Physics 1422, General Physics I-A
Spring 2005

Dr. Yost

Office: E339 Baylor Sciences Building

Hours: MW 2-3 PM
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or by appointment

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Textbooks: Douglas Giancoli, *Physics for Scientists & Engineers*, 3rd Edition Prentice Hall, 2000

A.P. French, Newtonian Mechanics, W.W. Norton, 1971

Web Site: http://scott-yost.baylor.edu/phy1422

Lectures: MWF, 1:00 – 1:50 PM, A207 Baylor Sciences Building

Welcome to **Physics 1422, General Physics I-A** for science and engineering students! This course is an introduction to the physical concepts of mechanics and thermodynamics. By the end of the course, you should be familiar with Newton's Laws, forces, work and energy, momentum and inertia, rotational motion, oscillation and waves, and some aspects of thermodynamics. The purpose of this course is to introduce you to the ways in which a physicist models nature using mathematics, and uses these models to understand our world. In the process, you will also gain facility with problem solving in mechanics and thermodynamics.

This course differs from PHY 1425 in that it requires only concurrent enrollment in Calculus 1 (MTH 1321), not previous completion of a calculus course. Thus, physics and calculus are learned together, as is appropriate, since Newton invented calculus for the purpose of formulating his laws of mechanics. The relaxed prerequisite does not mean that this course is any less rigorous than PHY 1425. On the contrary, the use of a second textbook, A. P. French's *Newtonian Mechanics* (M.I.T. Physics Series) in the early parts of the course will help us to explore the interplay between physics and the underlying mathematics more deeply than may otherwise be possible, and will help you to see physics as more than just a series of equations to be memorized, but rather as a set of ideas that can be used to model our world mathematically. This course will be very useful for any students who wish to begin their physics studies immediately, without waiting to complete MTH 1321.

Physics is a hands-on subject!

You cannot do well by watching your professor work problems on the board, or by asking your friends to show you how they did them. The problems are designed to help you discover the ways in which the concepts of physics apply to a variety of situations. There is absolutely no substitute to struggling through the problems yourself. Do not leave the problems to the last minute. Most of them are intended to require too much thought to be done as simple exercises. Those who do this normally do not learn the material well, and have disappointing performance on the exams. The due dates will be kept close to the completion date for each chapter to encourage starting the problems early.

Your grade in the course should largely reflect the amount of effort you put into the homework. However, it is a mistake to make completing the homework your only goal. The real goal is to understand the material, and to do this well, you must first read the chapter, and not blindly try to start on the problems, hoping you can skim the material for the right equations to use. That approach may get you through the homework more quickly, but without the understanding you will need to apply your knowledge in new contexts, including the exams. If you have trouble with one of the problems, go back and read the chapter some more, or try some different problems and come back to it.

The mathematical tools we will use include algebra, trigonometry, geometry, and vector algebra. **Everyone should have a comfortable working knowledge of algebra, geometry and trigonometry**, since these used extensively on a daily basis. In physics, mathematics is not just a means of solving problems, but the **language** in which the fundamental ideas are expressed. Any weakness in these areas will have a strong impact on your understanding of physics. You should consider a tutor if you feel you need one. Vector algebra is needed any time we want to describe quantities that have a direction. If you are not already familiar with vectors, you will be soon.

Calculus was invented to describe the kind of physical problems we will be considering, and is essential for the most general treatment, as Newton first realized. This course should be taken concurrently with a calculus course, and you should find that the two forces help to reinforce each other. Seeing calculus a physical context will help you understand the concepts of differentiation and integration more fully and intuitively.

Grading

Your grade for the course will be determined by a combination of factors weighted as indicated below. The grading scale will be fixed as shown. The grades on exams will be curved, but the grades on homework and laboratories will not. The minimum passing grade is a final total of 60.0%, including a laboratory grade of at least 60.0% as well. **Failing laboratory grades are unacceptable.** If you fail the laboratory, you fail the course as well. **Attendance is required** in all Baylor courses. Excessive absences (25% or more, excused or not) will result in failure of the course.

