Physics 1B, Fall 2007

Instructor: Eyal Goldmann  
Phone: (310) 660-3096  
email: egoldmann@elcamino.edu. Note: The spam-blocking software used by the school occasionally blocks emails sent to me by students. If you wish to contact me by email, you should send email from an El Camino email account, as these emails will not be affected by the spam blocker. If you submit your homework through an off-campus email service and the homework does not arrive in my inbox, you will not receive credit for the homework.  
Office: Physics 104B  
Office Hours: Monday 3:30-4:00 pm; Tuesday 2:30-3:30 pm; Thursday 12:00-1:00 pm; Friday 10:00-11:00 am.  
Non Office-Hour Consultation: I spend a lot of time in my office outside of office hours, and normally during this time I am happy to see students. (The exception is the hour immediately prior to any classes that I teach; I usually spend this time on prep.) In order to reach my office, however, you must pass through an outer door which may be locked even though I may actually be in my office and available. You can call the number above with your cell phone if you’d like to check. Also, feel free to make an appointment, either by calling me or by email.  
Website: http://www.elcamino.edu/faculty/egoldmann/egoldmann.htm (This syllabus, as well as homework assignments and the course calendar are available through the website.)  
Nicenet: I have set up an internet forum which students can use to discuss topics from class, or exchange hints on the homework. To access this, go to http://www.nicenet.org and enter the course key, which is 7207945P2Z.

ATTENDANCE: A student missing any class session during the first two weeks may be dropped from the course in order to allow other students to enroll. Therefore, if you expect to miss a class during the first two weeks, you must inform me in advance. Also, if you miss ten or more hours of class time up to the last day to drop, you may be dropped. Attendance will be taken at the beginning of class, and students arriving late will be marked absent. If you arrive after class begins, you will need to see me after class so that I can mark you present. If you expect to miss a class for any reason, please send me an email.

QUESTIONS: I will generally begin the class periods by asking for questions. Please prepare by reviewing notes from recent lectures between class meetings, and reading ahead in the text, so that you will be able to ask questions at the beginning of the class. Good questions make the class more interesting and more helpful.

CELL PHONES: Please turn your cell phones off or set them to “vibrate” before class starts. The first two times your cell phone sounds in class there will be no penalty. After that, I will deduct 0.1 percentage points from your final grade per occurrence.

COURSE STRUCTURE: A schedule which gives exam dates, lab dates, and homework due dates has been posted on my website.
**READING:** The text we use is Physics for Scientists and Engineers, 6th Edition, by Serway and Jewett. You may either purchase Volume 1, ISBN 0-534-40956-3, or the full edition ISBN 0-534-40842-7. If you have not purchased a textbook already, allbookstores.com is helpful in locating discounted copies. A detailed list of topics to be covered and associated reading follows:

<table>
<thead>
<tr>
<th>Topic Number</th>
<th>Topic</th>
<th>Reading Assignment (Serway &amp; Jewett 6th Edition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fluid Statics</td>
<td>§§14.1–14.4</td>
</tr>
<tr>
<td>2</td>
<td>Fluid Dynamics</td>
<td>§§14.5–14.7</td>
</tr>
<tr>
<td>3</td>
<td>Temperature</td>
<td>§§ 19.1 – 19.3</td>
</tr>
<tr>
<td>4</td>
<td>Kinetic Theory – Temperature and the Ideal Gas Law</td>
<td>§19.5, §21.1</td>
</tr>
<tr>
<td>5</td>
<td>Thermal Expansion</td>
<td>§19.4</td>
</tr>
<tr>
<td>6</td>
<td>Kinetic Theory – Degrees of Freedom</td>
<td>§21.4</td>
</tr>
<tr>
<td>7</td>
<td>Specific Heat</td>
<td>§20.2</td>
</tr>
<tr>
<td>8</td>
<td>First Law of Thermodynamics</td>
<td>§§20.4–20.6</td>
</tr>
<tr>
<td>9</td>
<td>Adiabatic Processes</td>
<td>§21.3</td>
</tr>
<tr>
<td>10</td>
<td>Phase Transitions</td>
<td>§20.3</td>
</tr>
<tr>
<td>11</td>
<td>Heat Transfer</td>
<td>§20.7</td>
</tr>
<tr>
<td>12</td>
<td>Distribution Functions</td>
<td>§§21.5 – 21.6</td>
</tr>
<tr>
<td>13</td>
<td>Second Law of Thermodynamics</td>
<td>Chapter 22</td>
</tr>
<tr>
<td>14</td>
<td>Wave Motion</td>
<td>Chapter 16</td>
</tr>
<tr>
<td>15</td>
<td>Sound Waves</td>
<td>Chapter 18</td>
</tr>
<tr>
<td>16</td>
<td>Superposition and Standing Waves</td>
<td>Chapter 17</td>
</tr>
</tbody>
</table>
GRADING: Your grade will be based on homework, in-class work, labs, exams, and a final exam, which will be weighted towards the final grade as follows:

