PHYS 251 (CRN 14362): Foundations of Physics I, Fall 2008

Syllabus

Instructor
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Office hours Tue 1-2, F 12-1 (or by email appointment, or just drop by)

with the help of:
Rick Fok (rfok@uoregon.edu) and Wei Gong (wgong@uoregon.edu) who will assist with grading, office hours, and homework help.

Please check Staff Information on Blackboard for up-to-date contact information and office hours.

Course Description
Phys 251 is the first part of the two-year series PHYS 251-2, 351-2, designed to provide an overview over common principles of classical and modern physics.

This 11 am section of PHYS 251 requires preparation in calculus. This section is also designed to offer you a diversified set of assignment options that can be tailored to individual learning styles, and to encourage you to assume responsibility for your learning.

Objectives
• To learn fundamental concepts of classical physics.
• To develop qualitative thinking skills and problem solving skills that can be applied in a variety of fields.
• To develop learning skills.

Content
• Newton's Laws: how to describe and predict translational and rotational motion.
• Concepts of force, momentum, and mechanical energy.

Pre-requisites
Calculus: MATH 251 or equivalen. MATH 252 is a co-requisite.

Textbook
Resnick, Halliday and Krane (HRK), PHYSICS, Volume I, 5th Edition (2002), Wiley (also on reserve in the Science library and in the Physics Reading Room in the Willamette Atrium)
or
Giancoli, Physics for Scientists & Engineers with Modern Physics, 4/E.

HRK treats some topics a little more rigorously than Giancoli. Some students find Giancoli a little more pedagogical. In Winter term you may be required to use Giancoli.

Additional/alternative reading (optional)
"Understanding Physics " by Cummings (Wiley) is strongly based on our book (Resnick/Halliday/Krane), with lots of additional, interesting examples. If you want, you can use that book instead of HRK Let me know.
"The Feynman Lectures on Physics" (Addison Wesley) are a classic that looks at much of the material from an entirely different point of view. It makes for great additional reading for the seriously intrigued. Its possible to read individual chapters.
"Introducing Newton" by William Rankin (Totem Books) is of the cartoon type and a great introduction to Newton's Laws and their historical context. You can read it anytime, and its fun (actually!).

**Mathematical tables**

In PHYS 251 you most likely will not need any mathematical equations that are not listed in the textbook (check out the textbook's appendices!). However, in the future, as you continue your studies in physics, you will find it increasingly useful to be able to look up integrals, basic mathematical rules, etc. If you want to acquire such a reference already now, many students use the following: "Mathematical Handbook of Formulas and Tables" by Spiegel and Liu, Schaum's Outlines Series

**Course format**

*Mondays, Wednesdays and Fridays (11 – 11:50, WIL 110)* will be used to move forward with course content. You are expected to read the textbook before coming to class (see below for details on reading assignments and reading quizzes). All material assigned in the textbook is required course content, whether we discuss it in class or not. *Tuesday sessions (11 – 11:50, WIL 110)* will be used for a variety of learning activities including the discussion of assignments, group work, problem-solving sessions, and possibly a research lecture.

**Grading**

Reading quizzes, Homework, Midterm, and Extra Assignments together 60% or more  
Final exam 40% or less

Reading quizzes, Homework, Midterm and other assignments together are worth nominally 60%. Points earned in any and all of these activities count towards the total. You need 600 points to achieve the full 60% in this category, but through extra credit you can earn substantially more than that.

If you earn less than 600 points, say 480, then the best possible final grade you can achieve (assuming a perfect score in the final exam) will be 48% + 40% = 88%.

However, if you earn more than 600 points, say 680, then you have a perfect score on 68% of the course, and the value of the final exam will be reduced from 40% to [(40 - (68-60))/40] = 32%. If you get 80% on the final exam, your grade will be (0.68*100% + 0.32*80%) = 94%.