You may view your grades on the Blackboard system (my.baylor.edu). Homework grades can be viewed while logged into the CAPA system (capa.baylor.edu).

Hour Exams	40%	90.0 – 100.0	A
Comprehensive Final	20%	86.0 – 89.9	B+
Homework	20%	80.0 – 85.9	B
Laboratory*	20%	76.0 – 79.9	C+
	100%	70.0 – 75.9	C
		60.0 – 69.9	D

* Must have passing laboratory grade.

Laboratory

Each of you should be enrolled in one of the laboratory sections associated with this course. The laboratory experiments illustrate some of the concepts we will be studying, and will serve to remind you that physics is an observational science, grounded in experiment. Doing the experiments yourself will allow you to confront the real-world issues of accuracy and precision, experimental error, and how to decide whether your results agree with theoretical expectations to within the limitations of the experimental setup.

Laboratories begin the first week of classes. Note that for safety reasons, no food or drink is allowed in the laboratories, and closed-toe shoes must be worn for experiments.

You will be assigned a laboratory grade by your laboratory instructor. This grade will make up 20% of your final course grade. **You must have 60% or better in the laboratory to pass the course**, independent of any other grades. Your laboratory grade will be based 75% on your laboratory reports, 10% on the laboratory final exam, and 15% on your recitation grade.

Recitations

Each laboratory period will begin with a half-hour recitation session, where you can discuss problems which have been completed, or ones which are not yet due. The conduct of these sessions will be determined by your recitation instructor, base on the current course material. You will receive a grade in the recitation session which is determined by your level of participation and any quizzes which may be given. Recitations begin the second week of classes.

Exams

Four hour exams will be given during the term. A comprehensive final exam will be given at the end of the course.

Chapters from French's book are denoted with a prefix **F**, while chapters from Giancoli's book are denoted with a prefix **G**.

Calculators may be used on the exams, and you will be given a list of essential equations. These equations appear on the review sheets. (See the links in the above schedule.) If you do not have a scientific calculator, you should get one before the first exam.

Missed Exams

There are no makeup-exams. If you have an unavoidable conflict that you are aware of at the beginning of the course, you may petition for an exam date to be changed. **Such requests must be received by the end of the second week of classes, Sept. 2**, and will be granted only if this is possible without a serious affect on the scheduling of the course or on other students. To allow for emergencies or unavoidable conflicts, one exam grade may be dropped for each student. If you take all four hour exams, your lowest score will be dropped.

You must make every effort not to miss the final exam, since there is no makeup final. In case of a missed final, Baylor policy requires an incomplete, which must be resolved in the next semester. A complete schedule of final exams can be found on the Baylor Fall 2005 Exam Schedule. Baylor policy permits the schedule to be changed if three final exams are scheduled on one day. If you have a conflict, you must resolve it by mutual arrangement between the professors of the courses involved. Normally, exams for non-major electives will be rescheduled before exams in major or required courses. Check your final exam schedule now! **No requests to reschedule the final exam will be considered less than 30 days before the exam.**

Exam Structure and Strategy

The hour exams will normally have two multi-part homework-style questions, plus some multiple choice questions which will test your understanding of the concepts in the chapters covered. The homework-style questions will be closely modeled on assigned problems, but will not duplicate them exactly. To do well on these, you should be sure to understand the reasoning behind the solutions to each problem, not just memorize which equations were used. The conceptual questions may introduce new situations, which will not require much computation to analyze, but will focus on central concepts covered in the course.

You should write your answers as neatly as possible to achieve the greatest possible credit. Be complete, and show all equations used. If you are not sure of the equations, try explaining what you would do in words. Just because you are stuck on a problem does not mean you should panic. Use strategy to get as much credit as possible on the problem. Do not turn in blank problems if you can avoid it. Partial credit will be awarded generously on exams, if you provide enough information to merit it. The final exam will be entirely in multiple choice format, so partial credit is not applicable. The problems on the final exam will be shorter to allow all topics to be covered.

