PHYSICS 1101W.100: Introductory College Physics I

Preliminary Syllabus, Spring 2009

Syllabus revisions will be posted on the 1101 syllabus web site

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Office Hours: To be determined (will post on website)

<table>
<thead>
<tr>
<th>SUMMARY</th>
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<tr>
<td><strong>Before each lecture:</strong></td>
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<tr>
<td>- Read the assigned readings which will be posted on the Physics course website at <a href="http://www.physics.umn.edu/courses">http://www.physics.umn.edu/courses</a> and announced in lecture</td>
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<tr>
<td>- Answer the “pre-flight” questions at the course WebVista site.</td>
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<td><strong>Before each lab:</strong></td>
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<td>- Read the Introduction, Objectives and Preparation sections of the write-up in the lab manual for the problems your instructor has assigned for that week.</td>
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<td>- Complete any suggested text reading that is given in the Preparation section.</td>
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<td>- Take the pre-lab quiz for that week at the course WebWista site.</td>
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<td><strong>On-going:</strong></td>
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<td>- Complete the assigned homework problems. They will be collected in by your LA and one problem will be graded.</td>
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<td>- If you have questions on homework problems, etc., you can attend Learning Assistant (LA) office hours or TA office hours.</td>
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<td>- Lab reports will be due about every 2 weeks. Your TA will assign them.</td>
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<td><strong>Quizzes and final exam:</strong></td>
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<td>- There will be 4 quizzes given in lecture: Feb. 13, March 6, April 10 and May 1.</td>
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<tr>
<td>- There will be 4 group problems as part of each quiz which will be given in discussion section on: Feb. 12, March 5, April 9 and April 30.</td>
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<td>- The final exam is on Friday May 15, 8-11am.</td>
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**TA Office hours**: Office hours held by the 1101 TAs will be included on our web page office hour link. These will be held in Tate 230. Tate 230 is the TA office hour room for all Physics TAs, and each TA, whether they are assigned to our course or other introductory courses, are available for consultation about all introductory courses. Feel free to consult any physics TA holding office hours in that room.

**LA Office hours** Office hours held by the 1101 LAs are for 1101 students only. They will be held in either Physics 130 or 479. They will be listed on the office hour link on the 1101 web page.

**Course materials**

- **Textbook** (required): *Essentials of College Physics* by Serway and Vuille, Publisher Thomson  
  (Warning: This book comes with a CD. If you plan on selling the book back to the bookstore, they require that the CD accompany it.)
- **Lab Manual** (required): College Physics Laboratory: Mechanics
- **Lab Journal** (required): Univ. of Minnesota 2077-S
- **Personal Responder**: (required) Interwrite PRS
- **Ti-30xa Calculator** or other simple scientific calculator. These are the only type of calculator that will be permitted during quizzes and the final exam. NO GRAPHING CALCULATORS ARE PERMITTED.
Supplementary (optional) course materials: *The Competent Problem Solver for Introductory Physics, by Heller and Heller.*

**Course Overview:**
Physics 1101 is the first semester of a two semester introduction to physics. The main emphasis will be on the branch of physics known as *mechanics*. This is the study of motion and the causes of motion through the applications of fundamental principles of physics. We begin with kinematics, the quantitative description of the motion of particles. We then build on kinematics to learn how and why motion occurs, through the application of Newton's laws of dynamics. Many examples will be considered as we explore the properties of specific forces and the details of the motion they bring about. The next step will be to describe physical processes in terms of energy and momentum, quantities that are always "conserved." Conservation laws allow us to solve problems in mechanics that would be very difficult by other techniques and provide a powerful approach to the analysis of physical systems in general. We then will extend our understanding of motion to the kinematics and dynamics of rotation. Finally, we will briefly study some of the physical properties of solids and fluids. By the end of this semester, you should have a deeper understanding of the phenomena occurring in your surrounding physical world. You should have a clearer picture of the behavior of the universe on the largest (cosmic) scale, and on the smallest (subnuclear) scale. You should also understand a bit more about the physics of biological systems, including your own body. In addition, you should be more competent at measurement and quantitative reasoning concerning physical processes.

**Prerequisites**
No prior physics course is assumed, but facility in algebra and basic trigonometry is essential. If you feel rusty you should review and practice. Chapter 1 and Appendices A through D in your text provide an overview of the tools you will need.

**Work Load**
This is a demanding course. There is a lot to learn. The course moves at a fast pace. Since each new topic builds on previous work, it is of great importance that you do not fall behind. You should expect and plan for a workload consistent with University policy (three hours per week per credit for a total of twelve hours per week for an average student to receive an average grade). This amounts to at least six hours per week outside of scheduled class meetings.

