

PHYSICS 100Lxg: THE PHYSICAL WORLD

Fall 2014 [class # 50310]

Syllabus

Dr. Däppen

Classes meet:	TTh 12-1:50pm, SLH 200 (Exams may be in different rooms - to be announced!)
Office/Contact:	SHS 370, 740-1316, e-mail: dappen@usc.edu
Office hours:	Monday 11am-12noon (SHS 370) & TTh 1:50-3pm (classroom and/or SHS 370), and by appointment (arranged in person, by phone, or e-mail)
Labs meet:	SGM 300 (consult p. 6 for your lab days!)
Lab director:	Joseph Vandiver, SGM 309 , 740-8889; e-mail: vandiver@usc.edu
Lab-TA Office:	SGM 300 & 313 (hours TBA)
Departmental-TA Office:	ACB 431 (hours TBA)

Course description (Catalogue):

The fundamentals of physics presented with emphasis on the structure and beauty of physical laws. Practical component will relate these laws to commonly encountered events.

Expanded Course description:

This course is designed specifically for non-science majors who have very little, if any, background in the sciences and mathematics. One of the primary goals of this course is to introduce you to the most important and useful concepts of physics which help us understand natural phenomena. They allow fundamental explanations and predictions, while at the same time they provide a unified picture in describing our universe. This picture is remarkably beautiful and simple. A very important additional goal of this course is to expose you to new ways of thinking about those things that have aroused our curiosity. By learning a few techniques of analysis you will be better prepared to gain understanding of many phenomena in the world around you and see common concepts at work. The course is non-mathematical by prerequisite, but it will be necessary to perform some calculations that are very simple and will employ formulae that are easy to remember.

It will turn out that formulae represent ideas, reflecting the fact that mathematics is the language of science. As with any language, there are different levels of ambition. One can study thoroughly for many years, or merely buy a phrase book, to be opened in the airplane shortly before arriving. Those who have ever experienced the impact of a mere dozen well chosen expressions in a foreign language will know what I mean. The same point was driven home by someone who said it more beautifully than I could have done myself: *In a large public lecture, the famous British astrophysicist Hermann Bondi mentioned the following hypothetical proposal. Imagine going in the street and asking around if somebody would be willing to learn Chinese within two years for the good pay of 250,000 pound sterling. He conjectured that there would be some respondents willing to try. After all, he would only ask for a level of fluency to understand what other people produced, that is, to be able to read, not write, literature. After that, Hermann Bondi asked to imagine the same inquiry regarding the willingness of people to learn theoretical physics. Just in order to understand the concepts other people have discovered, not to discover new physics. Alas, Hermann Bondi feared that despite the promised cash reward the response would be a universal "No, this is above my abilities". And this from the same people who could imagine learning Chinese. How wrong! How sad!*

Learning objectives:

On completion of the course, students will have obtained

- knowledge about how science is done;
- an understanding of the major physical principles that explain the functioning of the world;
- minimum quantitative techniques necessary to apply the principles of physics;
- knowledge about the most important steps in the history of physics;
- information of the role of mechanics within physics, which is its crown discipline, where the basic concepts of physics (mass, force, space, time etc.) are developed;
- some feeling for making and interpreting experiments;
- a motivation for a life-long interest in physics that will stimulate reading relevant articles in the future.

Text:

Paul G. Hewitt – *Conceptual Physics* (12th Edition)

Tentative Schedule:

<u>Week</u>	<u>Date</u>	<u>Topic</u>	<u>Reading</u>
1	8/26-28	Science and Nonscience; Inertia; Linear Motion	Ch. 1.1-2, 1.5; 2; 3
2	9/ 2 - 4	General Motion, Newton's Laws	Ch. 4; 5
3	9/ 9 -11	Momentum, Energy, Rotational Motion	Ch. 6; 7; 8

Deadline: Dropping without W, Electing P/N: September 12

4	9/16-18	Laws and Symmetries	handout
FIRST MIDTERM EXAM: Tuesday, Sep. 23 (Bring No. 2 pencil)			
5	9/23-25	Gravitation, Projectiles, Satellites	Ch. 9.1-5; 10
6	9/30-10/2	Atoms; Liquids, Gases	Ch. 11.1-5; 12.2-4; 13.1-7; 14.1-5
7	10/ 7 - 9	Heat and Heat Transfer; Thermodynamics	Ch. 15, 16; 18.1-6
8	10/14-16	Waves and Sound	Ch. 19; 20
SECOND MIDTERM EXAM: Tuesday, Oct. 21 (Bring No. 2 pencil)			
9	10/21-23	Electricity, Magnetism	Ch. 22; 23; 24
10	10/28-30	Electromagnetism; Electromagnetic Waves, Color	Ch. 25; 26; 27
11	11/ 4 - 6	Light: Emission and Quanta; Atomic Spectra	Ch. 30; 31; 32
12	11/11-13	Nuclear Physics (only tested on the final exam!)	Ch. 33; 34

