Physics 113 – General Physics
Fall term 2006, University of Rochester
Information, Syllabus, and Schedule

P113 is a physics survey course designed for science majors who are not majoring in physics or engineering. 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. 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.

Course instructor:

Prof. Steven Manly e-mail: **Steven.Manly@rochester.edu**
Phone: 275-8473
Office: B+L 203E

Office hours: Tuesday 2-3:30 and 4:30-5:00 ***or by appointment.*** With my travel and your variable needs/schedules fixed office hours are not terribly practical. If I am out of town or one of the Tuesday time slots does not work for you, speak to me or send e-mail to find a mutually suitable time. Workshop leader office hours are TBA and will be found posted on the class website.

Course web site:

Extensive use will be made of the web for distributing course materials, making announcements, etc. The class URL is http://www.pas.rochester.edu/~manly/class/P113_2006/ **.**
If you have problems reaching this site (and you've verified it is not your problem), please contact me.

WebCT:

I will use some features of WebCT in this course. In particular, I will report grades to you via WebCT. You can log into, and learn more about, WebCT at http://webct.rochester.edu .

Course e-mail:

I will set up a course e-mail distribution list. Time-critical announcements, hints for problem sets, corrections for problem sets, exam location changes, etc. will be sent to you via e-mail. ***It is essential that you be on this list if you are in the course.*** In such a large course, communication is a HUGE issue. Consequently, I will make redundant announcements (via email and class and website) and I will make liberal use of email. I apologize in advance if you feel "spammed" by me from time to time, but it is necessary to keep things running smoothly.

Lectures:

Hoyt Hall, Tuesday/Thursday 1230-1345

Textbook:

- Douglas Giancoli, **Physics for Scientists and Engineers**, Volume 1, 3rd edition (2000), Prentice-Hall.
- Please note that if you are buying a version of the text that will cover P114 material as well, be sure to get the version that includes modern physics.

Books on reserve in Physics and Astronomy (PAS) library:

- Douglas Giancoli, **Physics for Scientists and Engineers**
- Instructor's Solution Manual for Giancoli (use with great care! If you start looking at solutions in this book without first trying the problems on your own, I ***absolutely guarantee I will toast your tail*** in this course!)
- Young and Freedman, **University Physics**
- Halliday, Resnick and Walker, **Fundamentals of Physics**
- Tipler, **Physics**

Philosophy and goals:

I have two major goals in this course as far as each of you is concerned. One goal is to provide you with a basic survey of the principles of mechanics and an appreciation of the importance of these principles to your world. The other goal is to develop in you the ability and confidence to attack analytical problems. (Note: I did NOT say memorize equations!)

Unfortunately, I cannot open your skull and shove this knowledge/ability in your head. I will provide a systematic program of study and assignments at the appropriate level for this course. I have chosen a textbook at the appropriate level for this course. I will give lectures that I think are relevant and useful and even entertaining in spots (have mercy, it's physics after all). I will provide a support system manned by well-trained graduate and undergraduate teaching assistants. ***THE REST IS UP TO YOU!*** I will treat you as professional, adult students. I expect you to treat the course accordingly.

Plug-and-chuggers beware! I rarely give a problem on an exam that is exactly like something you have seen. I will give some problems that are very similar to what you have seen in order to check for basic brain activity. However, I am much more interested in testing your understanding of the concepts/techniques and your ability to use them when facing uncharted territory. Often my exam problems are almost trivial if you understand the concepts and quite difficult if you don't. Typically, they are not hard technically (I'm not testing your ability to do math). We do give substantial partial credit for good attempts. Often the mean on my exams is around 65/100. If the class and the exam are "normal", the mean is roughly a B. In the past, some students have found the low numerical means somewhat frustrating. Though I do not wish frustration on any of you, I find the low mean comes about naturally if I give exams that allow me to evaluate students at the upper end of the curve as well as those at the lower end. Since I must evaluate all the students in the course, we are forced into exams that yield lower means.

Be aware that you'll benefit from working to understand the concepts behind the problems. If you spend time plugging numbers into whatever equation seems to work without putting much thought as to why that is the correct equation

… well, you won't enjoy the exams very much. Honestly, there is no shortcut in this business. The most efficient way to get through this course is to relax and work to understand the concepts and problem solving techniques.

Workshops:

An integral part of this course will be "physics workshop". You will meet once a week, for two hours, with a group of up to eleven other students and a leader. 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 basic idea of the workshop concept is to institutionalize the study group with some leadership and supervision from the professor. The students in the workshop are expected to work through the module. The workshop leader will act as a facilitator, not a lecturer … and not an answer-giver. I *know* my workshop leaders can do the problems. Our job is to help you find it within yourself to do them! It is up to *you* to make your workshop section work.

