

# PHYS 103

## Introductory Physics I

### Bowdoin College – Spring 2011

Meeting Times:

(LECTURE) Searles 315, MWF 9:30a – 10:25a

(LAB) Searles 323 (01: M 1:00p-3:55p, 02: T 1:00p-3:55p, 03: F 1:30p-4:25p)

Instructor: <b>Rob Salgado</b> Visiting Assistant Professor of Physics Office: <b>Searles 304</b> Voice: (207)-725-3170	Email (the <u>best</u> way to contact me): <b>rsalgado@bowdoin.edu</b> Instant-Messengers: AOL, WindowsLive[hotmail], Yahoo, Google, Skype: <b>robowphy</b> (IM only... do <i>not</i> email here—I won't read it)	Office hours: <b>-to be announced</b>
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Lab Instructor: **Kenneth Dennison** ([kdenniso@bowdoin.edu](mailto:kdenniso@bowdoin.edu)), Searles 125 (207)-798-4315

Departmental Coordinator: **Dominica Lord-Wood** ([dlord@bowdoin.edu](mailto:dlord@bowdoin.edu)) (M-F 9:30-5:00), Searles 319 (207)-725-3308

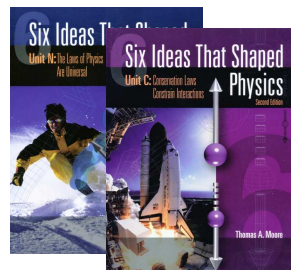
Catalog Description:

#### PHYS 103 – Introductory Physics I

An introduction to the conservation laws, forces, and interactions that govern the dynamics of particles and systems. Shows how a small set of fundamental principles and interactions allow us to model a wide variety of physical situations, using both classical and modern concepts. A prime goal of the course is to have the participants learn to actively connect the concepts with the modeling process. Three hours of laboratory work per week. To ensure proper placement, students are expected to have taken the physics placement examination prior to registering for Physics 103.

[Prerequisite: MATH 161 or higher with a minimum grade of C-. (May be taken concurrently).]

(Inquiry in the Natural Sciences, Mathematical, Computational, or Statistical Reasoning)



Required Materials:

**units C and N of “Six Ideas That Shaped Physics” (2nd ed)**, T.A. Moore [(McGraw-Hill, 2003), 978-0072291520 and 978-0072397123.]

**Bowdoin College Phys 103 Laboratory Manual.** Purchase (for \$5 cash) from the dept. office (Searles 319) before your first lab session.

Graph Paper Notebook, Quad Ruled, available at the college bookstore. Choose a size thin enough to fit inside the homework return slot.

A scientific calculator will be needed for problem assignments, in the lab, and for examinations. Please label the calculator with your name.

*Optional supplements (featuring review summaries and worked problems) that may be useful to you:*

various Schaum's Outlines for Physics: <http://bowdoin.aquabrowser.com/?q=schaums+physics&cmd=find>

Electronic Materials:

I will maintain a Blackboard website ( <http://blackboard.bowdoin.edu/> ) that links to homework assignments, electronic-whiteboard notes, and handouts. (These materials are not a substitute for regular attendance, participation, and problem-solving.)

Course Goals:

- A. To develop Newtonian concepts in physics, with an emphasis on fundamental principles.
- B. To reinforce important concepts in physics and mathematics.
- C. To further develop physical intuition, mathematical reasoning, and problem solving skills (including scientific modeling and computational thinking).

Course Requirements:

Come to class **ON TIME, AWAKE, and ALERT (to the physics topic under discussion)**.

Come to class PREPARED and EQUIPPED, having read or written any assignments. You are expected to familiarize yourself with the material before class by reading the assigned chapters in the textbook. Class time will be used to discuss this material, work through examples, and to address any questions or problems you may encounter. Read the Introduction for Students on page xvi of Unit C.

Grades are roughly weighted as follows:

\* means that “You cannot earn a passing grade without this item”

~~15% IN-CLASS EXAM #1 (tentatively, Fri, Feb 18) 20% PROBLEM SETS

~~15% IN-CLASS EXAM #2 (tentatively, Wed, Apr 6) 20% LAB (required\*)

~~30% CUMULATIVE FINAL EXAM (required\*) Tue, May 17, 2011 at 9:00am

Final letter-grades are based on a modification of the scale **A [95 90] B [87 84 80] C [77 74 70] D [67 64 60] F[59 and below]**.

Your final grade will be no worse than this scale.

Problem Sets (due daily in “THE HOMEWORK BOX” before class):

You are strongly encouraged to discuss the homework with other students. However, be sure that you can do the homework *by yourself* and that you present your own work. You can always ask me or the TAs for help after you have made an honest effort. You are always welcome to stop by my office hours, send an email, or an IM.

