PHYS 251H (CRN 16203): Foundations of Physics I, Fall 2006

Syllabus

Instructor
Heiner Linke
Phone 346 4583
Email linke@uoregon.edu
Office 373A Willamette
Office hours M 1-2, F 12-1 (or by email appointment, or just drop by)
with the help of:
Jonathan Hanni (homework grading, office hours, and homework help)
Phone 346 4770
Email jhanni@uoregon.edu
Office hours Tentatively Tue 12-1 (WIL 216); Thu 11-12 (WIL 147) plus one more Wed afternoon
(see the Staff profile on Blackboard for up-to-date info).

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 common principles of classical and modern physics.
The honors section PHYS 251H requires preparation in calculus. This section is 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 equivalent and MATH 252 as a co-requirement. In order to enroll, please contact the instructor (see above) or the physics undergraduate advisor (Prof. Dean Livelybrooks, WIL 225, d livelyb@hendrix.uoregon.edu) for authorization.

Required textbook
You may need Volume II in Winter.

Additional/alternative reading (optional)
"Understanding Physics * by Cummings (Wiley) is strongly based on our book (Resnick/Halliday/Krane), with lots of additional, interesting examples. I like it quite a bit, but unfortunately it doesn't cover Modern Physics which you will need in Winter. However, if you want, you can use that book instead of Resnick. Let me know.

Giancoli: Physics for Scientists and Engineers, Third Edition (Prentice Hall) will be used by the regular section of 251 throughout the year.
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.

"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

\[ \frac{480}{600} = 0.8 \times 100\% = 80\% \]

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 \( (40 - (68-60))\% = 32\% \). If you get 80% on the final exam, your grade will be \( (0.68\times100\% + 0.32\times80\%) = 94\% \).

Available points (approximate numbers, subject to small changes)
Reading quizzes (20 - 25 quizzes, 3 - 7 points per quiz) ca. 120
Core homework (9-10 weekly assignments for 30 - 40 points each) ca. 340
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.)

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A+</td>
<td>97% or more</td>
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<tr>
<td>A</td>
<td>93% - 96%</td>
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<tr>
<td>A-</td>
<td>90% - 92%</td>
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<tr>
<td>B+</td>
<td>87% - 89%</td>
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<td>B</td>
<td>83% - 86%</td>
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<td>75% - 79%</td>
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<td>C-</td>
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<td>D</td>
<td>65% - 69%</td>
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<tr>
<td>Fail</td>
<td>&lt; 50%</td>
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</table>
Extra assignments posted will not be graded. Homework problems cannot be submitted late. Problems submitted after solutions are due will receive no credit.

Homework problems are graded 100% of the points. Solutions must be submitted in person or electronically.

Extra assignments will be posted online before the due date. Solutions will be due at the beginning of class on the due date.

Late homework will not be accepted. Homework must be submitted in person or electronically.

Office hours: Monday, Wednesday, and Friday from 3:00 PM to 4:00 PM. You can also schedule an appointment to discuss homework problems.

Office hours are designed to provide help with homework problems. If you have a question about a homework problem, please come to my office hours. I will be available to answer your questions.

Homework is graded 100% of the points. Each homework problem will be graded on a scale of 0 to 100 points. A minimum of 90 points is required to pass the class. The instructor will determine the final grade for each student based on the homework, quizzes, and exams.

Homework will be graded on a scale of 0 to 100 points. Each homework problem will be graded on a scale of 0 to 100 points. The instructor will determine the final grade for each student based on the homework, quizzes, and exams.

How do I decide which assignments to complete?

If you are unsure of how to approach a problem, you can ask for help. I will be available to answer your questions during my office hours. You can also schedule an appointment to discuss homework problems.

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Optional lab course (recommended)

Learning objectives, see Syllabus. For late homework, see Homework.

Deadlines for Reading Quizzes, Extra Assignments, Extra Homework, Problems and

Late submission policy

Assignments can be used for bonus points.