- **Homework:** ......................... .15% of total grade
- **Labs:** ................................. 15% of total grade
- **Exams:** 3@ 17% each............... 51% of total grade
- **Final Exam:** ........................... 19% of total grade

**Grade Assignment:**
- A: 90% to 100%
- B: 80% to 89.9%
- C: 65% to 79.9%
- D: 55% to 64.9%
- F: 0% to 54.9%

**In-class work:** From time to time, I may decide to collect problems which have been assigned as in-class work. If I do this, grades on these problems will be counted as part of your homework score.

**EXAMS**

**Exams will be given on 9/28, 10/26, and 11/30, and the Final Exam will be held on 12/14.** You may bring a calculator of your choice to each of the exams. You may bring a single HANDWRITTEN 3”x5” note card to each of the first three exams, and a single HANDWRITTEN 5”x8” note card to the Final Exam. Blank note cards will be provided a week before each exam by the instructor. You must use the blank note cards provided by the instructor. You will not be allowed to use formula sheets prepared on your own paper.

**Studying for an exam:** Before an exam, review all of the relevant homework problems. Make sure that you can solve all of them cold, closed book, no notes. If you are unable to do any of the problems closed-book, review your notes, close the book again, and start from scratch. Repeat this process until you can do all of the homework problems without notes. If possible, try to solve unassigned problems from the book.

**Makeup policy for exams:** Permission to take a makeup exam must be requested, and the exam scheduled and taken, within a week of the originally scheduled exam time. Makeup exams will be allowed only in accordance with the following rules:

- **Medical Emergencies:** If you miss an exam due to medical emergency or acute illness, you must provide a written medical excuse. If at all possible, please advise me of absence before the exam begins. Non-emergency visits which you would normally be able to schedule around an exam (regular checkups, etc.) do not generally constitute an excuse for missing an exam.
- **If you expect to miss an exam for any reason other than a medical emergency or acute illness, permission to retake must be requested BEFORE the exam is administered, and will be granted only under unusual circumstances. You must provide a written document supporting your excuse before a makeup will be given.**
In rare circumstances (such as a family emergency) a conflict may arise which forces you to leave town before receiving a response from me on your request to reschedule an exam. Even under such circumstances, I must receive a notification from you, either through email, written notice, or voice mail (310-660-3096) before the exam occurs, and may still choose not to grant a makeup if I deem the conflict to be an insufficient reason for missing an exam.

HOMEWORK
Homework assignments will be posted on my website as the course progresses. You should be working on the problems in a homework assignment as we work our way through the material in class. Unfortunately, I will not have time to grade every homework problem which is turned in. Instead, I will select a subset of the homework problems for grading.

Turning in the Homework: Homework is due at the beginning of class on the due date. Homework turned in during class will be deducted 5%. Homework turned in after class on the due date will be deducted 10%. Homework will not be accepted after 11:59 pm on the due date. If you need to miss class for a reason other than a medical emergency, you will need to hand the homework in early or arrange to have someone else bring it in.