Grading of Exams

The multiple choice questions on the hour exams will always request an explanation. Be sure to write something, since even a wrong answer can receive some credit if the explanation is good. On the problems, write enough to show your reasoning process. Correct equations are more important than correct numbers, but they must be written clearly enough to tell what you are doing. Even if your answer is wrong, you can still get almost full credit if the steps leading to it are conceptually correct.

Exam grades are not curved. The scores are normalized such that 60% of the credit on the conceptual questions plus 30% of the credit on the longer problems is required for a passing grade. (A passing grade means a normalized score of 60%.)

Final Exam

Due to time constraints in reporting the grades, the final exam consists only of multiple choice questions. These questions may require some computation, and will be drawn from material covered throughout the course. The types of questions will be similar to homework questions, but not identical, and generally shorter to fit the exam time frame. The grading scale on the final exam may be curved. You should expect that approximately 50% credit is required to pass the final exam.

Preparation for Exams

A common complaint in courses such as this is that the students will say they did well on all the homework, but could not work the exam problems. This is usually a result of incomplete preparation, or relying too strongly on others for help on the homework. The exams test your knowledge more completely than the homework, since they cover more material and force you to make decisions about which concepts apply to the problems. In the homework, this is usually obvious, since you have just studied the material. It is important to spend enough time on the material to be comfortable with generalizing it to new situations. In the sciences, it is not enough to just know how to solve problems which have been seen before. If you really understood the problems you worked for the homework, and took time to read the book to recognize the concepts (not just equations) that apply, you should have no trouble recognizing the same concepts in the exams.

You can help avoid difficulties on the exams by going back and reading the chapter after you did the homework, so that you are sure you understand the concepts and their physical meaning. Physics is not about finding the equation that has the same symbols in it as your problem. Those symbols have a meaning, and you will do much better in the course if you take the time to learn the physics behind the equations.

Another way to avoid trouble on the exams is to be sure you can work every problem yourself. Working through someone else's solution is no substitute for puzzling through the problem on your own. Those frustrating moments (or hours) when you can't figure out which equations apply, or when you don't seem to have all the variables you need, are the same moments when most of your learning is occurring. The amount of hard effort you put into this course is directly proportional to what you will get out of it. There are no shortcuts to learning physics.

Homework

How much you learn in this course will depend most strongly on how much time and effort you put into the homework.

Approximately half the problems will be graded using the CAPA system. This system provides individualized problems for each student. You will find a set of help links at the right. These are also available from the CAPA login page and from the CAPA main menu after you log in. A set of printable instructions (PDF) is also available.

CAPA problems are always due at **noon** on the due date, according to the computer clock, unless otherwise noted. **The cutoff is absolute.** Late homework cannot be accepted for any reason. However, the lowest homework score of the semester will be dropped, which will effectively provide an exception for one emergency per student.

Each problem set will also include problems which will be graded by hand. These problems are due the same day as the CAPA problems, and are to be turned in at the beginning of class. Problems may be discussed during the class in which they are due, so late problems will not be graded. You will find all of the problems, graded by CAPA or by hand, on the CAPA web site. The set will show how the problems are to be turned in. The answers to all problems will be posted on the CAPA web site as well.

Homework Strategy

You should not think of homework as a task to be completed, but as a task which is essential to your learning. It is the process that matters most, not the answer. Your approach to the homework is probably the biggest factor which will influence your success in the course.

Homework begins with reading the textbook. You should always try to read the sections being discussed in class ahead of time, so that you will not be confronting new material in the lectures. The goal isn't to memorize new equations, but to understand the physical concepts mathematically. Most of the equations are easy to remember once you fully understand them. Physics should be read with a pencil and paper at hand, so that you can work through the examples and be sure you understand any difficult points. You can then come to the lectures prepared to ask questions about anything you couldn't understand on your own. If you get behind on the reading, the course can be much more difficult than it has to be. It often helps to read the material more than once. You should find that you understand much more of it after you have done the problems.

After you have read the sections being discussed in class, you should start on the homework from those sections. You should start on the appropriate problems immediately, and not wait until just before they are due. Working the problems will help you understand the rest of the chapter much more completely.

