Physics 113 – General Physics
Fall term 2013, 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, fluids, thermodynamics (if time), 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: Monday 3-4 pm and Tuesday 2:15-3:30 or by appointment**.** With my frequent travel associated with my research and your variable needs/schedules, fixed office hours are not terribly practical. If I am out of town or the specified time slots do not work for you, speak to me or send me an e-mail to find a mutually suitable time. Walk-in office visits (no appointment) are welcome with the understanding that if I'm in the middle of something else we might have to put off our discussion to a mutually acceptable time.

Workshop leaders/TA's:

Jeff Kleykamp - jkleykam@z.rochester.edu
Shih-han Hung – shihhan@pas.rochester.edu
Selin Haci – shaci@u.rochester.edu
Tanveer Karim – mkarim2@u.rochester.edu
Dilyana Mihalova – dmihaylo@u.rochester.edu
Kevin Silverstein – ksilver2@u.rochester.edu
Steven Torrisi – storissi@u.rochester.edu
Jun Yin – jyin6@u.rochester.edu

Workshop leader office hours/locations will be announced soon.

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_2013/ **.**
If you have problems reaching this site (and you've verified it is not your problem), please contact me. Additional material, including your grades, will be distributed via BlackBoard.

Course e-mail:

I will use BlackBoard to email the class time-critical announcements, hints for problem sets, corrections for problem sets, exam location changes, etc. You will need to be registered formally for the course to receive these emails. Also, once registered for the course I advise you to check the appropriate email account with reasonable frequency, particularly if you miss the beginning of lecture when I will make general announcements.

Lectures:

Hoyt Hall, Tuesday/Thursday 1230-1345

Textbook:

- Douglas Giancoli, **Physics for Scientists and Engineers**, Volume I, 4th edition (2009), Prentice-Hall.
- You may find this textbook as a single volume or as a large single volume that includes mechanics. If you get the version that includes electricity and magnetism (for physics 114), make sure it includes the modern physics chapters at the end.
- You are welcome to use previous editions of the text. Just be aware that the problem assignments will be referring to the problems in the 4th edition. Copies of the 4th edition will be on reserve in the Physics and Astronomy Library located on the 3rd floor of Bausch and Lomb Hall.
- I think you have the option of purchasing access to the Mastering Physics site online. This site has an electronic version of the text that you can see/access (not downloadable). It also has some tutorials and the such some of you may find useful. As I understand it, the access to the site which you purchase only lasts a couple of years. I am asking that you buy the hard copy text or purchase access to the online version of the text for your use in the course. I believe if you purchase the hard copy of the text in the bookstore, the online access to Mastering Physics is included.

Some useful 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 problem – significant effort - on your own, I ***absolutely guarantee I will toast your tail*** on the exams!)
- Young and Freedman, **University Physics**
- Halliday, Resnick and Walker, **Fundamentals of Physics**
- Tipler, **Physics**

Philosophy and goals and advice for surviving this couse:

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 is physics after all). I will provide a support system manned by well-trained 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 for the most part). 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, I feel forced to give 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, you'll have a long and miserable semester in this course. Sadly, there is no easy way out. The concepts will seem rather opaque at first, but once grasped, things will seem rather easy … sort of like riding a bike.

I try very hard to make my lectures understandable. Remember that during lecture I am taking you by the hand and leading you through a story that I want to tell. That is very different from facing problems on an exam without my being there to guide you. You really must spend significant time in workshop and doing problem sets if you hope to understand this material and do well on the exams.

Finally, some of you will be deceived into thinking of this as an easy course initially. If you have seen some of these concepts before (and most of you have) the initial part of the course will make sense and seem boring. If I give an exam before we hit Newton's Law problems, the mean is usually very high (85ish). If I give an exam after we hit Newton's Law problems the mean drops to 65. As we move into the material, things becomes more subtle and people who like to take shortcuts will often get confused and think about the physical situations incorrectly. New concepts/techniques in much of this course will seem complex and opaque at first. That said, consistent hard work will pay off and the concepts and ability to solve the problems will come. This material requires time to bounce around your skull for a while before it begins to make sense. Most

students studying for finals cannot believe how they missed trivial things on the earlier exams – indicating that they didn't let things bounce around enough to gel before the earlier exam. Give it time. Study along the way. ***Be warned: in my experience, most students who cram for physics exams do not do very well*** *(as compared to how they do when they cram for many other courses).*

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 or so other students and a leader. During this time, you will work with your fellow students on a "workshop module" that I prepare. The module will contain simple questions, conceptual exercises, and quantitative problems relevant to the material (usually) covered the week before in class. At times the workshop material may be new to you (depends a bit on the synchronization between lecture and workshop). Some of the problems will be simple and some quite complex.

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 together or in small subgroups. 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 explain 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 used as motivation for me to bump upward (or not) grades within one point of a grade boundary in the final distribution

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Laboratory:

Currently, the laboratory is conducted independently of lecture. However, the lab grade contributes to your final course grade. **You must do all the labs get a grade for this course.** The laboratory grade will be averaged in as 16% 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 Bodek. The physlabs e-mail address is appropriate for the majority of your questions, and is more likely to yield a timely response. There is no reason to contact me concerning lab issues unless your problem has not been resolved by the professor and staff running the laboratories.

