Physics 151: PRINCIPLES OF CLASSICAL PHYSICS

Winter, 2011

"It seems to me a superlative thing to know the explanation of everything, why it comes to be, why it perishes, why it is." — Plato

Contact Information:

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Note: Moodle will be used "maxwell"

Meeting Times:

Lecture (Youngchild 121): 8:30-9:40 am MWF
Laboratory (Youngchild 115): 1:00-4:00 pm W, Th
8:00-11:00 am T, Th
Office Hours: 10:30-11:30 am MW, 1:30-3 pm Th
Group Homework Sessions: Wed. 8:30-10 pm, YC 115

Course Outline and Goals:

Physics 151 provides a calculus-based introduction to concepts in classical physics: mechanics; electricity and magnetism; circuits; optics; and thermodynamics. The goals of this course are:

- To develop an intuitive understanding of fundamental physical concepts.
- To use this conceptual understanding to quantitatively analyze and solve problems.
- To look beyond the textbook exercises and think about how these concepts apply outside the classroom.

Required Materials:

R. Wolfson, *Essential University Physics*, volumes 1 and 2; ISBN: 978-0805392128 Pearson (2007).
Theory of Experiment. *ToE* will be distributed in class. Your student account will be charged $7.88 ($7.50 + 5% tax) after the second week of class.
Computation Notebook (Lab book, # 43-648). Shared by lab partners.

Course Philosophy:

The lectures in this course will be devoted to understanding the concepts of classical physics, not repeating the text word-for-word. This requires commitments from you: you must read the assigned reading before coming to class, and you should be ready to participate in class. Be prepared for homework and exam problems based on material covered in the text but not in the lectures. There will be a homework help and review session offered on Wednesday evenings.

Assignments:

I will collect homework every Friday at the *beginning* of class; late homework will not be accepted since solutions will be immediately posted on Moodle. I expect you to devote considerable effort to the homework; this expectation is reflected in the weighting the homework receives in the grading formula. Homework must be *neatly written or typed*, and include complete explanations of your work. Homework will be returned the following Wednesday in class.

Reading quizzes will be administered via Moodle prior to each class. The quiz will be available starting 24 hours before class, and will close 15 minutes prior to class time. *I rely on your commitment to the Honor Code to take these quizzes independently, and not to share the questions with your classmates.* Reading quizzes are **open book**.

There will be three short quizzes in class with questions that are representative of questions on the exams. These provide timely feedback to both you and me about your understanding of the material, and help prepare you for the exams.

There will be two exams and a comprehensive final examination for this course. Expect an approximately equal mix of conceptual and quantitative questions. Exams will be preceded by an optional review session scheduled outside of class.

Laboratory:
Laboratory experiments are an integral part of grappling with physical ideas. There will be one three hour lab per week.

Grading Formula:
Grades in this course are determined as follows:

Weekly homework:	20%
Reading quizzes:	5%
In class quizzes (3):	10%
Exams (2):	25%
Final:	20%
Laboratory:	20%

With hard work, it is certainly possible for everyone to get an **A** in this course; that is my goal. However, hard work alone is not sufficient for a particular final grade. Grades will be based on your achievement on the assignments described above.

Honor Code:
No Lawrence student will unfairly advance his or her own academic performance or in any way limit or impede the academic pursuits of other students of the Lawrence community.
Honor the Honor Code. All work on quizzes, exams and the final must be your own. I encourage you to work together on the homework; however, you are responsible for writing your own answers, and for ensuring you can solve the problems independently. All written work must be accompanied by a signed reaffirmation of the Honor Code, "I hereby reaffirm the Lawrence University Honor Code."

Healthy Balance:
All members of the Lawrence community – students, staff, and faculty – have the responsibility to promote balance in their lives by making thoughtful choices. Balance results from two skills: avoiding imbalance through careful planning, and managing and containing imbalance when it occurs. This course will be demanding, but should not overwhelm your academic (let alone whole) life. If it threatens to, come talk to me, a tutor, friend, counselor, or adviser.

***Proposed* Daily Schedule:**

Monday	**Lab**	**Wednesday**	**Friday**
January 3 Welcome, and Kinematics Review Ch. 1-3	*Rolling Cylinders*	Jan 5 Forces and Newton's Laws Review Ch. 4-5	Jan 7 Work, Energy, and Momentum Review Ch. 6-7, 9.2
Jan 10 **Quiz 1: Ch. 1-9** Rotational Motion Ch. 10.1-10.3	*Angular Momentum*	Jan 12 Angular Energy and Momentum Ch. 10.4-5, Ch. 11.1-4	Jan 14 Angular Momentum and Electric Charge Ch. 11.4, 20.1-3
Jan 17 **NO CLASS: MLK Jr. Day**	*Charge/Mass ratio of the electron*	Jan 19 Electric Field and Field Lines Ch. 20.4, 21.1-2	Jan 21 Electric Potential Ch. 22.1-2
Jan 24 **Exam 1: Ch. 10-11; 20-21.**	*Electric Potential mapping*	Jan 26 Electric Potential Ch. 22.2-22.3	Jan 28 Electric Current: Ch. 24.1-24.2
Jan 31 Current and Circuits: Ch. 24.3-5, 25.1	*DC Circuits*	February 2 Circuits: Ch. 25.2, 25.4, 23.2	Feb 4 Magnetism: 26.1-2
Feb 7 **Quiz 2: Ch. 22-25** Magnetism: Ch. 26.3-4, 26.7	*No Lab: Reading period*	Feb 9 Electromagnetic Induction: Ch. 27.1-3	Feb 11 **NO CLASS: Reading period**
Feb 14 Waves: Ch. 14.1-3, 14.7	*Standing waves on a string*	Feb 16 **Exam 2: Ch. 22-27**	Feb 18 Electromagnetic Waves: Ch. 29.4-29.6
Feb 21 Wave Optics: Ch. 14.5, 32.1-2	*Wavelength of light*	Feb 23 Geometric Optics: Ch. 30.1-30.2	Feb 25 Geometric Optics: Ch. 30.3-4, 31.1
Feb 28 **Quiz 3: Ch. 29-30** Imaging: Ch. 31.2, 31.4	*Build a laser*	March 2 Temperature and Heat: Ch. 16.1-3	Mar 4 Heat in Matter, First Law Ch. 17.1-2, 18.1
Mar 7 Thermodynamic Processes (Engines): Ch. 18.2, 19.1-2	*No Lab: Finals*	Mar 9 Entropy and the Second Law: Reading TBA	Mar 11 **NO CLASS: Finals**

Final Exam: Saturday, March 12 6:30-9:00 pm in YC 121.

Physics 151 Grading Guidelines

Solutions are graded on a scale of 0-10 points. For 10 points, the problem must have the following pieces:

a diagram
a narrative describing the physical reasoning, including starting assumptions
a neatly composed answer
the proper units
the correct answer

One point will be deducted from the following scale for each piece missing.

10 points:	Mathematically correct solution with a complete explanation, including everything above.
9 points:	Solution that is well explained and reasoned but has a minor algebraic error.
8 points:	Solution starts with the correct equation, and physical reasoning, but mathematical errors make it impossible to complete the solution.
7 points:	The correct equation appears somewhere near the start of the solution (and random incorrect equations are absent), but I can't follow what goes on from there.
6 points:	The right idea is mentioned, but misses the first mathematical step (e.g. the first equation is wrong).
5 points:	An attempt at an assigned problem (simply writing down the problem is insufficient)

Homework assignments will be posted on Moodle.

Note: Illegible homework will be returned ungraded, at the sole discretion of the grader.