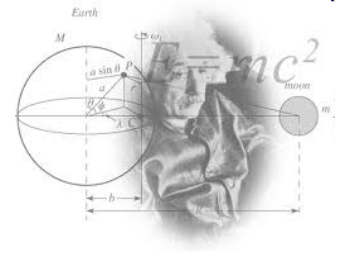




# PH101: Essentials of Physics

## Portland State University, Fall 2010



**Instructor:** Chris Butenhoff

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**Office hours:** T, Th 1500-1600, or by appointment.

**Room:** BA 190

**Class Meeting:** TR, 12:00-13:50h

**Webpage:** Blackboard, <http://bb.pdx.edu>.

**Required Text:** Inquiry into Physics, Vern Ostdiek/Donald Bord, Cengage Learning

## WELCOME

In physics we try to discover how the Universe works, what rules it follows, what organizing principles it obeys, and of what stuff it is composed. This does more than simply satisfy our curiosity, in many ways this pursuit creates our notion of the Universe. It creates a model of what's "out there", of reality. In this light the pursuit of physics is more than just a means to build better mousetraps or to understand the rainbow's colors, physics can and does influence how we view the world and our place in it. As such it's a vital branch of knowledge not just to scientists and engineers but to all inquisitive, informed people. A well-rounded education is simply incomplete without physics.

This class is the first part of a two term sequence. The course continues Winter term as Ph 102. We will roughly cover half the textbook this term including Newton's laws of motion and gravity, the principles of conservation of momentum and energy, phases of matter, and thermodynamics. This is primarily a course on classical physics, those concepts that were laid down during seventeenth through nineteenth centuries that overturned two thousand years of prior human knowledge and changed the way future people would think about their world. Some recognize this advancement as the greatest human achievement in science.

### Course goals

In addition to the physics content of the class, by the end of the term you should be able to:

- Form a conceptual framework of physics that will help you better understand the natural world.
- Understand the scientific method and see it as one way of gaining knowledge.
- Appreciate how physics helps shape our personal and cultural worldviews.
- Recognize physics in your daily life.
- Improve quantitative literacy and critical thinking skills.
- Improve logical thinking by applying equations of physics to novel situations.

### Difficulties:

Though we are modern people, in many ways we view the physical world as the ancients did. We have misconceptions about basic physical concepts from our common everyday experiences. It took human thought over two thousand years to change this view. You'll be asked to do it in ten weeks. It takes time and practice to fully integrate these new concepts into our thinking. We don't have much time so you'll need to practice. My advice is to work through as many exercises and problems at the end of each chapter as you can.

Many students believe that simply reading the chapter text alone is sufficient to understand physics. It isn't, so please don't fall into this trap. On quizzes and exams you won't simply be repeating chapter text, rather you'll be applying the concepts to novel problems.

Another difficulty with physics is the language. Terminology in physics may have different meanings than how we use it in everyday conversation. For example, in common-use, we tend to use such words as velocity, speed, momentum, and inertia, interchangeably. In physics each of these has a precise meaning. Much of the challenge is to first "unlearn" our preconceived definitions and replace them with the physical definitions.

### **Math requirements**

You should look through the textbook to assess whether you are comfortable with the level of mathematics in this course. The equations we'll use are algebraic, for example  $F=m*a$ . The ability to manipulate algebraic equations like this (for example, solve for the variable "a") will be of great help to you in learning the material. We'll be working with graphs and slopes, scientific notation, and unit conversions. We'll go slowly through these and there's a good math review at the end of the textbook. I'm happy to work with you as well.

**Blackboard:** If you are enrolled in the course, you automatically have access to the Blackboard site. Log on to the site at <http://bb.pdx.edu> with your ODIN username and password. The Blackboard site is a repository for class materials and announcements. You will also find a grade sheet that lists your grades for quizzes and exams. Make sure to check it often and report to me if you think there is an error in your grade.

The discussion boards on Blackboard can be used for communication with your classmates on a variety of topics related to the class. We'll also make use of the discussion boards for extended conversation on posted articles. Participation in these discussions counts toward extra credit. See the extra credit section below.