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, you will find that you are unable to begin problems on your own, which will make the exams rather painful.

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. The TA's will be instructed not to accept solutions that are obviously copies of the Giancoli solution without significant original effort and elaboration also being in evidence.

Your solutions to each week's problem set must be handed in before 7 am on Friday. To turn them in, deposit them in the "P113" locker in the hallway by B&L 106. I will ask that one of the TAs empty the locker when they come in on Friday mornings. If the problem set is not in that locker when the papers are picked up, it will count as a zero. Rather than negotiate or pass judgment about poor or good excuses, I will give you three problem set "drops", no questions asked. In other words I will only count 9 of the 12 (or so) assigned problem sets. In spite of that, you should do and come to closure on any problem sets you fail to hand in or your exam grades will suffer and that *will* affect your final grade.

The point of asking 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.

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. Typically, when this happens, I will cancel class at the regular time and post a PDF file of the lecture slides and an accompanying mp3 audio file. Upon return, I will make the assumption that you have covered the material and listened to the lecture. I will usually be in e-mail contact when out of town, though I might not be carrying my copy of the textbook.

Makeups/missing exams and problem sets:

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. Makeup exams involve a huge amount of work for me and, quite honestly, cannot be done fairly in a course like this. So, please don't come ask me to give you a makeup exam because you feel that you had a decent reason for missing the exam in the first place. The flexibility in the system is already there for you. If you have good reasons to miss two term exams, contact me.

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.

Plan not to miss the final exam. If you request a makeup final exam because you mistakenly bought an expensive plane ticket for the incorrect date for going home for the holidays, I will laugh at you. Seriously. The date for the final exam is set. Plan around it.

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 6 at 3:30 pm in Hoyt Auditorium.

Grades:

- All exam grades will be rescaled so that the class mean of each exam is 100. For example, if the overall mean of exam 1 is 63, everyone's exam 1 grade will be rescaled by 100/63 before the grade calculations below are performed. This renormalization will (approximately) even out the variations in exam difficulty (this is essential since I am allowing each student to drop an exam grade potentially).
- Your grade will be calculated via one of the four 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
1	---	20%	20%	35%	16%	9%
2	20%	---	20%	35%	16%	9%
3	20%	20%	---	35%	16%	9%
4	18%	18%	18%	21%	16%	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 and subject to change as we go. The exam dates are fixed. Exam subject matter will change as appropriate for the material covered.

Lecture	Date	Topic	Chapter
1	Sept 3 (Tu)	Organizational stuff, the nature of physics	1
2	Sept 5 (R)	1d motion, kinematic variables	2
3	Sept 6 (F)	Statistics lecture (for lab) Hoyt 3:30-5 pm	Lab website
4	Sept 10 (Tu)	1d motion with constant accel.	2
5	Sept 12 (R)	More 1d motion, vectors	3
6	Sept 17 (Tu)	More vectors, multidimensional motion	3
7	Sept 19 (R)	motion, newtonian gravitation	4,5,6
8	Sept 24 (Tu)	Newton's laws	4,5
9	Sept 26 (R)	Newton's laws, friction	4,5
10	*Oct 1 (Tu)	Friction, circular motion, energy	4,5,7
Exam 1	*Oct 3 (R)	0800-0930, no lecture this day	
11	Oct 10 (R)	Work and Energy, springs	7
12	Oct 15 (Tu)	Springs, potential energy	7,8
13	Oct 17 (R)	Potential energy, gravitation	6, 7,8
14	Oct 22 (Tu)	Gravitation, momentum conservation	6,7,8,9
15	Oct 24 (R)	Mom conservation, Center-of-mass coords	9
16	Oct 29 (Tu)	CM coordinates, rotational kinematics	9
17	Oct 31 (R)	Rotational motion, energy conservation	9,10
18	Nov 5 (Tu)	Rotational motion, moment of inertia	10
19	Nov 7 (R)	Cross product, angular momentum	10,11
Exam 2	Nov 12 (Tu)	0800-0930, we will have lecture this day	
20	Nov 12 (Tu)	Torque, angular momentum, precession	11
21	Nov 14 (R)	Static equilibruim	12
22	Nov 19 (Tu)	Static fluids	13
23	Nov 21 (R)	Fluids (static and dynamic)	13
24	Nov 26 (Tu)	Fluid dynamics	13
25	Dec 3 (Tu)	Simple harmonic motion	14
Exam 3	*Dec 5 (R)	Exam 3 in Hoyt during lecture time	
26	Dec 10 (Tu)	Waves	15,16
27	Dec 12 (R)	Waves	15,16
Final Ex.	Dec 19 (R)	7:15pm, location TBA	cumulative

**No lecture in Hoyt on Oct. 1 (I'm out of town), Oct. 3 (exam earlier in the day) , and Dec. 5 (exam during lecture time instead of lecture). To substitute for the Oct. 1 lecture, I plan to post pdf files with detailed slides and an mp3 audio file to stream for the lecture.*