version: 9/10/2012
This document will be revised.

PHYS 141
Principles of Mechanics

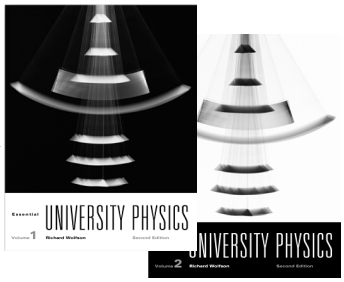
Lawrence University – Fall 2012

Meeting Times:
(LECTURE) **Youngchild 121, MWF 8:30a – 9:40a** (LABs) **Youngchild 118 (5058: Tu 1-4; 5059: W 1-4; 5060: Th 8-11a; 5062: Tu 8-11a)**

Instructor: **Rob Salgado** **Visiting Assistant Professor of Physics** Office: **Youngchild 111** Voice: **(920)-993-6083**	Email (the best way to contact me): **roberto.b.salgado@lawrence.edu** Instant-Messengers: AOL, WindowsLive, Yahoo, Google, Skype: ****to be announced**** (IM only… do *not* email here—I won't read it)	Office hours: ****to be announced****

(LABs) **Youngchild 118 (5058: Tu 1-4; 5059: W 1-4; 5060: Th 8-11a; 5062: Tu 8-11a)**
Lab Instructors: **Jeffrey Collett** and **Matthew Stoneking**

Catalog Description:



PHYS 141 - Principles of Classical, Relativistic, and Quantum Mechanics
A calculus-based introduction to fundamental concepts in mechanics, from Galileo and Newton through relativity and quantum mechanics. Weekly laboratories emphasize the acquisition, reduction and interpretation of experimental data and the keeping of complete records. Explicit instruction in calculus will be provided.
Units: 6.
Prerequisite: None, but calculus is recommended.

Required Materials:

Essential University Physics (2nd edition), Volumes 1 and 2.
Richard Wolfson (Addison Wesley/Pearson, 2012).

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

Electronic Materials:

I will maintain a Moodle website (**http://moodle.lawrence.edu/course/view.php?id=5536**) 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)… which can be applied to many fields of study outside of physics!

Course Requirements:

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

You are expected to **have read the assigned chapters before class**.
Class time will be used to **discuss this material with *other students,*** work through examples, and to address any questions or problems you may encounter.

Grades are roughly weighted as follows:

5% CLASS PARTICIPATION (mainly discussing physics with other students during class)
20% HOMEWORK (lowest nonzero grade will be dropped)
20% LAB
30% TWO in-class EXAMS (15% each)
25% CUMULATIVE FINAL EXAM: Sunday, November 18, 2012 3:00-5:30pm [Be sure your travel plans agree with this.]
Final letter-grades are based on a modification of the usual scale: **A [100-90] B [89-80] C [79-70] D [69-60] F[59 and below].**
Your final grade will be no worse than this scale. There are no quotas for the various letter grades.

Homework (due at the start of *[tentatively] Monday*'s class, in "THE BOX"):

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 in "THE BOX" at the start of Monday's 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. It is my intention to coordinate with the graders to have your homework returned promptly.

Solutions will be scored by a grader. 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.

Our text employs a strategy, **"IDEA"** (interpret, develop, evaluate, and assess), that we will try to adopt.

Getting HELP!

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 tutors for help after you have made an honest effort. You are always welcome to stop by my **Office Hours** or to **send an email or an IM.**

Tutoring sessions: (to be arranged) The tutoring sessions are intended to help you with the process of solving the problems, not to lead you to the "right answer."

Proposed Sequence of PHYS 141 topics (subject to adjustments, as needed):

```
Su Mo Tu We Th Fr Sa
   10 11 12 13 14 SEP    Ch 1-3
   17 18 19 20 21        Ch 4-5
   24 25 26 27 28        Ch 6-7  ; EXAM-1 (Ch 1-5), tentatively FRI, Sep 28
    1  2  3  4  5 OCT    Ch 8-9
    8  9 10 11 12        Ch 13,15,33a
   15 16 17              Ch 33z  ; reading period
   22 23 24 25 26        Ch 34   ; EXAM-2 (Ch 6-9, 13,15,33), tentatively FRI, Oct 26
   29 30 31  1  2 NOV    Ch 35-36
    5  6  7  8  9        Ch 38-39a
   12 13 14 15           Ch 39z
18                                FINAL-EXAM
```

[It is best to resolve schedule conflicts *before* the scheduled in-class exams.]

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 7 requires that you understand many of the chapters before it.

Do not fall behind! If you find yourself falling behind, you must get some help. Ask for help from your classmates! Tutors! Me!

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

This is a calculus-based course: some 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.*

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. I will try to make available access to additional problems with worked solutions. There are many other physics 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 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.
(There is more for you to learn by reading and reflecting on the homework solutions.)

You should be regularly reading ahead of the lecture.
You don't have to wait until I discuss a topic or wait until the end of the chapter before attempting the homework problems.