Deadline: Dropping with W: November 14

THIRD MIDTERM EXAM: Tuesday, Nov. 18 (Bring No. 2 pencil)

13	11/18-20	Special Relativity	Ch. 35+ handout
14	11/25	General Relativity	Ch. 36+ handout

Thanksgiving Day: November 27

15	12/ 2 - 4	Physics of the Early Universe	handout
----	-----------	-------------------------------	----------------

**ALL STUDENTS (NO EXCEPTIONS) MUST TAKE THE
FINAL EXAM, Tuesday, December 16, 11 a.m.-1 p.m.**

Accommodation for students with disabilities:

Students who need to request accommodations based on a disability are required to register each semester with the Disability Services and Programs office (Student Union, Room 301). In addition, a letter of verification to the course instructor, from the Disability Services and Programs office is needed for the semester in which you are enrolled for this course. If you have questions concerning this procedure, please contact both the instructor of the course, and the Disability Services and Programs office at (213) 740-0776.

Exams

Note that for all exams, the **room (or rooms!)** may differ from the usual class room. The location of the exam room(s) will be announced later.

There will be three (one-hour) mid-term examinations and one (two-hour) final exam. Of the three mid-terms, only the scores of the two highest will be counted. The score of the lowest of the three will be dropped. The overall course grade will be based upon the examinations as follows: the **two** highest mid-term exams are **each** worth 20% of the total score of the course, the final exam is worth 25% the total score of the course. [The remaining 35% of the total score are for the laboratory (20%) and homework (15%); see below]. **All exams are closed book.**

Grading: Broadly speaking, grading is by the **distribution curve** of the combined scores of exams, homeworks and lab. Please note that I do **not** use rigid percentage marks (such as, *e.g.*, a rule that 90% would correspond to an A- or similar). Further details about the grading procedure are **given in class**.

It is implied that the third mid-term exam can serve as a make-up exam for either of the first two exams (no questions asked!). There will **not** be any other make-up exams. Any student missing two of the three mid-terms, will only have recorded the points scored on the one exam taken.

In the week before each exam I will **review the essential topics** and indicate which material could be on the test.

The final exam will be held on **Tuesday, December 16, 11 a.m.-1 p.m.** There can be no change in the final exam date for anyone.

Homework

There will be 14 homework sets

<u>Homework # 1</u>	given out: Aug. 26	DUE: Sep. 4
<u>Homework # 2</u>	given out: Sep. 2	DUE: Sep. 11
<u>Homework # 3</u>	given out: Sep. 9	DUE: Sep. 18
<u>Homework # 4</u>	given out: Sep. 16	DUE: Sep. 25
<u>Homework # 5</u>	given out: Sep. 23	DUE: Oct. 2

<u>Homework # 6</u>	given out: Sep. 30	DUE: Oct. 9
<u>Homework # 7</u>	given out: Oct. 7	DUE: Oct. 16
<u>Homework # 8</u>	given out: Oct. 14	DUE: Oct. 23
<u>Homework # 9</u>	given out: Oct. 21	DUE: Oct. 30
<u>Homework #10</u>	given out: Oct. 28	DUE: Nov. 6
<u>Homework #11</u>	given out: Nov. 4	DUE: Nov. 13
<u>Homework #12</u>	given out: Nov. 11	DUE: Nov. 20
<u>Homework #13</u>	given out: Nov. 18	DUE: Dec. 2
<u>Homework #14</u>	given out: Nov. 25	DUE: Dec. 4

Those who miss the distribution in class can find the assignments on **Blackboard**, where I will also post solutions. Homework have to be turned in by the end of the due day (which is always a lecture day). It can be turned in either during class, or be dropped into my mailbox on the 3rd floor of SHS (in the mail room opposite my office), or – if that room is closed – be slid underneath my office door (SHS 370). Since the homework solutions will appear on Blackboard immediately after the due dates, I am not able to accept late homework. However, you can miss up to two assignments provided all other scores are perfect according to the following policy:

Homework will count for 15% in the overall score. Each of the 14 homework scores will be given equal weight, and each set with a perfect score gives 1.25%. I will cap the total homework score at 15%. This means that you can obtain the maximum homework score of 15% already with 12 perfect assignments. And by turning in more than 12 assignments, you will have a possibility to repair deficiencies in individual scores!

