Physics 121 syllabus

Physics 121 (Spring 2013)
Class Info: Monday & Wednesday  11:40 a.m. - 1:30 p.m.  Room F 208  CRN-20983
West Campus

Text: College Physics (8th Edition) by Young and Geller

Perquisites: C or better in intermediate algebra (i.e. high school level algebra II) and enrolled
in college algebra. This prerequisite will be strictly enforced.

Instructor: Dr. Wayne Hacker
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Office hours: Monday: 1:30-2:30 p.m.; 5:00-5:30 p.m.; 8:30-9:00 p.m.
Tuesday: 8:30-9:30 p.m. (In the open lab F110)
Wednesday: 1:30-2:30 p.m.; 5:00-5:30 p.m.; 8:30-9:00 p.m.
Thursday: 8:30-9:30 p.m.
Other times by appointment only

Note: My half-hour office hours after class are sometimes held in the class.

These hours are subject to change. Changes will be announced in class.

Important dates

Holidays/Closures: Martin Luther King Day January 21
Rodeo Days February 21, 22
Spring Break March 11-17

Deadlines: Official withdrawal deadline April 4
Final exam week May 8-14
Last day of class May 13

Grading policy: Each exam will be scored out of 100%. At the end of the semester, the
scores will be converted into grades of A, B, C, D, and F using the standard grading scale:

F < 60%   60% ≤ D < 70%   70% ≤ C < 80%   80% ≤ B < 90%   90% ≤ A

Warning: If you decide to drop the class, make sure you fill out the proper paperwork and let me
know. If you do not officially withdraw, you will probably receive a failing grade for the course,
which will remain on your record forever.

Course grading scheme

Exam 1 (Math Prerequisites) ............... Wednesday, January 23 ............... 10%
Exam 2 (Math Preliminaries) ............. Monday, February 11 ............ 10%
Exam 3 (Kinematics) ....................... Monday, March 4 ................. 20%
Exam 4 (Newton’s Laws) ............... Monday, April 8 ................ 20%
Exam 5 (Work, Energy, Momentum) .... Monday, May 6 ............ 20%
Comprehensive Final Exam .............. Monday, May 13 .......... 20%

Warning: You will need to bring a student I.D. to the final exam. Except for the final
exam, all exam dates are subject to change. Changes will be announced in class.
**Classroom etiquette:** Disruptive behavior will not be tolerated and can be cause for being dropped from the class. Disruptive behavior is defined as behavior that is disruptive to the learning process and outside normal behavior parameters. See the Student Code of Conduct for particulars; but examples of disruptive behavior are inappropriate talking while I’m talking (including phone calls), arriving late or leaving early, sleeping, doing other class work in class, etc. In particular—If you talk in class I will kick you out, and you will not return until I have received a note from the department chair and the dean OK’ing your return. If you miss an exam during this time, then you will receive a zero for that exam.

**Academic integrity:** Violations of scholastic ethics are considered serious offenses by Pima Community College, the mathematics department, and your instructor. Students may consult the PCC Student Handbook sections on the Student Code of Conduct, on scholastic ethics and on the grade-appeal procedure. Copies are available at PCC campus libraries and at [http://www.pima.edu/studentserv/studentrights/](http://www.pima.edu/studentserv/studentrights/)

**Cheating:** If I catch you cheating, then you will receive a zero for that exam. Your misery will not end there. Since someone who has cheated once is likely to cheat again in the future, you will not take any more of the regular written exams. Instead, you will take oral exams during office hours, or at a time of my choosing. If you can’t make it to an oral, then you will receive a zero for that exam as well.

If you are caught cheating a second time, you will be given an F for the course and reported to the Dean of Student Development, where further action will be taken. Refer to the PCC Student Code of Conduct & Scholastic Ethics.

This class will abide by the Scholastic Code and Student Code of Conduct.

**Incomplete grade:** The grade of I is reserved for students who
a) are passing with a C or above
b) cannot complete a small (25% or less) amount of the course for unavoidable documented reasons.

These criteria are subject to the instructor’s discretion. Incompletes are very rare, and are an opportunity to make up missed work, not a new start. I have rarely given incompletes!

**Withdrawals:** You may award a W to yourself by officially withdrawing before 2/3 of the semester is past. If you just quit coming to class without formally withdrawing, you will receive zeros on all of the remaining assignments, which will probably lower your grade to an F that will remain on your record forever.