**Lectures - M W F (1:25-2:15) in Physics 150.**
In lecture we will motivate and introduce new material, analyze example problems, and generally work to organize and interpret the knowledge accumulated in your reading, in lab, and in other course activities. Our task will be to elaborate on important and difficult ideas, and to clarify points that may be confusing. We will utilize a variety of tools and devices to assist in clarifying concepts and methods. Lecture demonstrations will be used to illustrate new concepts, and we will attempt to recognize and address misconceptions that arise. In-class clicker questions will be posed for class response using the personal responder. We will develop strategies for solving problems that will be applied and reinforced in discussion sessions and labs. Clicker questions and other problem solving will be often been done in groups, facilitated by the Learning Assistants. It is impossible to cover all of the details in lecture, and it is not our intention to duplicate the text. You should complete assigned reading (see below) and associated pre-flight questions before attending class. By preparing in advance and asking informed questions you can help ensure that class time is used to maximum advantage. Early in the semester we will introduce a semi-formal strategy for solving physics problems. We will do examples using this procedure, and you will be required to apply it explicitly in solving homework, discussion session and test problems.

**Reading and Problem Assignments**
Your primary learning tools in this course is the working of physics problems from your text and provided by us. This includes homework problems and in-class problems. Any of these problems can appear in the class quizzes. One homework problem in each assignment will be graded. There will also be a grade associated with pre-flight and clicker questions (see below).

It is important to solve physics problems, whether they are simple exercises or context rich problems, as best as you can before examining the solution provided by an “expert.” As the first step in this, it may be most beneficial to your reading if you treat the examples given in the text as problems, solving them yourself before you read the authors’ solutions. You do not understand how to solve a problem, and the underlying physical principles or their application to the problem, until you can find the solution without looking at someone else’s solution. Working problems is the only reliable way to test your understanding of a topic. Try as many of problems as you have time for, emphasizing first the problems that you have or will have solutions to compare your work to. If your answer agrees with the one given in some form, fine. If not, or if you can’t come up with any answer, seek help from the 1101 instructional team, including the TAs in the Physics Tutoring Room (Room 230), or your LA. Some of your fellow students are also potentially good resources. Doing physics problems is hard work, but you will be rewarded by a deeper understanding and sense of accomplishment. The test problems will be of the same type and general level of difficulty as the problems that you will be assigned, or presented in lecture, or worked on by your group in your discussion section.

As mentioned above, we will develop strategies for solving problems. The University of Minnesota Physics Education Research Group has long been at the forefront of the study of how skilled problem solvers actually solve problems, particularly those that are more complex than the simpler exercises and examples, and more like real world situations. Much of this is detailed in “The Competent Problem Solver” which is optional for this course. In order to illustrate a common strategy of expert problem solvers, we will first apply it to simple problems, so simple that most of you could solve them much faster than an application of this method. While the discipline of using this method on simple problems may at first seem frustrating, it generally pays off when the problems become more difficult. (This can also serve as a paradigm for solving non-physics “problems” in other contexts that you might deal with.)

Responder and Pre-flight Questions

Several “pre-flight” questions based on the assigned reading will be posted on the course WebVista site to help you and us gauge and pace your reading. These must be answered on the web before class by 9 am the day of class and will be graded in part according to participation and in part according to correctness. Ordinarily during class there will be several “clicker” (responder) questions, which are also graded. “Clicker” questions are graded only on the basis of correctness. These will relate to the concepts that are introduced in your reading and during the lecture, and demonstrations that are given in lecture. The points for these clicker and pre-flight questions will be included in your final grade.

Discussion Sessions: Thursdays at 1:25 or 2:30 pm

In discussion sessions you work with classmates, your LA and TA to solve a challenging problem in small groups. Some analysis of the solution will be presented at the end of the session. On quiz week, there will be a group problem in the discussion section, which will count for 25% of the total quiz grade. Your group will solve that problem collaboratively with all group members receiving the same score for that problem. Only those participating in all discussion sessions during the preceding weeks will be allowed to take the group part of the quiz. The TA will assign the groups and new groups will be assigned after each quiz.