You are encouraged to work together on the problem sets (in fact, the absolutely best way to make sure you understand how to answer a question is to see if you can explain it to someone else), but the final write-up must be your own. Please follow the Golden Rule: explain your answers as you would like them to be explained to you; the graders will be looking at completeness, clarity, and legibility, not just the final answer. There is no need to be verbose: the answers should be crisp and clear. Please check your course score on the web site every once in a while.

The homework problems are intended to provide useful (but, by no means, comprehensive) preparation for the exams. While the exams will have multiple choice questions, the homework will involve longer problems with more complicated answers. (Exams will be graded by machines, homework by humans.)

Graded homework will be distributed in class. Since homework is graded by humans (our friendly TAs), you cannot expect instant gratification. Turnarounds of a couple of week should be considered normal. Therefore, it is logistically impossible to return some relevant graded homework in time for one of the exams. Of course I will post the solutions in time, but if you want to compare your own answers with the posted solution of those relevant sets before the exams, you should rely on your memory or make copies of your homework submissions.

My email

The best way **to contact me** is via e-mail (dappen@usc.edu).

Blackboard

Blackboard is the USC web-based interface between classes, students and instructors. Access is through <http://blackboard.usc.edu>, using your USC login name and password.

- i) *Old Exams*,
- ii) *Homework Assignments and Homework Solutions*,
- iii) *Handouts*, and
- iv) *Information on your test and homework scores*.

Regarding the last item, finding your test and homework scores can help you to double check your own records against mine. For instance, sometimes (hopefully very rarely) a student's homework might be mislaid. The information given by blackboard allows you to detect such problems in time. So please check it regularly. If you obtain what you believe is incorrect information, please discuss the matter with me immediately.

Academic Integrity

Academic integrity is a bedrock principle of our community, and we all want to ensure the highest standards. Please consult the following key University documents: (1) Trojan Integrity Guide can be found at <http://www.usc.edu/student-affairs/SJACS/forms/tio.pdf> . (2) The Undergraduate Guide for Avoiding Plagiarism can be found at <http://www.usc.edu/student-affairs/SJACS/forms/tig.pdf> .

LABORATORY

The course Physics 100 has a mandatory laboratory component, and you should already be signed up for one of the laboratory sessions. The purpose of the laboratory is to give you some feeling for making and interpreting experiments, thereby reinforcing some of the course material.

I hope that our laboratory will enhance your experience and enjoyment of this course. Please appreciate the great logistical complexity of arranging laboratories for so many people with such a broad variety of backgrounds: I therefore kindly request your good will and patience in this enterprise.

FIRST THINGS FIRST: The First Laboratory Meeting

For our class (labs # 50311-50319), your first meeting will be held in the week of September 1-5, ON YOUR SPECIFIC LABORATORY DAY. It is very important to attend the first session.

For your convenience, on the following page, I include the tentative basic laboratory schedule (courtesy by the laboratory director). Further details will be given during your first laboratory meeting.

Please note that the **organization** of the laboratory is completely independent of the class. Therefore, your laboratory grade (which, as mentioned before, constitutes 20% of your overall score) will be derived **solely from your performance in the laboratory, and in accordance with the rules established by the laboratory.**

Physics 100 Lab Schedule

Location: SGM 300

Week of Semester	All Lab Sections
Aug. 25 – 29	No Labs
Sept. 1 – 5	Basic Aspects
Sept. 8 – 12	No Labs
Sept. 15 – 19	Acceleration Down an Inclined Plane
Sept. 22 – 26	No Labs
Sept. 29 – Oct. 3	Physical Properties of the Earth
Oct. 6 – 10	No Labs
Oct. 13 – 17	Waves
Oct. 20 – 24	No Labs
Oct. 27 – 31	Color
Nov. 3 – 7	No Labs
Nov 10 – 14	Electrical Circuits
Nov. 17 – 21	No Labs
Nov. 24 – 28	Thanksgiving week
Dec. 1 - 5	Radioactivity