**ADA compliance:** Pima Community College in compliance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act offers reasonable accommodations, including material in alternative formats, to qualified students with appropriate disability documentation. To obtain a reasonable accommodation, students must be registered with a campus Disabled Student Resource Office (DSR) who will verify, identify, and authorize implementation. Accommodations cannot be made without verification of the need. Students are responsible for making all accommodation requests in a timely manner. For more information, contact the West Campus DSR office.

Pima Community College is an equal opportunity, affirmative action employer and educational institution committed to excellence through diversity.
About this course

This course requires a certain amount of basic mathematical knowledge and skill. Unfortunately, some students sign up without these essential prerequisites: because they haven’t had the necessary math courses; because they took them long ago and have forgotten the material; or because they took them from an “easy-A” instructor who gave them an unwarranted passing grade. If that A that you received seemed too good to be true, it probably was! Experience has shown that such students generally suffer horribly in the course, withdraw in mid-semester or earn failing grades, and slow the rest of the class down, to the great detriment of students who need to learn this material for things like the MCAT. If I discover that you registered for the course without the formal prerequisites, I will drop you administratively, for which I do not need your consent.

The Idea behind the course setup

I have spent several years writing my own problems with solutions in the form of: sample exams, homework sets, large problem sets that act as a giant test bank, and course notes, all so that this course could be free of the over-priced textbooks that often accompany courses such as this. This is course is textbook independent. You are encouraged to buy any edition of any of the textbooks listed on my website. If you are in doubt as to which one to get, then get any version of the current book that we are using at Pima, or the U of A. Be forewarned that I am not following any of these books. I am following the topics in my problem sets on my website. If you want a course with a pre-set textbook, or you feel that you just cannot learn without online homework, then you should immediately drop this class and take this course with someone that is using a pre-made online homework system and textbook. Be forewarned, that you maybe required to spend upwards of several hundred dollars, whereas with my system you should be able to get by on about $10. That said, most students actually really like the way that I have laid out the course.

The lay out of the course

I have broken the course into 5 basic components, and each component has an accompanying sample exam, homework set, and extra practice problems. The component topics are listed below:

- exam 1 (mathematical prerequisites)
- exam 2 (mathematical preliminaries)
- exam 3 (kinematics)
- exam 4 (Newton’s laws)
- exam 5 (work, energy, and momentum)

Course support

All exam components come with sample exams with solutions, homework with solutions, and a problem bank with over 2000 problems with solutions. Taken all together, this material should be more than sufficient to prepare you for each exam.
About the exams

Exam 1 (mathematical-prerequisites) This course requires a certain amount of basic mathematical knowledge and skill. Unfortunately, some students sign up without these essential prerequisites: because they haven’t had the necessary math courses; because they took them long ago and have forgotten the material; or because they took them from an “easy-A” instructor who gave them an unwarranted passing grade. Experience has shown that such students generally suffer horribly in the course; withdraw in mid-semester or earn failing grades; and slow the rest of the class down, to the great detriment of other students, who thereby miss out on material that they need for future courses.

If I discover that you registered for the course without the formal prerequisites, I will drop you administratively, for which I do not need your consent.

I will also give a 50 minute exam on the prerequisite material very early in the semester. The questions will be very straightforward, covering basic mathematical techniques that you will need for the course. No new material will be on the exam. If you’re adequately prepared for the course, you should find this exam very easy. If you do poorly on the exam, I will give you a formal written warning that your background appears to be deficient, and that you should drop the course. If you choose to disregard this warning, you will probably find the semester a very difficult one: I will not slow the pace so that you can keep up, nor will I waste the class’s time explaining basic math to you.

A sample math-prerequisites exam with solutions and homework set with solutions is provided on the course website. All questions will be multiple choice and of the same format as the sample exam (see below for details). All exam questions will come from the problem set on my website with minor changes. Be forewarned: A good grade on this exam is not an accomplishment, it’s a necessity. You can do well on this exam and still fail the course.

Exam 2 (mathematical-preliminaries) This is a 50 minute multiple-choice exam based on elementary material that you should know, but probably don’t, before you enter the course. The purpose of this exam is to make sure that everyone has the same minimum mathematical background. Be forewarned: A good grade on this exam is only a sign of adequacy, not of excellence. You can do well on this exam and still fail the course.

Exams 3-5 are 2 hour multiple-choice exams based on topics that are at the heart of a classical course in mechanics. Good grades on these exams means that you are really learning the material and should feel a real sense of accomplishment.

Exam format

All of the regular exams 1-5 in this course will be multiple-choice/short-answer no-partial-credit questions. The final will also be entirely multiple choice. Moreover, no calculators or electronic devices of any kind will be allowed on the first two exams.