All information provided in class from another student. For those present in class, accidental-in-class attendance will not be checked or graded. If you miss class it is entirely your responsibility to obtain information.

Attendance policy

Science Library ITQ for assistance.

If you experience any problems please visit the Knight of Technology/Blockboard Login your account (email address and password). For access and information.

Web Resource

The instructor prior to the exam.

No make-up exams will be given. In case of an unavoidable absence from any of the midterms, contact

Final: Tuesday, December 11th, 11:00 - 12:15, WCL 110, Chapters 1-4

Midterm, Part 2: Tuesday, Oct. 24, 11:00 - 12:00, WCL 110, Chapters 5-10

Midterm, Part 1: Friday, Oct. 20, 11:00 - 12:00, WCL 110, Chapters 1-5

and problems similar to homework problems:

Tests and exams

You must earn at least 80% of the possible points for the assignment.

NOTE: I expect thoughtful work; for a particular learning log assignment to count towards your

grades, you must earn at least 80% of the possible points for that assignment.

Extracurricular efforts that are not part of the course objectives will not be counted towards your

degree. If you have any questions, please be sure to communicate with the instructor.

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degree. If you have any questions, please be sure to communicate with the instructor.

Assignment folders on Blackboard.

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Assignments on Blackboard.

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Assignments on Blackboard.
• 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 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 you 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.

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 2: Tuesday, Oct. 24, 11:00 - 11:50 (WIL 110): Chapters 1-5
Final: Tuesday, December 5th, 10:15 - 12:15, WIL 110: 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.

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 251H 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</th>
<th>Reading assignment (see Blackboard)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep 25 - 30</td>
<td>1 Units</td>
<td>Wed 9/29: Handout on the weight standard, Ch 1 and Appendices A,B,C</td>
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<td>2 Motion in 1D</td>
<td>Fri 10/1: Ch 2 and Appendix H</td>
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<td></td>
<td>3 Begin Newton's Laws</td>
<td>Mon 10/4: Ch 3:1-5</td>
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<td>Wed 10/6: Ch 3:6-8</td>
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<td>Fri 10/8: Ch 4:1-4</td>
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<td>4, 5 Force, Newton's laws in 1D, 2D, 3D</td>
<td>TBA</td>
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<tr>
<td>Oct. 2 - 6</td>
<td>6, 7 Momentum, systems of particles</td>
<td>TBA</td>
<td>Midterm, Part 1, Fri Oct. 20th</td>
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<tr>
<td>Oct. 9 - 13</td>
<td>5, 6 Applications of Newton's laws, momentum</td>
<td>TBA</td>
<td>11-12, WIL110 (Ch. 1-5)</td>
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<td></td>
<td>TBA</td>
<td>Midterm, Part 2, Tue Oct 24th</td>
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<tr>
<td>Oct. 16 - 20</td>
<td>8 Rotation kinematics</td>
<td>TBA</td>
<td>11-12, WIL 110 (Ch. 1-5)</td>
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<td>Oct 23 - 29</td>
<td>9 Rotation Dynamics</td>
<td>TBA</td>
<td></td>
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<td>Oct 30</td>
<td>- Nov. 3</td>
<td>TBA</td>
<td>Thanksgiving week</td>
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<td>Nov. 6 - 10</td>
<td>10 Angular Momentum</td>
<td>TBA</td>
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<td>Nov. 13 - 17</td>
<td>11, 12 Work, kinetic and potential energy</td>
<td>TBA</td>
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<tr>
<td>Nov. 20 - 24</td>
<td>13 Conservation of energy (14 Gravity)</td>
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<td>Nov. 27</td>
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<td>TBA</td>
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<td>- Dec. 1</td>
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Final: Tuesday, Dec. 5th, 10:15-12:15 WIL 110

Preview

PHYS 252 will be a mixture of fairly independent topics: Special relativity, Fluids, Introduction to waves and oscillations, Introduction to topics of modern physics. (e.g. 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.