Laboratories:

You have the same TA and work in the same group as in your discussion session. Labs are roughly coordinated with lectures, and are designed to give you an opportunity to test, expand and refine your understanding of basic physics concepts. Careful recording of observations in your lab journal and preparation of formal lab reports are important parts of this experience. Since you carry out the lab exercises in a group and the equipment for each lab is available for only a limited time, make-ups are
Because this course satisfies University requirements as a laboratory science class and as a writing intensive course, you must receive a minimum laboratory grade of 60% to receive a passing grade in the course. The laboratory grade will be based on the demonstration of a well organized and correct written technical communication of the physics concepts of this course in your laboratory journal and laboratory reports, well thought out predictions and answers to the questions in the laboratory manual brought to class, and collaborative skills as evidenced by effective group work. To ensure that you have a conceptual introduction to the physics and mathematical concepts needed for beginning the lab, you will take a computerized quiz on the textbook reading that is preparation for each lab. No one will be allowed to participate in the laboratory unless they have passed the computerized preparation quiz for that topic. There are no make-up laboratories. The laboratory preparation quiz is available on the web. It is an open book, open notes quiz. The quiz may be taken as often as necessary but must be passed by 5 PM the evening before your scheduled laboratory session. A passing grade is approximately 75%. If you fail to pass the quiz after two attempts, get help from your instructors or fellow students. Leave time to get help so don’t wait to take the quiz at the last minute. No laboratory makeup will be allowed except in situations officially recognized by the University. In that case, the laboratory work must be made up by arrangement with your instructor before your next scheduled laboratory period.

Grades for the laboratory work will be determined in part by laboratory reports (one for each laboratory topic), in part by your work in the laboratory, in part by a final laboratory exam, and in part by your work in answering the prediction and other questions turned in before lab. The predictions and questions assigned by your TA must be turned in no later than 5pm, 2 days before the laboratory each week. The specific part of the laboratory for which you will write a report will be assigned to you by your instructor at the end of each laboratory topic (about every two weeks). Reports should be no longer than 5 nor shorter than 3 typed pages (using a word processor is required and such facilities are supplied by the University) including all necessary predictions, graphs, data tables, and calculations. Reports must be delivered to your laboratory instructor for grading no more than 2 days after they are assigned. Late reports will not be accepted. Graded reports will be returned to you not later than your next laboratory meeting and, with instructor permission, may be revised based on instructor comments to achieve a higher grade. If a revised report is allowed, it must be given to your laboratory instructor within 2 days. Details of the laboratory grading are in your laboratory manual. Remember this is a writing intensive course so your grade will depend on your communication skills.

Quizzes and Final Exam

There will be four quizzes, each in two parts. The second part will be a lecture hour quiz and will occur on the following Fridays during lecture time: Feb. 13, March 6, April 10 and May 1. The first part of each quiz will be a group quiz during the discussion section on the Thursday preceding the Friday quizzes (i.e. on Feb. 12, March 5, April 9 and April 30). The lecture hour part of the quiz is 75% of the quiz grade, while the discussion section part of the quiz is the remaining 25%.

**The three-hour final exam** is on Friday May 15, 8:00-11:00. The location will be announced closer to that date.

- The quizzes and final exam will consist of a mixture of multiple choice questions and longer worked problems. A sheet of equations and other useful information will be provided. No books or notes will be allowed. Only a TI-30xa or equivalent simple scientific pre-approved calculator will be allowed. No graphing or programmable calculators will be permitted. The use of any communication devices (cell phones, messaging devices, etc.) during examinations is not allowed.

- To be successful in problem solving you must get the physics right and communicate your understanding clearly and effectively. To receive full credit on any problem, your solution must be complete and understandable to the grader, with clear algebraic formulation of the physics, explicit definitions of all the symbols used, and proper handling of units and significant figures. In general, problems must be solved algebraically before numbers are substituted (one exception is that plugging in zero should be done when appropriate to simplify the algebra). We will go over problem solving procedure in class.
A valid picture ID will be required on exam days. Examples of a valid ID are a University ID or Driver’s License.

No make-up quizzes are given. See make-up policy below.

Tentative Plan:

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<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapter(s)</th>
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<tbody>
<tr>
<td>1 - 2</td>
<td>Introduction, kinematics in one dimension</td>
<td>1&amp;2</td>
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<tr>
<td>3 - 4</td>
<td>Complete kinematics: two-dimensional motion, including circular motion</td>
<td>3; 7.1-7.3</td>
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<tr>
<td>5 - 6</td>
<td>Newton's laws of motion</td>
<td>4; 7.4-7.6</td>
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<td>7 - 8</td>
<td>Work and energy</td>
<td>5</td>
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<tr>
<td>9-10</td>
<td>Momentum and collisions</td>
<td>6</td>
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<tr>
<td>11 - 13</td>
<td>Rotational kinematics and Dynamics</td>
<td>8</td>
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<tr>
<td>14</td>
<td>Solids and Fluids</td>
<td>9</td>
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Grading:

7% for responder and pre-flight questions (Scores for lowest 3 days for each will be dropped)
8% for homework problems (Lowest homework score will be dropped)
15% for the laboratory. Completion of all labs, and a lab grade of at least 60% will be required to pass the course.
45% for best 3 out of 4 quizzes (15% per quiz, including both the lecture and discussion section parts of the quiz). The lowest quiz score is dropped.
25% for three-hour final examination.