Although no partial credit will be given, I recognize that everybody, however careful, makes mistakes from time to time. I will therefore allow you one free mistake on each exam. For example, if the exam consists of 21-questions, I will base your grade on your best 20. You will not receive extra credit for getting all of the answers right. I never give extra credit problems on exams. You can never score more than 100 % on any given exam.
All problems will use either letters, or simple integer/fractional numbers in the problem statement. This means that there is no reason that you will need the use of a calculator or electronic device at any time.

Typically, 50 minute exams will be 11-question exams and 2 hour exams will be 21-question exams. The only exception to this is exam 5 and the final. Typically, the final will be 11-questions.

Exam problems will generally be similar to problems that you’ve seen in your homework, on sample exams, or examples solved in class. Solutions will not generally be provided for the exams, since you will have solutions to similar problems in my problem bank.

Any exam may have a comprehensive component. This means that it could include not only questions based on the most recent material, but also material already covered on previous exams. Such questions will generally be identical to problems on earlier exams or sample exams, with only the numbers changed. You should regard these questions as easy bonus points.

The comprehensive section will typically be no more than 25% of the problems on the exam; the majority of the exam will cover the recent material. This is not true of the final; see below.

Warning: The sample exams do not have review problems on them because, in general, I do not give review problems on exams. I reserve this option for topics that the class as a whole had trouble with. Since these “trouble topics” can vary from class to class, I will not make any commitment to any particular topic ahead of time.

Reviewing for exams. I do not generally give review sessions before exams, nor will I spend a lot of class time reviewing material that’s already been covered. You will have access to lots of problems with worked solutions in the test bank (a.k.a. problem set), sample exams, homework sets, and in my class notes. Working through these problems is the best way to review for the exam.

You must show your work. I will not give partial credit for the work that you do on your exam paper. Nevertheless, you must show your work. The purpose of this course’s exams is to give me an accurate measurement of how well you are learning the material—not how lucky you are at guessing answers, or how skilled you are at copying from your neighbor’s exam. If you answer a difficult problem without doing any written work, I will assume that you are guessing or copying.

If you have answered a difficult problem without doing any written work, or if the work that you show doesn’t seem to lead to your answer, then I will grade the problem as wrong, even if your answer is correct. If you feel that you have been unfairly penalized, I will give you an oral exam during my office hours; if you can solve problems of similar difficulty without doing any written work, I will give you credit for the exam problems. You must take this oral exam within one week of the original exam’s being returned to you, in conformity with the regrading policy for the course.

Curving course grades: Individual exam scores will not be curved. If I decide to curve, I will do so at the end of the semester, with students’ total exam scores. In such a case, I will look for natural breaks in the distribution—which is another reason why you shouldn’t let other students copy your work.
Regrading exams: There is a “statute of limitations” on regrading exams. If you believe that you should receive additional credit for an exam, you must request the additional credit no more than one week after the exam has been returned to the class. After that time, I will not award you additional points on the exam, however good your claim to them may be.

The one-week period for regrading begins when I return the exam to the whole class. If you are absent on that day and don’t get your exam until later, you will not be given additional time in which to request a higher grade.

Illegible or ambiguous answers are wrong answers. I will not award you points for a problem on which I can’t understand your answer, and I will not regrade it based on your explanation of what you were trying to say. I will also not give you credit for a problem in which you got the right answer, but circled the wrong letter on the answer sheet.

If you ask me to regrade, I will regrade your entire exam, not just a particular part of a particular question. If I find an error that I didn’t notice the first time I graded, I will mark it as wrong. Your score after regrading may be worse than it was before.

Missed exams: You should not miss an exam if you can help it. However, I realize that there are times when someone misses an exam for legitimate reasons.

Warning: In the past, staffing shortages in the testing center have resulted in the center closing for a week at a time without any forewarning to the faculty, or to the students. Unfortunately, because of staffing shortages and increased use as a placement center, the current administration can not guarantee to keep the testing center open. It is for this reason that there will be no makeup exams except the final (this does not apply to DSR students).

Since Pima west campus has no reliable testing center, there are no makeup exams (except the final exam). No exceptions! If you miss an exam, then I will replace your missed exam score with your score on the final exam with no grade penalty.

If you must miss the final exam because of a scheduling conflict with a course at the U of A, you need to contact me at least a week before the exam date and supply me with proof of the conflict. In that case, we can devise an alternate final exam at another time. Be forewarned that the alternate final exam will be different, and possibly more difficult, than the final taken by the rest of the class. Warning: You should not schedule a flight home until after the last day of finals! If you do so, you may not be able to makeup the final exam should there be a scheduling problem.