No attempt will be made to sort out students in the workshop sections according to mathematical ability, gender, date of birth, tattoo color, pierced appendage, etc. 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.

I have data from past courses that show consistent attendance of workshops strongly correlates with a better grade in the course. The workshops are the best way I know to help you understand physics concepts and learn to solve analytical problems.

Workshop leaders will keep track of workshop attendance. This will be one of my gauges as to the level of effort you put into the course. This will be taken into account during the final letter grade assignment and will be the deciding factor for hairline grades.

We will try to sort out the workshop times and assignments during the first week of class. Workshops will begin during the week of January 30.

Workshop leaders:

Please see the class website.

Laboratory:

Currently, the laboratory is conducted independent of lecture. However, the lab grade contributes to your final course grade. **You must do (and hand in) all the labs get a grade for this course.** The laboratory grade will be averaged in as 14% of the course grade. All questions regarding the laboratory should be sent to the laboratory e-mail address (physlabs@pas.rochester.edu) or addressed to

Professor McFarland. The physlabs e-mail address is appropriate for the majority of your questions, and is more likely to yield a timely response.

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. P113 is a quantitative, problem-driven course. I will work mostly on concepts and mathematical techniques 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 students, it is not possible to do well in this course without struggling with most of the homework problems throughout the semester.***

A week after each problem set is assigned, 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 both before and after you turn in your assignment. However, I urge you to struggle with each problem on your own first. Otherwise your colleagues will carry you and you won't get much out of it. Most of you will find it easy to follow someone else's work. If you follow others too much, as you do the problem sets you will find that you are unable to begin problems on your own.

A fraction of your grade (9%) comes from your solutions to the problem sets. Only one problem, chosen at random, will be graded each week. It is not necessary to have the correct solution to the selected problem in order to get credit. You must, however, have made an honest attempt to do the problem. I reserve the right to switch the system from grading a single problem to making a "scan for effort" throughout the problem set or full careful grading of the whole set.

Your solutions to each week's problem set must be handed in by 1:50 pm on Thursday, i.e., the end of class on Thursday. If you can't make it to class, you can turn the problems in early by placing your solutions in my B&L mailbox or under my office door. We will usually release of the official class solutions roughly at the time you hand in your assignment. Solutions handed in late will not be accepted. In case that didn't sink in, let me say it again. ***Solutions handed in late will not be accepted.*** It is expected that most of you will miss handing in two or three assignments due to the need to prioritize your busy lives. I will only count 9 of 12 assignments toward your grade. That means you can fail to turn in up to three problem sets with no direct effect on your grade. ***You should do any problem sets you fail to hand in anyway or your exam grades will suffer and THAT will affect your final grade.***

The point of forcing you to turn in the problem sets is to promote the habit of keeping up with the course. ***Physics does not cram easily***. Many concepts/techniques need time to gel.

Personal response system:

We will use a personal response system (PRS) during lecture this semester. You will need to purchase a PRS transmitter at the bookstore (something like a small remote control). If you still have the one you used in P113, it will work for our class. Bring it to lecture regularly once we start using it. This is a tool that will enable me to get responses from you in real time during lecture. It helps me make the lectures more interactive and engaging (which is tough to do in an analytical course like physics). The use of the PRS device is a requirement in this course. It improves the experience for everyone. I reserve the right to allocate 1% of your final numerical average to PRS usage if too few of you are bringing the PRS devices to class. 1% may not sound like much, but it can be a big deal in the end. I will warn you if I feel that this is necessary.

Presentation or poster:

A fraction of your grade (13%) will come from a verbal or poster presentation to the class about something in the real world that is relevant/interesting to you and can be understood or made to work using the principles of mechanics and thermodynamics. You aren't on your own in this task! These will be a group effort (initially organized around workshop sections) … a fun way to get to know one another and share the joys of physics. ☺ More on this later in the semester …

Where's the prof?:

You are my priority. However, my research duties will force me to travel some this term. I will do all I can to schedule my travel so that it has a minimal impact on your class. However, I won't be able to completely avoid it. Class will go on. I'll do my best to arrange a decent guest lecturer or record a video of the lecture and stream it for you or arrange for you to view it with someone present to answer questions. The option I choose will depend on the nature of my trip and your preferences. I will usually be in e-mail contact when out of town.

Makeups/missing exams and problem sets:

If you miss the final exam for this course you will have to take an incomplete in the course and take the final exam in December 2007 in order to complete the course. If you miss one of the term exams *for any reason* (no matter how good or frivolous), that exam will count as your "drop". I do not want or need to hear about it. If a good reason is forcing you to miss a second term exam, contact me and I will try to work something out with you.