[Note: If it will result in a higher grade, all 4 quizzes will be included and the final will only count 20%. Your grade will be calculated both ways and the highest will be used.]

Your course grade will be calculated on an absolute scale, as follows:
A: 100 - 90%, A-: 90 - 85%, B+: 85 - 80%, B: 80 - 75%,
B-: 75 - 70%, C+: 70 - 65%, C: 65 - 60%, C-: 60 - 55%,
D+: 55 - 50%, D 50-40%, F: <40%. (At the boundaries, the higher letter grade prevails. E.g., 90% is an A, not an A-.

Make-ups:

As specified by University policy, missed quizzes will result in a grade of zero except in the event of conflicts with scheduled activities of official University organizations, religious holidays, and verifiable illnesses as prescribed by University regulations. The course instructor must be notified at the beginning of the semester or as soon thereafter as possible (no less than three weeks in advance) about conflicts due to scheduled, official University activities or religious holidays. Disputes concerning the validity of an excused absence will be settled in consultation with the Director of Undergraduate Studies in Physics. A make-up final exam will be given only for students with valid, verifiable conflicts of these types, or students with three final examinations in a 16-hour period if our exam is the middle of the three exams. Requests for make-ups for reasons other than those specified by University policy cannot be honored.

Other information:

The official web page for the Physics 1101W.100 is http://www.physics.umn.edu/courses/2009/spring/Phys%201101W.100/index.html
General course information, lecture outlines/synopses, solutions for the assigned problems and the tests, and other items will be made available through this class web site.
Minnesota privacy laws require that tests and other materials are returned in a manner that ensures that no one else can see your grades. Papers will be handed out at the first recitation after grading is
CHEATING: Don't do it!
All work that you turn in for a grade must be your own. The following behaviors are considered to be cheating.

a. Using the responder of another student
b. Copying all or part of a lab report, data table or fabrication of data (see Intro, pg. 3 of Lab Manual)
c. Copying all or part of a homework assignment or exam
d. Any other matter covered by the University statement below.

Your TAs are observant. They notice duplication in lab reports.

Mandatory Statement about academic integrity:
The University expects the highest standards of honesty and integrity in the academic performance of its students. Any act of scholastic dishonesty is regarded as a serious offense, which may result in expulsion. Scholastic dishonesty is defined as submission of false records of academic achievement; cheating on assignments or examinations; plagiarizing, altering, forging, or misusing an academic record; taking, acquiring, or using test materials without faculty permission; acting alone or in cooperation with another to obtain dishonestly grades, honors, submission of false records of academic achievement; cheating on assignments or examinations; plagiarizing, altering, forging, or misusing an academic record; taking, acquiring, or using test materials without faculty permission; acting alone or in cooperation with another to obtain dishonestly grades, honors, awards, or professional endorsement. Aiding and abetting an act of scholastic dishonesty is also considered a serious offense with the same possible consequences. Students may not make commercial use of their notes of lectures or University-provided materials without the express written consent of the instructor. (See the Senate policy at http://www1.umn.edu/usenate/policies/classnotes.html.)

Academic dishonesty in any portion of the academic work for a course shall be grounds for awarding a grade of F or N for the entire course.

Classroom courtesy

Lectures end when the idea or technique under discussion has been concluded and the lecturer has indicated that the students are free to leave. For this reason lectures are rarely expected to end exactly at the end of class time. Packing up books, putting on coats, or standing up while the lecture is in progress interferes with the learning of other students and shows disrespect for the educational process. Those who must leave early should sit near the end of a row to minimize the disturbance they will inflict on the other students, however consistent with a seating plan that will be introduced to optimize group activities. Cell phones, MP3 players and similar devices must not be used and must be turned off during the lecture period. Computers may only be used for taking class notes, and keyboarding must not be a disturbance to other members of the class. Note that food and drinks are not allowed in Room 150.

Physics 1101 is has an interactive lecture. If you choose not to participate, you will be excused from lecture.