All exam dates are fixed and are given in this syllabus, and will not typically be changed. If you will be out of town on more than one of these dates, you should find a different class that better fits your schedule. In general, if you find yourself unable to make it to exams and classes, then you should drop this course and retake it when you reach a stage in your life where your schedule is less crowded.

Comprehensive Final Exam. The final exam will be comprehensive. It will be your last chance to show me that you’ve learned the material covered by the course. I believe that if you show a good understanding of the material at the end of the semester, then you shouldn’t be punished for a bad exam score earlier; thus if your final score is better than your lowest exam score, then I will replace the latter with the former. Do not count on doing well on the final, though: it will be more difficult than the previous exams, both because it will be comprehensive and because the problems will not necessarily be drawn from the homework
and the sample exams. Also, it will typically have less questions that are more computational and less conceptual, which tends to lead to lower grades. Typically students do worse on the final by at least one letter grade compared to the regularly scheduled exams.

Homework policy

I typically teach four or five courses, with anywhere from 150 to 200 students. This makes it impossible for me to examine everyone’s homework for clarity, neatness, etc. I could do what some instructors do and just check it off, but there is no point to that. It is my strong opinion that if you’re not going to do it right, then don’t bother doing it at all.

From my many years of teaching experience I can confidently say that if you don’t do homework, you will not learn the material, and nothing that you do during the 48 hours before the exam will make up for that.

The only way to learn physics is by working lots of problems—and that means working them yourself, not just reading the worked solutions. This is why I strongly recommend that you follow the following “learning algorithm”. Although I give you the solutions to the homework, you should only use them as a last resort!

I maintain a problem bank of problems with worked solutions on my website; you should make use of these problems when doing the homework. I have organized both the homework and problem-bank problems into categories, or types.

Suggested Learning Algorithm:

Step 1: Start by looking at the homework problems and pick out a set of problems that you want to work.

Step 2: Find similar problems in my problem bank and work through the solutions to get the idea. Here I am treating the problem-bank problems as example problems.

Step 3: Attempt the homework. If there is a problem where you can’t get the answer, repeat step 1 and start over.

Step 4: If after all of the above steps you cannot get the solution, then (and only then) should you use the solutions that are provided for the homework.

Step 5: After completing the homework, you should take the sample exam. Use the solutions to grade yourself and if you miss any problems you should try working more problems from the problem bank.

If you still feel uneasy about a certain type of problem, then go back to the problem bank and work more problems until you do feel comfortable. If you have the proper prerequisites for the course, then you shouldn’t have to do every single problem (which probably wouldn’t be possible, unless you’ve got a lot of free time); but for every type, you should work problems until you feel confident that you can do problems of that type. If you need more problems of a particular type, you will find additional worked problems in my class notes.

Although I won’t collect homework, you should try to do yours neatly, and you should save it in a folder or notebook. If you are close to the border between two grade levels and ask me
to give you the higher grade, the first thing I will ask is to see your homework. If you don’t have a sheaf of homework to show me, the conversation will be over.

Errors in test-bank problems. I try to proofread my problems and solutions carefully. Nevertheless, errors are unavoidable when writing several thousand problems and solutions. If you can’t understand how I arrived at an answer, you should ask me in class or during my office hours. There are excellent reasons for doing this—

- You might be making a mistake. If so, I can explain it to you and set you on the right track.
- If there’s a mistake in my work, I will correct it. Generations of future students will benefit from your finding the error.
- By catching one of my errors, you will prove to me that you are working hard on the homework. I will remember this in your favor if you end the semester near the border between two grade levels.

Class participation policy

I strongly encourage you to ask questions and participate in class. I reserve the right, at my discretion, to award bonus points to students who regularly participate in classroom discussion and who have well-organized and very complete homework notebooks (only applicable to courses where I do not collect homework). If your final grade is near the border between two grade levels, your level of class participation will be an important factor in determining your grade for the course.

About the synchronization between the physics lecture and lab

While it would be wonderful if the physics lecture and lab were synchronized, as they are in integrated classes or in the lecture-lab courses at the University of Arizona, unfortunately this is not generally the case for separate lecture-lab courses at West Campus at Pima c.c.. I have put much effort in making a general outline for the lab lectures to keep them in sync with the lecture, but the lab instructors are under no obligation to follow my outline. Many times these lab instructors stray off and teach topics that are weeks ahead of the lecture, and there are no mechanisms in place to force them to follow the outline as there would be at a university. This is part of the “open lab philosophy” at West campus and there is nothing that you or I can do about it. Some students prefer to take their lab at the university, which I personally think is a good idea. Others, wait until they finish the lecture class, and then take the lab class; also not a bad idea.