I have provided flexibility in the structure of the course to allow you to miss an exam and a reasonable fraction of the problem sets with no penalty. Use this flexibility sparingly and in times of real need because I will not negotiate for additional flexibility. Bear in mind that a big motivation of the problem sets is to

keep you from falling behind in the course. To allow you to skip or do these assignments late defeats their purpose.

Lab lectures:

Short lab lectures will be delivered by TA's at the start of each lab. In addition there will be exactly **-one-** general laboratory lecture to the class as a whole. The topic will statistics and it will be delivered on Friday, September 8 at 3:30 pm in Hubbell Auditorium.

Grades:

- All exam grades will be rescaled so that the class mean of each exam is 70. For example, if the overall mean of exam 1 is 63, everyone's exam 1 grade will be rescaled by 70/63 before the grade calculations below are performed. This renormalization will (approximately) even out the variations in exam difficulty.
- Your grade will be calculated via one of the five schemes shown in the table below, taking the one that yields the highest average. The numbers represent the relative contribution of the item in that column to your final numerical grade.

Scheme	Exam 1	Exam 2	Exam 3	Final exam	Lab	Prob sets	Project
1	---	16%	16%	32%	14%	9%	13%
2	16%	---	16%	32%	14%	9%	13%
3	16%	16%	---	32%	14%	9%	13%
4	16%	16%	16%	16%	14%	9%	13%
5	18%	18%	18%	23%	14%	9%	---

- You will not receive a grade in the course until you have completed the required laboratory work.
- Your initial relative position on the grading curve depends solely on the numerical grade as calculated above. I will then assign letter grades to the numerical scale. There is no fixed curve to be assigned … no grade quotas. If you all do "A" work in my eyes, you ALL get A's and I get to deal with the dean and the chairman of the department … but so be it. It's a problem I would love to have!
- If you are close to (but below) a grade boundary (within one point as the rounding is done to the nearest integer by my Excel spreadsheet) … and many of you will be … I will give you the higher grade near the boundary if you have attended more than half the workshops.
- 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 may 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 pass … you may not be in any danger of an A, but you'll get through the course.

Schedule:

This course schedule is approximate. The exam dates are fixed. Exam subject matter will change as appropriate for the material covered.

Lecture	Date	Topic	Chapter in text
1	Sept 5 (Tu)	Organizational stuff, units, vectors	1
2	Sept 7 (R)	Straight line motion	2
3	Sept 8 (F)	Lab Lecture: Intro to statistics Hoyt 3:30-5 pm	Lab website
4	Sept 12 (Tu)	Motion with const. Acceleration	2
5	Sept 14 (R)	Multidimensional motion, vectors	3
6	Sept 19 (Tu)	Projectile motion	3
7	Sept 21 (R)	Circular motion, Newton's Laws	3, 4
8	Sept 26 (Tu)	Newton's Laws	4,5
9	Sept 28 (R)	Newton's Laws, examples	4,5
10	Oct 3 (Tu)	Newton's Laws, examples	4,5
Exam I	Oct 5 (R)	12:30-1:45 (Hoyt Auditorium)	~1-4
11	Oct 10 (Tu)	Work, energy, vector scalar product	7
12	Oct 12 (R)	Gravitation	6,7,8
13	Oct 17 (Tu)	Potential energy, energy conservation	6,7,8
14	Oct 19 (R)	Momentum	9
15	Oct 24 (Tu)	Rotational motion	10
Exam II	Oct 26 (R)	0800-0930 (Hubbell Auditorium)	~5-10
16	Oct 26 (R)	Rotational motion	10
17	Oct 31 (Tu)	Angular momentum, cross product	11
18	Nov 2 (R)	Torque and Angular momentum	10,11
19	Nov 7 (Tu)	Equilibrium	12
20	Nov 9 (R)	Examples	11,12
22	Nov 14 (Tu)	Fluid mechanics	13
22	Nov 16 (R)	Simple harmonic motion	14
Exam III	Nov 21 (Tu)	12:30-1:45 (Hoyt Auditorium)	~10-14
holiday	Nov 23 (R)	Thanksgiving …no class (give thanks!)	
23	Nov 28 (Tu)	Waves	15
24	Nov 30 (R)	Waves, sound and music	16
Posters	Dec 2 (Sat)	**Project posters** (1-3 pm, Loc TBA)	-
25	Dec 5 (Tu)	**Project presentations**, thermo	17
26	Dec 7 (R)	**Project presentations** thermodynamics	18
Final Ex.	Dec 18 (M)	7:15pm, location TBA	cumulative