Though I will check the discussion boards periodically, *do not use it for communication with me.*

**Participation:** I encourage discussion and inquiry throughout the class. Classroom time can be more productive for you if you come to class prepared. This requires commitment on your part to read the text before coming to class. Please do so.

In an attempt toward more active learning, I will intersperse lectures with activities that will allow you time to discuss the topics of the day and practice short problems within small groups. None of these exercises will be graded, but they are used toward your extra credit participation grade.

### **Quizzes**

There will be short (10-15 min) quizzes every week. These are a good way for you to keep up-to-date with the material and for me to assess class comprehension. It also helps alleviate some of the stress placed on the exams. The quizzes will be based on material presented in the lecture and text since the previous quiz. The quizzes are given at the beginning of class and *no allowance will be made for late arrivals*. I will drop your two lowest quiz scores. You will need approximately six Scantrons for the term (available at PSU Bookstore and Student Union).

## Exams

There will be one midterm and the final. Exams will contain both multiple-choice and short answer questions. The final will be comprehensive with an emphasis on the material covered after the midterm. You are allowed to use one sheet of notes --- front and back --- for the exams and a calculator. You are responsible for all specified material in the text and lectures.

## Lecture notes

Lecture notes will be posted on Blackboard. My lecture notes do not cover everything covered in class so don't substitute these for attending class or taking notes yourself. Lecture notes typically are posted a day after the lecture.

## Homework

I will not collect homework problems. This does not mean doing end-of-chapter exercises and problems is not important --- it is. But with a large class, it's difficult to efficiently grade homework sets. Instead I have posted a number of recommended homework problems on Blackboard. I encourage you to do these and more. Practice is essential to success. I will gladly answer any questions you have.

## Extra Credit Opportunities:

1. *Presentation (up to 3 pts)* – About a 10-minute presentation at the beginning of the class. Your presentation should draw from one of three areas below:

*New physics:* Current research in physics.

*Physics of everyday life:* Application of the physics we'll learn in class to everyday activities/phenomena, e.g. physics of bicycles, sailing, tennis, etc.

*Demonstration:* A demonstration of the physics we'll learn in class. Feel free to be creative with this.

Let me know in advance if you wish to present. Time slots will fill-up on a first-come, first-served basis. If you are interested, I encourage you to present sooner rather than later.

2. *Online Discussion (up to 3 pts)* – I will post a number of essays and articles on Blackboard that cover topics outside those we discuss in class. To gain extra credit you are encouraged to participate in an online discussion of these articles. For full credit you'll need to contribute at least fifteen posts throughout the term. The posts need to be non-trivial in content. Your posts can be responses to points raised by others or your own ideas. Feel free to recommend topics to me.

3. *Participation (up to 3 pts)* – Throughout the term we will do a number of in-class activities like interactive lecture demonstrations and short partner/group activities. Turn in at end of class for credit.

**Absences** - To establish a fair make-up policy, only excused absences will be given the opportunity to do missed work. Missing an assignment due to work or other conflicting appointments are not valid absences. If you think you will miss a significant amount of class-time due to outside responsibilities, please be aware of this policy. I drop your two lowest quizzes to accommodate absences due to illness.

**Announcements:** Most announcements and communications will be through Blackboard. Please check the site often for updates.

**Respect:** You can do some simple things to ensure that everyone in class has the best opportunity to learn and do well. Please turn off cell phones before class, refrain from unnecessary conversations with others, refrain from listening to music, watching videos, or playing games during class. Above all please treat others with respect. We all enter the classroom with different skills and experiences. I'd like to have a classroom that is welcoming to all.

## Grading

### *Point Distribution*

Quizzes (drop two)	25
Midterm	35
Final Exam	40

### *Extra Credit*

Presentation	3
Blackboard Discussion	3
Participation	3

### *Final grades*

100-90	A
80-89	B
70-79	C
60-69	D
<60	F

“+” for top three percentages in each range

“-“ for bottom three percentages in each range

NOTE: If the class average is less than a middle C (75) (before extra credit is considered), all scores will be adjusted upwards to meet this criterion.

P/NP students must get 70% for a P.

Final Grades are final. No extra work can be done after grades are submitted to better your grade.

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