Homework Help from the Instructor: A typical student taking this class will require assistance, or at least hints, with a few of the problems on each assignment. In order to ensure that you have enough time available to seek assistance, you should begin working on a problem set as soon as we begin covering the related material in class. If you are unable to do a problem, you may call me or email me to ask for help (see contact information above), or come to an office hour, or set up an appointment. My weekly schedule is posted on my web site. Feel free to ask for an appointment as long as it is not during another class I teach or within an hour of the start of one of my classes; I usually use this time for prep. You are also encouraged to contact classmates or post questions on the class Nicenet site.

Homework and Academic Honesty: As homework in the Physics 1 series is quite challenging, most students seek assistance from their classmates from time to time. Although cooperation on homework assignments is generally quite useful, the main goal of the course is for you to develop your own thinking skills. It is therefore important that you do not allow discussion of a homework problem with another student to degenerate into a scenario where you are simply copying his/her work.

To prevent this from happening, I strongly encourage the following: When you approach another student for assistance with a homework problem, ask him/her to explain to you orally (without writing) how the problem was solved. If an oral discussion does not suffice, you may exchange written hints on paper, provided that nobody turns in that particular piece of paper for credit. However, YOU MAY NOT LOOK AT WORK WHICH ANOTHER STUDENT INTENDS TO TURN IN; this creates too much temptation for copying. Phone conversations, for example, are ideal for exchanging the right level of information.
IF TWO ASSIGNMENTS ARE SIMILAR TO AN EXTENT WHICH CAN ONLY BE EXPLAINED BY COPYING OR A SIMILARLY DETAILED SHARING OF INFORMATION, BOTH ASSIGNMENTS WILL RECEIVE A SCORE OF ZERO. ANY STUDENTS WHO COPY OR WHO ALLOW THEIR HOMEWORK TO BE COPIED WILL RECEIVE A ZERO ON THE HOMEWORK ASSIGNMENT. IF THIS HAPPENS TWICE, YOU WILL RECEIVE A ZERO HOMEWORK GRADE FOR THE ENTIRE SEMESTER.

Other Students’ Information: You should also acquaint yourself with other students who might be able to help you. In the space below, write the contact information of three other students:

<table>
<thead>
<tr>
<th>Name</th>
<th>Phone Number</th>
<th>email</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COURSE OBJECTIVES
On successful completion of this course, the student will be able to:

1. analyze physical problems involving the laws of thermodynamics, heat, fluids, and waves in order to:
   a. recognize the physical principles required to solve the problem
   b. isolate and model the physical principles underlying each part of the problem
   c. formulate the equations for each part,
   d. combine and solve the system of equations for the problem, and assess the physical reality of the result in terms of the data given, for a variety of physical situations involving the topics covered in this course.

2. explain, conceptually and/or quantitatively, physical phenomena related to course topics which are perhaps too difficult for realistic mathematical modeling.

3. demonstrate the ability to
   a. make meaningful measurements using basic mechanical measuring devices
   b. manipulate the collected data using basic error theories,
   c. report the outcome of the experiment, and
   d. explain the results physically.
RULES FOR HOMEWORK

1. General Appearance of Assignment: PROBLEMS VIOLATING THE FOLLOWING RULES WILL NOT BE GRADED.
   a. Handwriting should be neat, legible, and reasonably dark.
   b. Problems must be solved in exactly the order assigned. That is, problem 1 should be solved first, then problem 2, etc. Once I encounter problems appearing in the wrong order, I will stop grading the assignment.
   c. I try to make available the correct answers to all assigned problems. I do this only to allow you to check your work. DO NOT WRITE DOWN THE CORRECT ANSWER IF YOU HAVE NOT ARRIVED AT IT THROUGH YOUR OWN WORK. This is fundamentally dishonest, and you will receive a score of zero on the problem if I catch you doing it. If the answer resulting from your best efforts to solve the problem does not match the “official” answer, use your own answer.
   d. A reasonable attempt must be made to follow the rules given here. An assignment which shows little or no effort to follow the rules described here will not be graded.

2. Write your name, date, and assignment letter (assignments are listed as A, B, C, etc.) in the upper-right corner of the front page. Staple all pages together at the upper-left corner.

