05/03	W	Review for exam	–
–	05/05	F	**EXAM 4: RELATIVITY**	–
–	05/12	F	**FINAL EXAM**	–

Assignment schedule

Assignments are submitted on D2L and are due **Sundays and Thursdays at 11:30 pm**.

HW #	Due Date	Day	Lecture	Details
0	01/26	R	1	Submit file to dropbox
1	01/29	S	2	Quiz
2	02/02	R	3	Quiz
3	02/05	S	5	Quiz
4	02/09	R	6	Quiz
5	02/12	S	7,8	Quiz
6	02/16	R	9	Quiz
7	02/19	S	10	Quiz