Phys 221

Introductory Physics I

MWF, 12:40pm, Collins 318

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Collins 311
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This syllabus is subject to change or adaptation as the semester progresses.

Course Description: The intent of this course is to introduce the concepts of basic mechanics, including those of momentum, force and energy, to undergraduate students. The basics of thermodynamics and some atomic level physics will also be covered near the end of the semester. Particular emphasis will be placed on learning strong problem solving skills applicable both outside and inside the physics classroom.

Prerequisite(s): Math 140 or Math 151 and 152 (or taking concurrently)
Note: A minimum grade of C- is required for this course to count toward university credit.
Credits: 1.0

Text: *Matter & Interactions*, 4$^{\text{th}}$ Edition
Author: Chabay and Sherwood
ISBN-13: Hardcover: 9781118875865
E-Text: 9781119029083

Course Objectives:
Over the semester, students will gain a working knowledge in:

1. The Momentum Principle
2. Fundamental interactions and forces
3. Conservation laws
4. Basic thermodynamics

Moreover, physics is a field that requires intense problem solving. By the end of the semester students will have honed and practiced various methods of problem solving that can be applicable to their own fields of interest and study.

Grade Distribution:

Attendance	5%
Labs	15%
Written Homework	15%
Video Homework	10%
Test 1	10%
Test 2	10%
Test 3	10%
Final Exam	25%

Letter Grade Distribution:

>= 92.00	A	72.00 - 77.99	C
90.00 - 91.99	A-	70.00 - 71.99	C-
88.00 - 89.99	B+	68.00 - 69.99	D+
82.00 - 87.99	B	62.00 - 67.99	D
80.00 - 81.99	B-	60.00 - 61.99	D-
78.00 - 79.99	C+	<= 59.99	F

Student Learning Objectives (SLO):

- To have a broad theoretical and experimental understanding of kinematics and dynamics. Demonstrated through correct written homework, completion of labs, and passing the midterms and final exam.
- To be able to setup problems symbolically, correctly using an appropriate problem solving strategy with necessary mathematical methods to solve physical problems, and to communicate and interpret those solutions visually, numerically, and verbally. Demonstrated though lecture participation, homework, and lab participation.
- To understand and be able to model a situation computationally using basic principles and fundamental interactions. Demonstrated through computational homework and lab participation.
- To understand how to utilize and operate basic laboratory equipment and software to collect, analyze, interpret and present experimental data. Demonstrated though participation and completion of labs.

Course Assessment:

- **Homework**
  - Online: Online homework will be assigned on Monday and Wednesday after class and will be due Wednesday or Friday night at midnight (respectively). Each assignment will be approximately 1 problem broken up into sub-parts exploring a key concept discussed in class that day. Online homework will operate through WebWorK, and you will not be penalized for incorrect answers. The goal is for you to work your way through to the end and come and request help if you need it!
  - Video: Each Friday you will be assigned a problem objective, similar to the problem objectives that will accompany each online homework problem. In this case, however, *you* are responsible for creating and solving a problem that conveys your understanding and mastery of the objective. You will present your problem and solution in a short (<4 min) video which will be due Monday at midnight. Nothing fancy is needed; your video might just be an image of the worked problem with you talking about it. The underlying idea is that nothing showcases a mastery (or lack) of understanding (both to me and yourself) than when you have to physically explain something.

This is also your chance to show some creativity or explore types of problems that you may find more interesting or engaging. Anything is valid, so long as you can convey a mastery of the objective.

