Foundations of Physics

PHYS 251 - Fall 2008

http://physics.uoregon.edu/~torrence/251/
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Home | Syllabus | Homework | Exams | Blackboard

Course announcements go here

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Lecture  MTWF 10:00-10:50 Willamette 110
Labs  Phys 290 recommended

Textbook  Physics for Scientists & Engineers with Modern Physics, 4/E, Giancoli

Pre/Co-req  Math 251 or equivalent

Overview

Fall term will be concerned primarily with classical (Newtonian) mechanics, the basis for all modern physics. The following topics will be covered:

- Kinematic motion in 1D and 2D
- Newton's Laws
- Conservation of Momentum
- Conservation of Energy
- Rotational Motion

This corresponds to Chapters 1-12 of the text, although it is unlikely that we will complete every single section of these chapters in Fall. I have specified the version of Giancoli with Modern Physics as it is only a few dollars more than the version without. Either version will work fine for the entire year, as the added chapters come at the very end. If you only intend to take the fall quarter, you can also get away with the Volume I version which only covers the first 20 chapters. Older 3rd edition copies will also potentially work, except that you will need to be careful to get the correct homework assignments from the 4th edition book.

Physics is "simple". There are two important goals for this course:
• Learning the fundamental concepts underlying physics. There are really only a few concepts which physics, and hence the physical universe, is built upon. We will emphasize learning these well.

• Physics is inherently quantitative: We can determine exact and precise answers to specific questions, and test these answers. Learning how to arrive at quantitative answers is important in physics. This is where two skills are required: mathematical skills and problem-solving skills. For this, practice makes perfect (or close enough) -- this is the primary role of the homework.

Students need to be co-enrolled in Calculus (Math 251), or to have taken Math 251 or equivalent previously. We will actually need to use some elements from calculus before you see them in the Math series (if you are co-enrolled). Don't worry... we will take time to try to explain it as needed. Many students find that the application of Calculus to physical problems makes the math part make much more sense. Calculus was invented, after all, specifically to solve these sorts of mechanics problems.

Many students have more trouble with trigonometry and vectors than with calculus. We will also try to review the necessary math background here, but if you know you are a bit weak on vectors you may want to try to read through the first few sections of chapter 3 before we get to it in class.

Grading

Course grades will be based on weekly homework assignments (40%), two midterm exams (15% each), and a final exam (30%).

Syllabus

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>HW Assignment</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Ch. 1: Units, dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/29-10/3</td>
<td>Ch. 2: Kinematics in 1D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td>Ch. 2: Kinematics in 1D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/6-10/10</td>
<td>Ch. 3: Kinematics in 2D, Vectors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 3</td>
<td>Ch. 4: Newton's Laws</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/13-10/17</td>
<td>First Midterm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 5</td>
<td>Ch. 5: Friction</td>
<td></td>
<td></td>
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<tr>
<td>10/20-10/24</td>
<td>Ch. 5: Circular Motion</td>
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<tr>
<td>Week 6</td>
<td>Ch. 7: Work and Energy</td>
<td></td>
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<tr>
<td>11/3-11/7</td>
<td>Ch. 8: Cons. of Energy</td>
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<td></td>
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<tr>
<td>Week 7</td>
<td>Ch. 8: Energy and Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/10-11/14</td>
<td>Ch. 9: Momentum in 1D</td>
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<td></td>
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</tbody>
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Week 8
11/17-11/21 Ch. 9: Momentum in 2D  Second Midterm

Week 9
11/24-11/28 Ch. 10: Rotational Motion  No Class Friday

Week 10
12/1-12/5 Ch. 11: Angular Momentum

Finals
12/8- 12/12 Final Exam Monday Dec. 8th, 10:15-12:15

This syllabus is tentative, and is subject to change as the quarter progresses. Midterm exams are targeted for the weeks indicated, but the specific date will be announced no less than eight days before the exam. Practice exams and solutions will be provided in the week before each midterm.

Homework

One of the key goals of this course is to become proficient in solving physics problems. Homework problems are your primary tool for practicing this skill. Homework will be assigned from the text and will be due as posted above. Typically, assignments will be posted on Tuesday and due on the following Monday at the end of the day (5PM). To receive full credit you must show your work!

Homework should be turned in to the slot in the PHYS 251 (Torrence) box in the basement of Willamette Hall (just down the stairs out the back of our classroom). Graded assignments will be returned in the same box sorted by last name.

I will post solutions and potentially discuss selected problems on Wednesday after the assignments are due. Late homework will be accepted, but will automatically carry the following penalties.

- Before 5PM on day due: No penalty
- Before 10AM on next day: -20%
- Before 5PM on next day: -40%
- Later than that: -60%

Turning in your homework more than one day late is possible, but 60% of the assignment value will be deducted right off the top. If your answers are clearly copied from the solutions, no credit will be given. Turning in late homework is better than nothing, and practicing the problems will undoubtedly help you on the exams, but staying on top of the assignments and getting your work done on time is a key to achieving a good grade in this course.

You are encouraged to find help on your homework, including from other students, your TAs, the physics department drop-in help center, and the instructor during office hours. The physics reading room in the atrium of Willamette hall is available for students
wishing to work together. Each student must turn in their own homework assignment. Grades will be posted to Blackboard as soon as they are ready. Please check your Blackboard account regularly and report any discrepancies or possible errors as soon as possible.

HW Solutions

- [Homework 1 Solutions](#)

Exams

There will be two in-class midterm exams and one final exam. These are the primary means of assessing whether you have achieved the course goals. Exam problems will be similar to homework problems, in that you must solve quantitative problems on the physics topics addressed. All exams will be closed book, although you may bring one handwritten, single-sided, notebook-sized sheet of notes if you wish. Calculators may be used, although no stored equations or electronic dictionaries are permitted. Scientific calculators will be provided on request.

The exact exam dates will be set no later than 8 days before the exam, and a practice exam will be made available in the week before the exam is to occur. If a higher percentage score is achieved on the final than either of the midterms, the lowest midterm score will be dropped (and replaced with the score on the final). This gives you a chance to redeem yourself if you really screw up a midterm.