3. YOU MAY WRITE ONLY ONE EQUATION OR STATEMENT PER LINE. After you have written one equation on a line, go to the next line to write the next equation. If you write small and find this wasteful, you may draw a line down the middle of your paper to make two columns, and then begin working down the right side of the paper after you have completely used up the left side.

4. The following steps must be followed when STARTING a homework problem:
   a. Draw a diagram which presents all information given in the statement of the problem. Any symbolic variables (such as $x$, $t$, $F$, etc.) must either appear in the diagram or be listed next to the diagram.
   b. If appropriate, use your diagram to define a coordinate system.
   c. If information is given as a numerical value (such as 3.0m, 12.0s, 8.0N, etc.), a symbol (such as $x$, $t$, $F$, etc.) must be assigned to the numerical value. For example, if a problem says that a box has a mass of 3.0kg, you should write “$m = 3.0kg$” on your paper, on or next to the diagram. Do not simply write “3.0kg”; assign a symbol and write “$m = 3.0kg$”.

5. To begin COMPUTATION: Start your solution by stating a well-known equation you have seen either in lecture or in the text (e.g. $F = ma$, $\Delta x = v_{av}\Delta t$, etc.) that is appropriate to the problem at hand. The first equation in a solution should NEVER have numerical values plugged into it; it should be strictly in “variable” form.
6. When FINISHING a problem: If you have an equation in which the variable you are trying to solve for appears, and all other quantities are known, follow the following steps:
   a. WITHOUT PLUGGING IN NUMBERS, isolate the variable. Exceptions: (1) You may always plug in zero. (2) When you have obtained a quadratic equation, you may plug numbers directly into the quadratic formula to find the roots.
   b. Once you have an equation in which the variable is isolated on one side, plug numerical values (if given) into the quantities on the other side of the equation. WHEN YOU PLUG NUMERICAL VALUES INTO AN EQUATION, YOU MUST INCLUDE UNITS WITH THE NUMERICAL VALUES. (See item 7, below.)
   c. Compute the numerical value of the quantity of interest.

7. USE THE CORRECT UNITS.
   a. Every numerical answer must include the correct unit.
   b. Any time a number representing a physical quantity appears in a solution, units must be included. Do not insert numbers into an equation without inserting the accompanying units.

   Example:
   \[ \Delta x = v \Delta t \]
   \[ \Delta x = (4)(2) \]
   \[ \Delta x = 8m \]
   \[ \text{WRONG} \]

   Example:
   \[ \Delta x = v \Delta t \]
   \[ \Delta x = (4m/s)(2s) \]
   \[ \Delta x = 8m \]
   \[ \text{RIGHT} \]

   c. Check to make sure that the correct unit for your answer follows from the computation; do not just “tack on” the correct unit at the end of the problem. This generally requires a simple computation. An example follows:

   Example: Suppose you wish to compute the acceleration of a 5kg object subject to a 10N force. You would write:

   \[ a = \frac{F}{m} = \frac{10N}{5kg} = 10\text{kgm/s}^2 = 10\text{m/s}^2 \]

   Notice that expanding “N” into “kgm/s\(^2\)” allows you to cancel the “kg’s”, leaving m/s\(^2\), which is the correct unit for acceleration.
EXAMPLE OF HOMEWORK PRESENTATION:
The following example illustrates the use of Homework Rules 4-7, which appear on pages 6 and 7 of the syllabus. Be sure to follow the format illustrated below when solving problems 11 and 12 on the previous page of this assignment.

Problem:
A jogger is running in a straight line from point A to point B, which are separated by 200m. He maintains a constant speed of 4m/s. If the jogger is presently 50m from A (and 150m from B), and his stopwatch reads 20s, what will be the reading on his stopwatch when he reaches B?

\[ x = x_0 + vt - t_0 \]

\[ t = t_0 + \frac{x - x_0}{v} \]

\[ t = 20s + \frac{200m - 50m}{4m/s} \]

\[ t = 20s + 37.5s \]

\[ t = 57.5s \]