Physics 121, Spring 2007
Newtonian Mechanics

Instructor: Andrew Jordan
Course email: phys121@pas.rochester.edu
Office: Bausch & Lomb 317
Text: Giancoli's Physics for Scientists and Engineers, 3rd edition, Vol. 1 (2000), Prentice-Hall
Course Website: `http://web1.pas.rochester.edu/~jordan/phys121-spring07/phys121main.html`
Class: Hoyt Hall, Tu/Th: 9:40 - 10:55
Office Hours: Thursday 2-4

P121 is a physics survey course designed for physics and engineering majors. The topics of vectors, linear and multi-dimensional motion, work, energy, gravitation, simple harmonic motion, conservation of momentum and energy, constant acceleration motion, rotational motion, thermodynamics, and waves, will be covered at an introductory university level with some introduction to mathematical techniques used in more advanced courses. Students are assumed to have some knowledge of calculus, though the techniques will be reviewed as they are used. No previous physics instruction is assumed. If you want to be an engineer or scientist, this class is critical and should occupy a large fraction of your time.

Course email and website.— Extensive use will be made of the course website for distributing course materials, making announcements, etc. I will set up a course email distribution list. Time-critical announcements, grades, hints for problem sets, corrections for problem sets, etc. will be sent to you via email. Make sure you are on the distribution list! I will send out email to the class as a test during the first week of class. Let me know if you don't get it.

Workshops.— An integral part of this course will be "physics workshops". You will meet once a week, for two hours, with a group of several other students and a leader (see below). During this time, you will work on a "workshop module" that I prepare. The module will contain simple questions, conceptual exercises, and quantitative problems relevant to the material covered the week before in class. Much of this will be review and practice. Some of it will be new and relevant material. The students in the workshop are expected to work through the module as a *group*. The workshop leader will act as a facilitator, not a lecturer. Students who are rather challenged by this course will find the support available in workshop very helpful. Those of you who find this material easier may be surprised to hear that research on workshops tells us that you will benefit even more. It turns out you learn a great deal when you try to teach something. I urge you all, regardless of capability, to participate in, and enjoy, the workshops.

Workshops begin the week of January 29.

Workshop leaders.—
Michael Barbero, mbarbero@pas.rochester.edu
Melanie Day, mamday@pas.rochester.edu
P. Ben Dixon, bendixon@pas.rochester.edu
Andrew Stump, stump@pas.rochester.edu
Kara Morris, kmorris4@mail.rochester.edu
Brittney VornDick, bv001m@mail.rochester.edu
Jason Robin, jrobin@mail.rochester.edu

Laboratories.— The laboratory must be passed in order to pass this course. You must do (and hand in) all the labs get a grade for this course. The laboratory grade will be averaged in as 18% of the lecture grade. All questions regarding the laboratory should be sent to the laboratory email address (physlabs@pas.rochester.edu). The email address is appropriate for the majority of your questions. See the site `http://web1.pas.rochester.edu/~physlabs/` for more information.

Labs begin the week of January 29th.

Problem sets.— I will ask you to do a set of problems each week that illustrate and/or enhance what we've discussed in the lecture. P121 is a quantitative, problem-driven course. I will work mostly on concepts in lecture

. . . but the exams will consist of quantitative problems. It is absolutely critical to your survival in this course that you work on these problems each week! For the vast majority of the class, it is not possible to do well in the course without struggling with most of the homework problems throughout the semester.

When the graded problem set is returned to you, I will release a solution set. Your job is to study these solutions, understand your mistakes, and correct any misperceptions or holes in your understanding. You are encouraged to discuss the problems with others. However, I urge you to struggle with each problem on your own first. After all, you will not be allowed to discuss the problems on the exam until after you have turned it in!

Homework will be handed in to (and returned from) your workshop TA/TI each week. They will grade randomly selected problem(s). Each homework will be equally weighted in your final grade. Homework will be weighted as 10% of your final grade. It is between you and your TA/TI to keep track of homework and grades.

Although homework is a numerically small portion of your grade, you will seriously increase your chances of a high grade in this course if you do all of them (in a quiet setting where you can concentrate)! Consistent hard work on the problem sets will pay off through higher exam grades. Also, please work to keep up with the course. Physics does not cram easily.

