PHYS 251H: Foundations of Physics I, Fall 2003
Syllabus

Instructor
Heiner Linke
Phone 346 4583
Email linke@uoregon.edu
Office 373A Willamette
Office hours M 2 - 3
F 11 - 12

with the help of:
Brian Stubbbs (homework grading, office hours, and homework help)
Phone 346 4722
Email bstubbs@uoregon.edu
Office 414A Willamette
Office hours U 2-3, Drop-in Help Center, WIL 147
W 3-4, WIL 414A
H 2-3, WIL 414A

Course Description
Phys 251 is the first part of the two-year series PHYS 251-2-3, 351-2-3, designed to provide an overview over the common principles of classical and modern physics.

The honors section PHYS 251H requires preparation in calculus. This section is also designed to offer you a diversified set of options that can be tailored to individual learning styles, and to encourage you to take charge of your learning process.

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: to describe and predict translational and rotational motion.
- Concepts of force, momentum, and mechanical energy.

Pre-requisites
Calculus: Math 252 or equivalent.

In order to enroll, please contact the physics undergraduate advisor for authorization:
Prof. Dean Livelybrooks, WIL 225, dlivelyb@hendrix.uoregon.edu.

Required textbook
You will need Volume II in Winter and Spring.

Additional reading (optional)
Giancoli: "Physics for Scientists and Engineers (Prentice Hall).
Serwer and Jewett: "Physics for Scientists and Engineers" (Thomson).
"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.

More fun than textbooks
"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!). The following two books are entertaining collections of high-quality, "everyday" type physics problems: "Mad about physics" by C.P. Jargodzki and F. Potter (Wiley & Sons) "The flying circus of physics" by J. Walker (Wiley & Sons) has lots of good literature references.

Mathematical tables
In PHYS 251 you most likely will not need any mathematical equations 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, the following is used by many students: "Mathematical Handbook of Formulas and Tables" by Spiegel and Liu, Schaum's Outlines Series

Course format
Mondays, Wednesdays and Fridays (10 - 10:50, Onyx 171) will be used to work on 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. Thursday sessions (10 - 10:50, Onyx 171) will be used for a variety of learning activities including the discussion of assignments, problem solving sessions, and a guest lecture or two.

Grading
This course will be graded using an absolute point scale. Points are available through a variety of assignments and exams, and grades are awarded solely based on the number of total points earned. It is your responsibility to monitor your progress (assisted by the grade book on Blackboard), and to complete enough assignments and tests to receive the grade you expect.

Points available (approximate numbers, subject to small changes)
- Reading quizzes (4 -6 points per quiz) ca. 120
- Homework (9 weekly assignments with ca. 35 - 45 points each) ca. 350
- Extra homework problems (ca. 15 - 20 points per week) ca. 150
- Extra credit assignments 30 - 50 per assignment
- Bonus points (in-class and others) up to ca. 50
- Learning log entries ca. 50
- Midterm I 150
- Midterm II 150
- Final exam 150
- Total possible > 1200

Grading scheme
The below table shows the grade I guarantee you if you earn a given number of points. I will possibly be more generous, but will not grade harder than shown.

<table>
<thead>
<tr>
<th>Points</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>970 or more</td>
<td>A+</td>
</tr>
<tr>
<td>931 - 969</td>
<td>A</td>
</tr>
<tr>
<td>902 - 930</td>
<td>A-</td>
</tr>
<tr>
<td>873 - 901</td>
<td>B+</td>
</tr>
<tr>
<td>843 - 872</td>
<td>B</td>
</tr>
<tr>
<td>805 - 842</td>
<td>B-</td>
</tr>
<tr>
<td>717 - 804</td>
<td>C+</td>
</tr>
<tr>
<td>640 - 716</td>
<td>C</td>
</tr>
<tr>
<td>582 - 639</td>
<td>C-</td>
</tr>
<tr>
<td>485 - 581</td>
<td>D</td>
</tr>
<tr>
<td>less than 485</td>
<td>Fail</td>
</tr>
</tbody>
</table>
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 the learning activities you find most effective. In the beginning of term, until you have gained a better feeling for what the different assignments really encompass, you may feel uncertain what activities to prioritize. In that case, you may focus on the following activities, which together correspond to a more traditional grading scheme:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading quizzes</td>
<td>ca. 120</td>
</tr>
<tr>
<td>Homework</td>
<td>ca. 350</td>
</tr>
<tr>
<td>Bonus points, learning log entries, or an extra assignment</td>
<td>50</td>
</tr>
<tr>
<td>Midterm I</td>
<td>150</td>
</tr>
<tr>
<td>Midterm II</td>
<td>150</td>
</tr>
<tr>
<td>Final exam</td>
<td>150</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>ca. 970</td>
</tr>
</tbody>
</table>

As you can see, you can earn an A or B by scoring 80% of these points or more. However, be sure to allow for the fact that it is unlikely that you will score highly on all the activities you attempt.

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 at least two days until it is due at 8:00 am on the day of class. In the two hours between submission and class, the instructor can evaluate what needs to be clarified.