**Available points (approximate numbers, subject to small changes)**

- Reading quizzes (about 25 quizzes, 3 - 7 points per quiz) ca. 120
- Core homework (10 weekly assignments for usually 30 - 40 points each) ca. 350
- Midterm 1 ca. 80
- Midterm 2 ca. 60
- Extra homework problems (ca. 10 - 20 points per weekly assignment) ca. 150
- Learning Logs ca. 80
- Extra Assignments, Bonus Points up to ca. 75
- TOTAL POSSIBLE a lot more than 600

**Grading scheme** (I will possibly be more generous, but will not grade harder than shown.)

<table>
<thead>
<tr>
<th>97% or more</th>
<th>A+</th>
<th>75 - 79%</th>
<th>C+</th>
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<tbody>
<tr>
<td>93 - 96%</td>
<td>A</td>
<td>65 - 74%</td>
<td>C</td>
</tr>
<tr>
<td>90 - 92%</td>
<td>A-</td>
<td>60 - 64%</td>
<td>C-</td>
</tr>
<tr>
<td>87 - 89%</td>
<td>B+</td>
<td>50 - 59%</td>
<td>D</td>
</tr>
<tr>
<td>83 - 86%</td>
<td>B</td>
<td>&lt; 50%</td>
<td>Fail</td>
</tr>
<tr>
<td>80 - 82%</td>
<td>B-</td>
<td></td>
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How do I decide which assignments to complete?
The grading scheme is designed to give you freedom in managing your time, and to allow you to engage in those learning activities that you find most effective.

Early in the term you may feel uncertain what activities to prioritize. In this case I recommend to focus on the "core assignments": reading quizzes, core homework and the midterms. Together, these activities allow you to achieve a perfect grade.

As you become more confident, you should make up your own, customized plan, emphasizing activities that you find more useful than others. For instance, if you find reading quizzes useless (actually most students end up finding them quite useful) you may decide to do an extra project and regularly do some extra homework instead. To assist with this process I recommend to do Learning Logs 1 and 2.

Reading assignments and reading quizzes
Reading assignments will be announced on Blackboard in the Assignment Folder. You are expected to work through the reading before coming to class, and to review your notes and the text after class.

For each assignment, a short on-line quiz will be available on Blackboard for about two days until shortly before class begins (until 10:45 am).

NOTE: In rare cases a browser problem may prevent you from submitting your quiz. To be sure that your score was counted, please wait for the confirmation after submission. You can also confirm your grade online using Blackboard. If there is any problem, please send me an email immediately (linke@uoregon.edu) and check your email before coming to class. Usually I can clear your attempt online, and you can retake the quiz without problems, before class.

Homework
Homework problems will be assigned weekly on Fridays, either on Blackboard or through a handout in class. Each homework will contain a number of "core problems" which will add up to approximately 350 points over the course of the term, plus "extra problems" for additional points. The only reason for distinguishing "core" and "extra" points is to give you a guideline for how much homework you should do if you prefer to follow a more traditional grading scheme (see "How do I decide which assignments to complete?").

- Homework is due in the week after it was assigned, tentatively on Fridays at 4 pm.
- Please submit your homework in class or into the box outside WIL373.
- You are strongly encouraged to collaborate on homework, and to seek help from the instructor or TA as needed, but each student must submit her own work.
- Outside office hours, rather than emailing questions, please post questions on the Discussion Board on Blackboard. Please feel free to answer your peers' questions.
- Solutions will be posted on Blackboard, and graded homework will be returned in class, usually on Wednesdays.
- Late homework must be submitted in person to one of the TAs, or in one of their mailbox inside the "Binney Lounge", WIL 215. Late homework will automatically lose 20% of the points unless very compelling reasons are stated to the instructor (Heiner Linke) BEFORE the deadline. Extra homework problems cannot be submitted late. Problems submitted after solutions are posted will not be graded.

Extra Assignments
You can earn extra points through activities that engage you in thinking about the course material.

During the course of the quarter I will suggest a few such assignments. You may also propose assignments yourself, such as:

- a written report on a topic of your choice (an experiment you carry out, a computer simulation, a special topic report, a reading report,...).
- an oral presentation of a special topic of your choice in one of the Thursday sessions.
• an extra problem worked out in extra detail.

If you think you may want to do an extra assignment, start thinking about it early and be sure to stay in close contact with me, and discuss the topic with me. I will require that the assignment stands in direct relation to course material. You must work with me to set your own, firm deadlines, and submit early versions of your work for feedback. The point score will take into account improvement on early versions, and the quality of the presentation (clarity, form, grammatical correctness, etc.).

Expectations for extra assignments are high. There must not be the shadow of a doubt that you deserve at least 50% of the points for a specific assignment, or it will not be counted towards your grade. If in doubt about expectations, be sure to communicate with the instructor.