This disconnect between lecture and lab has resulted in numerous student complaints directed at me regarding the way the lab is being taught. For the record, I have no power to make these lab instructors follow the schedule set on the website by the department, or even show up for work for that matter! This is the job of the department chair Dr. Tony Pitucco. Also, I refuse to speed up my course to keep up with a lab instructor that is not following the standard lab schedule. In fact, it is official Pima policy that the lab lecture is to be subservient to the lecture. Unfortunately, I have not personally ever witnessed this rule being enforced on the West campus.
One sure way to avoid this trouble altogether is to ask your lab instructor on the first day of class if they are going to follow the standard schedule. If they say no, then get into another class! If they say yes, then hold them accountable. If an instructor promises to follow a schedule, and then doesn’t do it, this is grounds for a formal complaint against that instructor.

In the past, I have taken the student’s side on these issues, but unfortunately this has cost me personally with my relationship with the department chair and the administration. For this reason, it is no longer practical for me to fight this fight that I cannot win. I have too much to lose. But you can! If students are willing to band together for a reasonable cause, students have more power than they think. Below, I outline an approach for filing a written complaint. Remember, just whining about something that is fundamentally wrong with a broken system that is in place will not result in any action!

**Proper Complaint Protocol:** Always follow the chain of command!

**Step 1:** Contact by email (so that you have a record of the complaint) the department head Dr. Tony Pitucco and c.c. the dean Dr. Mary Kay Gilliland at apitucco@pima.edu and mkgilliland@pima.edu, respectfully. Be sure and give your email a subject title! Also, be sure to carefully describe what the problem is in complete detail. If you don’t get a response, then try a sending a second email. Please allow one week for a response. Be sure and indicate in the subject line that this is your second attempt at contacting them. If this action gets results, stop here.

**Step 2:** If step 1 does not produce results, then try emailing the vice president of instruction Mrs. Dee Lammers and the president Dr. Lou Albert. Carefully, respectfully, and politely explain the problem and explain that you have contacted both the dean and department chair and have waited at least a week for a response, but have gotten no satisfaction, either because nothing was done, or there was no response. Be specific! Again wait a week, and if you haven’t heard anything, then send a second email with a subject title indicating that this is a second attempt. This should produce results.

**Step 3:** In the off chance that step 2 does not produce results, then your only option may be to go to the district office with the complaint, or the board of governors. Keep in mind that this is an extreme and time-consuming step with no guarantees of producing results. I have personally never seen a problem, such as an out-of-control adjunct, or even full-time instructor at Pima, that could not be solved at the president’s level.

In the future, I plan to remedy this problem by only teaching physics courses where the lecture and lab are integrated, but I cannot start teaching integrated courses until after the spring of 2013.
Who does what

The instructor’s job:

• To give a good and clear lecture that a prepared student will understand.

• To answer student’s questions during office hours.

• To give exams that evaluate your level of understanding of the material taught in class.

• To teach you how to take a logical, rational approach to problem solving that prepares you for the next level in your education.

The student’s job:

• To come to class and pay attention.

• To ask questions if you don’t understand something.

• To do the reading assignments.

• To do homework, even though it is not mandatory.

• To show up for exams.

• To take responsibility for your education.

What is not the instructor’s job:

• To explain everything in the book so that the student doesn’t have to do any reading, working of problems, or learning on their own.

• To chase the student down and make sure they are coming to class, doing their homework, and cleaning behind their ears.

• To be a private tutor.
Choosing the right instructor for you

You should definitely drop my course and seek another course and/or instructor if:

- You need to have comments made on your homework.
- You are just looking for a check-mark, and have no interest in learning physics.
- You are addicted to numbers. Typically, when I work physics problems in class I use letters for the unknowns, work out the solution algebraically, and upon obtaining the final formula plug the numbers in. If you don’t like this style of pedagogy, then you should find another instructor.
- You need me to be more easy on exams like “that other instructor”. If you feel this way, then take “that other instructor”. In general, I will not come down to your level, you will come up to mine. It is important to note that this teaching philosophy does not mean that I will not help you, or answer a question no matter how basic.
- You want an easy grade. Unfortunately at PIMA College, it is all to easy to find instructors who give the entire class an A, regardless of their understanding of the material. This just devalues your degree and your GPA. Your grade will be based on learning outcomes, not on your prior GPA.

One Last Thing

Remember this: You chose me, I didn’t have a choice in you being in my class!