**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 immediately send me an email (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 the Blackboard web page. 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 Thursdays, 5 pm.**
- Submit your homework in class or into the box outside WIL.
- You are strongly encouraged to collaborate on homework, and to seek help from the instructor or TA (every day of the week, one of us has office hours), 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 peer's questions (the instructor will also do so).
- 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 the TA (Brian Stubbs), or in his 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.
- a very well-worked out extra problem.

Be sure to stay in close contact with me about your plans for obtaining extra credit, and discuss the topic with me. I 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 of early versions, and the quality of the presentation (clarity, form, grammatical correctness, etc.).

**NOTE:** For a specific Extra Assignment to count, you must earn at least 50% of the possible points for that assignment.

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 you aware of and improve your learning skills. To assist in this process you are encouraged to keep a learning log for credit. Specific (optional) assignments for learning log entries will be announced in class and in the Learning Log folder inside the Assignment Folder on Blackboard.

**NOTE:** For a particular Learning Log assignment to count towards your grade, you must earn at least 50% of the possible points for that assignment.

Tests and exams

Midterms and the Final will use a mixture of multiple choice questions, conceptual "short answer" questions, and problems similar to homework problems. **Tentative dates:**

- **Midterm 1, Part 1:** Thursday, Oct. 23, 10:00 - 10:50 (Onyx 171): Chapters 1-5
- **Midterm 1, Part 2:** Friday, Oct. 31, 10:00 (Onyx 171): Chapters 1-5
- **Midterm 2:** Week 8, Day TBA, 10:00 - 10:50 (Onyx 171): Chapters 1-10 (focus: 6-10)
- **Final:** Day to be announced; Chapters 1-14

- Note that the midterm dates are tentative.
- 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.

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 Gladstone username 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, and if you miss class it is your responsibility to obtain from another student all information provided in class. 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 254-5-6 (1 cr) is designed to complement the PHYS 251-2-3 course series. For 2003-4, these courses are temporarily listed as PHYS 390. A small fraction of students (such as some pre-meds) need a lab course along with their physics course, and these students should sign up for PHYS 390. For all other students, including physics majors, the lab is optional. Physics majors can elect to take PHYS 390 in their sophomore year, or in both the freshman and sophomore years.
PHYS 390 meets every second week on Mondays at 3 pm. In addition, you need to meet three times during the term to complete lab modules.
First meeting of PHYS 390 (obligatory for those who want to sign up):
Monday, September 29, 3.00 pm in WIL 17 (basement of Willamette Hall).

Tentative course outline (see Blackboard for updates).

<table>
<thead>
<tr>
<th>Week</th>
<th>Material</th>
<th>Reading assignment (see Blackboard)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep 29 - Oct 3</td>
<td>1 Units</td>
<td>Wed Oct 1: Ch 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Motion in 1D</td>
<td>Fri Oct 3: Ch 2</td>
<td></td>
</tr>
<tr>
<td>Oct. 6 - 10</td>
<td>3, 4 Force, Newton's laws in 1D, 2D, 3D</td>
<td>Mon Oct. 7: Ch. 3:1-5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wed Oct. 9: Ch 3:6-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fri Oct. 11: Ch 4:1-4</td>
<td></td>
</tr>
<tr>
<td>Oct. 13 - 17</td>
<td>4, 5 Applications of Newton's laws</td>
<td>TBA</td>
<td>Midterm 1, Part 1, Thu Oct 23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10.00 - 10:50 Onyx 171</td>
</tr>
<tr>
<td>Oct. 20 - 24</td>
<td>6, 7 Momentum, systems of particles</td>
<td>TBA</td>
<td>Midterm 1, Part 2, Fri Oct 31</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10.00 Onyx 171</td>
</tr>
<tr>
<td>Oct 27 - 31</td>
<td>7, 8 Rotation Kinematics</td>
<td>TBA</td>
<td></td>
</tr>
<tr>
<td>Nov. 3 - 7</td>
<td>9 Rotation Dynamics</td>
<td>TBA</td>
<td></td>
</tr>
<tr>
<td>Nov. 10 - 14</td>
<td>10 Angular Momentum</td>
<td>TBA</td>
<td></td>
</tr>
<tr>
<td>Nov. 17 - 21</td>
<td>11, 12 Work, kinetic and potential energy</td>
<td>TBA</td>
<td>Midterm 2, Day TBA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10.00 - 10:50 Onyx 171</td>
</tr>
<tr>
<td>Nov. 24 - 28</td>
<td>13 Conservation of energy (14 Gravity)</td>
<td>TBA</td>
<td>Thanksgiving</td>
</tr>
<tr>
<td>Dec. 1 - 5</td>
<td></td>
<td></td>
<td>Final TBA</td>
</tr>
</tbody>
</table>

Preview
PHYS 252 will be a mixture of fairly isolated topics: Special relativity, Fluids, Introduction to waves and oscillations, Introduction to topics of modern physics. (Halliday, Chapters 15-19, 20. 45 - 47, additional reading).
PHYS 253: Electricity and electromagnetism (Halliday, Chapters 25 - 38).
PHYS 351, 352, 353: Waves and oscillations, optics, interference, thermodynamics and heat engines.