Grades.—

- There will be three "term" exams during the course of the semester and one final exam at the end. You are allowed to drop one "term" exam. Those term exams kept are worth 18% of your grade and the final is worth 36%. You must take the final exam to pass the course.
- Your laboratory grade counts for 18% of your final course grade.
- You will not receive a grade in the course until you have completed the required laboratory work.
- In the event you miss an exam, that one will count as your drop grade. Don't miss two.
- Your grade will be calculated via one of the following formulas, taking the one that yields the highest numerical average:
  2 term exams*(18% each) + 1 final*(36%) + 1 lab grade*(18%) + homework*(10%)
  3 term exams*(18% each) + 1 final*(18%) + 1 lab grade*(18%) + homework*(10%)
  In other words, if you do well on the three term exams, but do poorly on the final, I will use the second formula.
- Your initial relative position on the grading curve depends solely on the numerical grade as calculated above. Professor Jordan will then assign letter grades to the numerical scale. There is no fixed curve to be assigned . . . no grade quotas.
- If you are very close to (but below) a grade boundary (within 1 point) . . . and many of you will be . . . I will give you the higher grade near the boundary if you have put effort into the class and the lower grade if you have not. Two things will go into this evaluation: 1) attendance of workshops, and 2) effort on the "workshop module", as determined by workshop leaders. These components are determined by the number of "checkmarks" you earn in the workshops. You get one checkmark for each workshop you attend and an additional checkmark if the workshop leader determines that you are reasonably prepared and have made significant effort on the module while there. Note: that does not mean you know all the answers! This generally degenerates into an evaluation of whether or not you really participate in the workshop.
- If you are at the bottom of the curve, it does not necessarily mean you are failing the course. It means I have to look very carefully at your scores and effort. If you are living on bits of partial credit and are putting in little visible effort, then you will probably not pass the course. If you are making more mistakes than you should, but are putting in effort and show that you are learning something by taking a pretty good crack at a number of problems through the semester, then you will probably pass.

Lecture	Date	Topic	Chapter and Sections in text
1	Th 1/18	Go over syllabus, units, dimensional analysis	Sec. 1-4 to 1-7
2	T 1/23	Straight line motion, const accel	2-1 to 2-7
3	Th 1/25	Motion in 2D, vectors	3-1 to 3-5
Lab lecture	F 1/26	Laboratory: Intro to Statistics place: Hoit (time TBA)	Lab manual
4	T 1/30	Motion in 2D, continued	3-6 to 3-10
5	Th 2/1	Newton's Laws	4-1 to 4-5
6	T 2/6	Newton's Laws, continued	4-6 to 4-8
7	Th 2/8	Applications of Newton's laws	5
Exam I	T 2/13	**Covers Chapters 1 to 5 (in class)**	
8	Th 2/15	Gravitation	6
9	T 2/20	Work and energy	7
10	Th 2/22	Conservation of Energy	8
11	T 2/27	Linear momentum and collisions	9-1 to 9-5
12	Th 3/1	Linear momentum and collisions	9-6 to 9-8
13	T 3/6	Rotational motion	10 &11
14	Th 3/8	Angluar momentum	10 & 11
	T 3/13 Th 3/15	**Spring Break** **Spring Break**	
Exam II	T 3/20	**Covers Chapters 6 to 11 (in class)**	
15	Th 3/22	Static Equlibrium	12
16	T 3/27	Fluids	13
17	Th 3/29	Oscillations	14
18	T 4/3	Waves	15
19	Th 4/5	Sound	16
20	T 4/10	Temperature, Thermal Expansion, Ideal Gas	17
21	Th 4/12	Kinetic Theory of Gases	18
Exam III	T 4/17	**Covers Chapter 12-18 (in class)**	
22	Th 4/19	Heat and the 1st law of thermo	19
23	T 4/24	Second law of Thermodynamics	20-1 to 20-4
24	Th 4/26	Second law (continued)	20-5 to 20-8
	T 5/1	**Review for Final**	
Final Ex.	Th 5/10	**Hubbell/Hoit @ 4pm**	-