- **Labs**
  - Labs will take place weekly during your assigned time. If circumstances arise and you have to miss a lab session, please contact both your lab instructor *and* myself so that we can attempt to work you into a different lab section for that week. If you miss it, there *is* a lab section near the end of the semester when a missed lab can be made up, but that is it. Attendance in labs is **mandatory** for you to receive points for that lab. *Missing more than 4 labs will result in immediately failing the course.*
- **Tests**
  - There will be three tests spaced throughout the semester in addition to the final. Tests will take place during lecture hours, and will thus be limited to 1 hour. Calculators are encouraged, however cell phones or any other Internet capable devices are prohibited. Basic trig calculators will do everything you need for this course and are only a few dollars should you need one for test days (I also have a small supply you could borrow from). All tests will be closed book, however you will be allowed a single sided, hand-written 3×5 inch index card upon which you can write whatever you might find helpful. The preparation of this note card can serve as an excellent review and study-aid for the test. Physics is not generally a memory demanding discipline, but having the basics in your head will greatly help you approach problems with speed and precision. The note card should provide you with enough of a fall back to not memorize everything while still encouraging you to memorize the vitals. All needed constants will be provided for you on tests. *While I'll ask you to turn note cards in with your tests, I will return them. Keep your old note cards, as you will be able to use them on the final!*
- **Attendance**
  - Attendance to lectures will be graded. Questions will be asked in class and students will respond via polling technology. Simply responding to each question will earn your attendance points for the day, but answering correctly will earn you some extra credit. Over the course of the semester, that extra credit can really add up, so show up!

Course Policies:

Late Work Policy

I understand that sometimes things come up and you are unable to get an assignment in on time, and I strive to be incredibly flexible and accepting of late work. However, there also comes a point when you get too far behind to realistically keep up with the class. In an effort to compromise between the two, my late policy is as follows. For the online homework, after the due date you will still have a week to complete the assignment for 80% credit, after which you receive a zero. For the video homework, you are alloted 7 cumulative days of late work throughout the entire semester. So you can turn 7 assignments in one day late, 1 assignment in a week late, etc. without penalty. Once you have used up your 7 days, any further late video assignments will immediately be worth only 50% of their total possible points.

Incomplete Policy

An incomplete grade will only be granted in the case of prolonged illness or family emergencies that remove the student from the campus for an extended time period during the semester. Under no situations will an incomplete be granted due to a student falling behind through lack of motivation, understanding, or time management skills. If you are concerned about your progress and how you are

doing in the class, please come visit me! We can sort out where you are struggling and work out a plan to get you back on track.

Tutoring Hours

The physics department employs several exceptional upper-class physics majors to serve as group tutors. Tutoring is available in the physics hearth from 7–9pm from Sunday through Thursday. We also have an embedded tutor in the class this semester, who can also be an excellent source for you to ask questions of! If you are getting stuck and need a push in the right direction, or if you just need to hear something explained in a different manner, stop by and talk to them!

Willamette Policies:

Academic Honesty

Cheating is defined as any form of intellectual dishonesty or misrepresentation of one's knowledge. Plagiarism, a form of cheating, consists of intentionally or unintentionally representing someone else's work as one's own. Integrity is of prime importance in a college setting, and thus cheating, plagiarism, theft, or assisting another to perform any of the previously listed acts is strictly prohibited. An instructor may imposed penalties for plagiarism or cheating ranging from a grade reduction on an assignment or exam to failing the course. An instructor can also involve the Office of the Dean of the College of Liberal Arts for further action. For further information, visit: https://willamette.edu/cla/catalog/resources/policies/plagiarism_cheating.php.

Time Commitments

Willamette's Credit Hour Policy holds that for every hour of class time there is an expectation of 2-3 hours work outside of class. Thus, for a class meeting three days a week you should anticipate spending 6-9 hours outside of class engaged in course-related activities. Examples include study time, reading and homework, assignments, research projects, and group work.

Diversity and Disability Willamette University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. My goal is to create a learning environment that is usable, equitable, inclusive and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, please notify me as soon as possible. Students with disabilities are also encouraged to contact the Accessible Education Services office in Matthews 103 at 503-370-6737 or Accessible-info@willamette.edu to discuss a range of options toemoving barriers in the course including accommodation.

Tentative Course Outline:

The weekly coverage might change as it depends on the progress of the class. However, I highly recommend you follow along with the reading, as it makes a large difference!