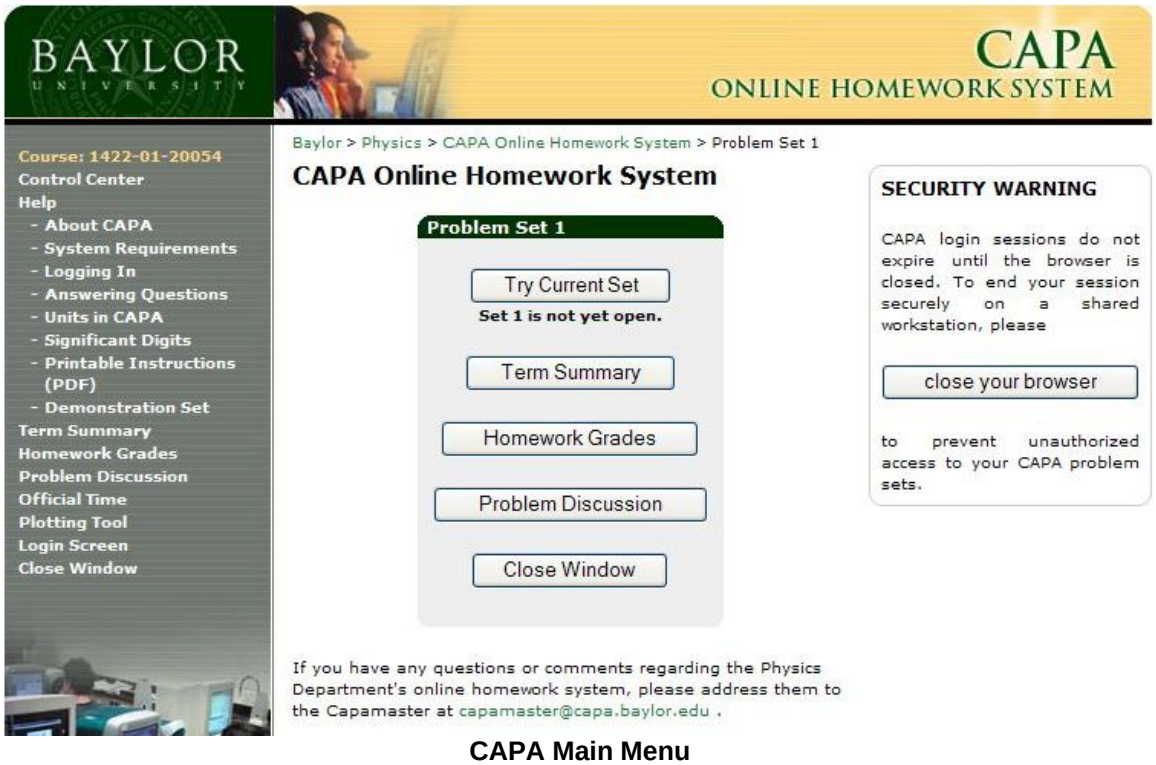
Collaboration

You may find it helpful to discuss problems with other students. Discussion links are provided in the online homework sets to facilitate interaction with other students. You may also find it useful to form study groups. Collaboration can be useful if you help each other work through the difficult

parts of each problem. However, you should be sure to understand how to work the problems on your own. Do not seek help until you have tried your best to solve the problems independently. It is easy to mislead yourself into thinking you understand a problem if you have not spent time struggling with it. Those frustrating times are when the most learning occurs. Letting someone else work your problems is a sure route to a disappointing final grade. Never just divide up the problems and only work a fraction yourself. You will not fully understand the rest of them, even if the solutions seem to make sense. Understanding how someone else worked a problem is not the same thing as understanding how to find the solution yourself.