**Bonus points**

Small amounts of bonus points will be made available at the discretion of the instructor.

**Learning log**

One of the course objectives is to make yourself aware of and improve your learning skills. To assist in this process, optional “Learning Log” assignments will be announced in the Learning Log folder inside the Assignment folder on Blackboard.

**NOTE:** I expect thoughtful work. For a particular Learning Log assignment to count towards your grade, you must earn at least 50% of the possible points for that assignment. I will not hesitate to assign zero points to work that I perceive as rushed or sloppy.

**Tests and exams**

Midterm and Final will use a mixture of multiple choice questions, conceptual "short answer" questions, and problems similar to homework problems:

**Midterm, Part 1:** Friday, Oct. 24, 11:00 - 11:50 (WIL 110): HRK Chapters 1-5

**Midterm, Part 2:** Tuesday, Oct. 28, 11:00 - 11:50 (WIL 110): HRK Chapters 1-5

**Final:** Thursday, December 11th, 10:15 - 12:15, WIL 110; HRK Chapters 1-14

No make-up exams will be given. In case of an unavoidable absence from one of the midterms, contact the instructor prior to the exam. If you fall ill with short notice you must obtain a doctor’s note.

**Web resource**

I will use Blackboard as the web resource. You should have received an email with information on how to log onto Blackboard (using your uoregon email address and password). For access and information, please go to: http://blackboard.uoregon.edu If you experience any problems, please visit the Knight or Science Library ITC for assistance.

**Attendance policy**

Attendance will not be checked or graded. If you miss class it is entirely your responsibility to obtain all information provided in class from another student. For those present in class, occasional in-class assignments can be used for bonus points.

**Late submission policy**

Deadlines for Reading Quizzes, Extra Assignments, Bonus Points, Extra Homework Problems and Learning Log entries are strict. For late homework, see Homework.

**Optional Lab Course (recommended)**

The lab course PHYS 290 (1 cr) is designed to complement the PHYS 251-2-3 course series. It is recommended to all 251 students. Physics majors should take it, and pre-meds may have to take it.
**Tentative course outline (see Blackboard for updates).**

<table>
<thead>
<tr>
<th>Week</th>
<th>Material (HRK)</th>
<th>HRK reading assignment</th>
<th>Comments</th>
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| Sep 29 – Oct 3 | 1 Units  
2 Motion in 1D  
3 Begin Newton’s Laws                                                                   | Tue 9/30: Handouts on the weight standard, Ch 1 and HRK Appendices A,B,C  
Wed 10/1 and Fri 10/3: Ch 2 and HRK Appendix H | (see Blackboard for updates and for assignments in Giancoli)                 |
| Oct. 6 - 10 | 3, 4 Force, Newton’s laws in 1D, 2D, 3D                                        | Mon 10/6: Ch. 3:1-5  
Wed 10/8: Ch 3:6-8  
Fri 10/10: Ch 4:1-4                                                               |                                                                          |
| Oct. 13 - 17 | 5, 6 Applications of Newton’s laws, momentum                                       | TBA                                                                     |                                                                          |
| Oct. 20 - 24 | 6, 7 Momentum, systems of particles                                            | TBA                                                                     | Midterm, Part 1, Fri Oct. 24th  
11-12, WIL110 (HRK Ch. 1-5)                                                |
| Oct 27 - 31 | 7, 8 Rotation Kinematics                                                       | TBA                                                                     | Midterm, Part 2, Tue Oct 28th  
11-12, WIL 110 (HRK Ch. 1-5)                                                |
| Nov 3 - 7   | 9 Rotation Dynamics                                                            | TBA                                                                    |                                                                          |
| Nov. 10 - 14| 10 Angular Momentum                                                            | TBA                                                                    |                                                                          |
| Nov. 17 - 21| 11, 12 Work, kinetic and potential energy                                      | TBA                                                                    | Thanksgiving week                                                         |
| Nov. 24 - 28| 13 Conservation of energy (14 Gravity)                                         | TBA                                                                    | Final: Thursday, Dec. 11th, 10:15-12:15 WIL 110                           |
| Dec. 1 - 5  |                                                                                | TBA                                                                    |                                                                          |

**Preview**

PHYS 252 will deal with Electricity and Electromagnetism  
PHYS 253 will tackle Waves and Oscillations.