**Tutoring sessions:** Searles Science Room 313 will be reserved on Sunday, Tuesday, and Thursday evenings from 5:00-11:00 for those Physics 103 students wishing to work together on problem sets. On Sunday and Tuesday nights from 7:00-9:00 upper-level physics students will also be available to provide assistance. The tutoring sessions are intended to help you with the process of solving the problems, not to lead you to the “right answer.”

On each assignment, be sure to include your name, the due date of the assignment, and the names of any fellow students from whom you received assistance. Please use 8.5" x 11" paper without ragged edges.

Assignments are due before the start of each class, and should be deposited in the locked homework box on the south end of the third floor of Searles Science Building. This box will be emptied a few minutes after the start of class. Late assignments will not receive credit because problems may be discussed in class on the day they are due, and solutions will be posted immediately.

Graded problem sets will be returned to your individual homework slot on the wall near the locked homework box. Make sure you only pick up your own assignments from the slots.

Solutions will be read by a grader or by the instructor. Explain your problem-solving procedure in words; equations alone are not sufficient. How you do a problem is more important than obtaining the correct numerical answer. If you are confused about some aspect of the problem, identify that aspect. If you make any assumptions, state them. Hand in as much as you can accomplish on each problem. Again, the thought process is more important than the final answer, so even unfinished problems are worth handing in. Solution sets will be posted on the third floor of Searles Science, and are also collected in a folder in the department office (319 Searles). You may not photocopy these solutions, but you may take notes based on them.

Missed exams and Alternate arrangements for Exams:

There are no makeup exams. There are no exceptions. If you are absent for an exam or a lab, **within one (1) week, you must send me an email with your excuse.** Only if that excuse is valid, your final exam will carry the weight of a missed exam. Otherwise, you will get zero credit for the missed exam. You are, of course, responsible for the content of any missed exam.

Requests for alternate arrangements must be **made in advance** and **must be accompanied by an email addressed to me.** I will reply by email with my decision on your request.

Labs:

The course includes weekly laboratory work. Labs will be held in Room 323 Searles Science. Students are expected to do all laboratory work, and to do it on the regular assigned day unless arrangements are made with the lab instructor in advance.

**Proposed Sequence of PHYS 103 topics (subject to adjustments, as needed):**

All of unit C, followed by all of unit N, followed by a brief introduction to Special Relativity.

Some advice:

Physics is a **challenging** subject that requires your dedicated attention, but rewards you with skills that you can apply in **any** discipline!

Physics is **cumulative**: For example, understanding Ch 12 requires that you understand many of the chapters before it.

*You must not fall behind! If you find yourself falling behind, you must get some help. Ask for help from your classmates! Your TAs! Me!*

Physics is written and spoken in a **Mathematical** language.

**This is a calculus-based course:** techniques of Differentiation and Integration will be used.

No matter how well you may have done in calculus, **don't neglect Algebra, Trig, Geometry and Pre-Calculus!** Review basic math!

Physics is about "understanding **relationships** between physical quantities", which we uncover by experiment and by logical and mathematical reasoning.

Physics is **NOT about formulas** and merely plugging-in numbers.

Formulas are often only "special cases of expressions of those relationships".

*"Knowing a formula without knowing when it applies" is generally useless.*

The act of "plugging-in numbers" measures your ability to do Arithmetic or to use a calculator.

The resulting number is only useful when you interpret it physically. *"The right number with the wrong physics" is just plain wrong.*

**YES, YOU CAN** understand and succeed in Physics only if YOU put in the required work.

Just attending lectures and labs is not enough. Just taking good notes is not enough.

Just reading the textbook is not enough. Just memorizing formulas and definitions is not enough.

Just doing the homework is not enough. Just reading the solutions is not enough.

There are no shortcuts. **YOU HAVE TO DO IT ALL.**

Most of the learning you will do is done by **you working out numerous physics problems outside of class!** (I am merely a guide for you.)

Your goal should be to do many physics problems so that

you learn how to approach new problems by thinking critically and logically ---not to merely redo old problems with new numbers.

Your textbook offers many sample-problems and end-of-the-chapter problems. Additional problems with worked solutions are in the electronic books listed on the first page of this syllabus. There are many introductory textbooks that also provide problems and worked-solutions.

While there are a lot of physics problems around, you should focus on physics problems that are similar to the assigned homework problems and that are nearby problems in the same section of the assigned problems.

I choose problems to help illustrate various physical ideas and mathematical skills that I feel are important.

You miss out on learning if you do not struggle, do not recognize and you do not reflect on what those ideas and skills are as you complete the problems. Please read my detailed solutions for elaborations of some of these key points.

You should be regularly reading ahead of the lecture.

Don't wait until I discuss a topic or wait until the end of the chapter before attempting the homework problems.