The CAPA System

Most homework will be assigned online using the CAPA system. To access it, go to the page `http://capa.baylor.edu` using a web browser. Click on the **CAPA Login** button to see the login screen. Select the course PHY1422-01 from the pull-down menu, and enter your student ID (either the 9-digit number on your ID card, or your Bear ID). You also must enter a "CAPA ID", which is a four digit number unique to each student and problem set. If you don't know the CAPA ID for a set, you may request one using the buttons below. Once you know the CAPA ID, you can enter it and press the **Enter CAPA** button.



CAPA Main Menu

Once in the system, you will see the CAPA Main Menu, which permits you to work problem sets, view their grades, and participate in discussions with other students.

- **Try Current Set** is the most important link, for working an online problem set.
- **View Previous Set** shows the answers to a closed set.
- **Term Summary** is a simple list of scores on each problem in each set.
- **Homework Grades** shows the grades on each set, plus graphic information on the overall class performance.
- **Problem Discussion** is a problem-related discussion board, for requesting or posting help on individual problems.
- **Close Window** ends a session by closing the window, the only secure way to be sure your work is safe from tampering.

When an answer is graded, the students receives an answer code showing whether the answer is correct, whether the units are right, and whether the number of significant digits is correct. These are checked in the order of units, then significant figures, then correctness. Incorrect units or significant figures will not deduct from the allowed number of tries. Students may simply correct them. If the units and significant figures are right (within specified tolerances), then the problem is graded, and any incorrect answers will count against the allowed number of tries.

The answer codes are:

- **Y** correct answer.
- **N** incorrect answer.
- **U** wrong units.
- **S** wrong number of significant digits.

A separate handout containing more details on using the CAPA system will be provided. Help is also available online while using the system.

Problems will be taken from the French and Giancoli textbooks. Since the numerical data for each problem is customized by CAPA for each student, the problems will differ somewhat from the statements in the book. It is best to work the problems symbolically before plugging in numbers, to facilitate comparing your solutions with those presented in class, or obtained by other students.

Calendar

This is a schedule for the Fall, 2005 semester of Section 1 of Physics 1422, General Physics I. The schedule shows the dates when the lectures will cover each chapters. Chapters are denoted by an author's initial and chapter number, so that F1 means chapter 1 in A.P. French's text, G15 means chapter 15 in D. Giancoli's text, *etc*.

The dates marked Set 1, Set 2, ... are when these online homework sets are due. Online homework is due at **noon** on the due date, according to the computer clock. Hand-graded homework is due at the beginning of the next class.

The last date to drop a class without an academic penalty is **September 16**. After that, a DP or DF grade must be assigned. Courses dropped after **October 14** are recorded as failed. The last date on which I will consider rescheduling requests for the final exam is **November 10**. The dates of the hour exams may be considered final after Sept. 2. All other dates are subject to change.

Week	Monday	Wednesday	Friday
Aug. 22-26	Syllabus, CAPA, G1	CAPA, F1	F2, Set 1
Aug. 29 - Sept. 2	F2	F3, Set 2	F3
Sept. 5-9	F4, Set 3	F4	F5, Set 4
Sept. 12-16	**Exam 1: G1, F1-F4**	F6	F7, Set 5
Sept. 19-23	F7	F7	F8, Set 6
Sept. 26 - 30	F8	F9, Set 7	F9
Oct. 3-7	F9	F10, Set 8	**Exam 2: F5 - F9**
Oct. 10-14	F10	F10 - F11, Set 9	F11
Oct. 17-21	G15, Set 10	G12.5, G15	**Fall Break**
Oct. 24-28	G16, Set 11	G16	G10, Set 12
Oct. 31 - Nov. 4	**Exam 3: F10-11, G15-16**	G10, G11 (Sec. 1-5, 7)	G11 (Sec. 1-5, 7)
Nov. 7-11	G13, Set 13	G13	G13
Nov. 14-18	G17, Set 14	G17, G18 (Sec. 1,3)	G19, Set 15
Nov. 21-25	**Exam 4: G10-11, G13, G17-18**	**Thanksgiving**	
Nov. 28-Dec. 2	G19	G20, Set 16	G20
Dec. 5-10	Review, Set 17	**Final Exam: Sat. Dec. 10, 2-4 PM**	