Week	Date	Chapter	Description	Lab
	Mon, Aug 30	Ch 1	Interactions and Motion	
1	Wed, Sep 01	Ch 1	Interactions and Motion	
	Thu, Sep 02			Pre-Test & Intro to Python
	Fri, Sep 03	Ch 2	The Momentum Principle	
	Mon, Sep 06		*Labor Day*	
2	Wed, Sep 08	Ch 2	The Momentum Principle	
	Thu, Sep 09			Intro to Python continued
	Fri, Sep 10	Ch 2	The Momentum Principle	
	Mon, Sep 13	Ch 3	The Fundamental Interactions	
3	Wed, Sep 15	Ch 3	The Fundamental Interactions	
	Thu, Sep 16			Intro to Glowscript Visualization
	Fri, Sep 17		**Test 1 (Ch 1-2)**	
	Mon, Sep 20	Ch 3	The Fundamental Interactions	
4	Wed, Sep 22	Ch 4	Contact Interactions	
	Thu, Sep 23			Simulating Free Fall
	Fri, Sep 24	Ch 4	Contact Interactions	
	Mon, Sep 27	Ch 4	Contact Interactions	
5	Wed, Sep 29	Ch 5	Determining Forces from Motion	
	Thu, Sep 30			Experimenting with Free Fall
	Fri, Oct 01	Ch 5	Determining Forces from Motion	
	Mon, Oct 04	Ch 5	Determining Forces from Motion	
6	Wed, Oct 06	Ch 5	Determining Forces from Motion	
	Thu, Oct 07			Space Voyage 1
	Fri, Oct 08	Ch 5	Determining Forces from Motion	
	Mon, Oct 11	Ch 6	The Energy Principle	
7	Wed, Oct 13		**Test 2 (Ch 3-5)**	
	Thu, Oct 14			Space Voyage 2
	Fri, Oct 15		*Mid-Semester Day*	
	Mon, Oct 18	Ch 6	The Energy Principle	
8	Wed, Oct 20	Ch 6	The Energy Principle	
	Thu, Oct 21			Free Week / Make up labs
	Fri, Oct 22	Ch 6	The Energy Principle	
	Mon, Oct 25	Ch 7	Internal Energy	
9	Wed, Oct 27	Ch 7	Internal Energy	
	Thu, Oct 28			Carts and Darts
	Fri, Oct 29	Ch 8	Energy Quantization	
	Mon, Nov 01	Ch 8	Energy Quantization	
10	Wed, Nov 03	Ch 9	Trans, Rot, and Vibrational Energy	
	Thu, Nov 04			Carts and Darts
	Fri, Nov 05	Ch 9	Trans, Rot, and Vibrational Energy	
	Mon, Nov 08	Ch 9	Trans, Rot, and Vibrational Energy	
11	Wed, Nov 10	Ch 10	Collisions	
	Thu, Nov 11			Pendulum Lab (Part 1)
	Fri, Nov 12		**Test 3 (Ch 6-9)**	
	Mon, Nov 15	Ch 11	Angular Momentum	
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Week	Date	Chapter	Description	Lab
	Wed, Nov 17	Ch 11	Angular Momentum	
	Thu, Nov 18			Pendulum Lab (Part 2)
	Fri, Nov 19	Ch 11	Angular Momentum	
	Mon, Nov 22		*Fall Break*	
13	Wed, Nov 24		*Fall Break*	
	Fri, Nov 26		*Fall Break*	
	Mon, Nov 29	Ch 11	Angular Momentum	
14	Wed, Dec 01	Ch 12	Entropy: Limits on the Possible	
	Thu, Dec 02			Pendulum Lab (Part 3)
	Fri, Dec 03	Ch 12	Entropy: Limits on the Possible	
	Mon, Dec 06	Ch 12	Entropy: Limits on the Possible	
15	Wed, Dec 08	Ch 12	Entropy: Limits on the Possible	
	Thu, Dec 09			Post-Test
	Fri, Dec 10		Semester Review	
	Fri, Dec 17		**Final**	