

PHYS 100Lxg: The Physical World

Fall 2019

Course Information

When: Lectures MWF 10:00 – 10:50 am (please be here on time)

Office Hours Mondays 12:00 – 1:00 p.m. Various laboratory sections/times.

Who: You and me (Moh El-Naggar, x 0-2394, mnaggar@usc.edu, SSC 419)

Where: Class SLH 200, Office Hours SSC 419

What: Classical & Modern Physics for non-specialists, from a very conceptual point of view. Our required text will be **Conceptual Physics, 12th Edition, by Paul G. Hewitt, Pearson**. In addition, **access to the online Mastering Physics homework system will be required**. You can buy the textbook “with Mastering Physics” from the bookstore, or from any number of websites. You can also purchase an e-text with Mastering Physics. If you don’t purchase a copy “with Mastering Physics”, you can always buy the Mastering Physics access separately.

Course Description

There is something special about physics. I don’t just say that because I love what I do, but because it really is special! At its best, physics is not entirely defined by the subject of study, but rather by the style of inquiry. Think about it: we are talking about one class where we can discuss the big bang, subatomic particles, the motion of you/fish/water/sand, the frequency range of musical instruments, light, electrons, how your iPad screen works, nanotechnology, climate change, DNA, and the list goes on - you get the idea. While we may be (and in some cases should be) interested in the details of a specific topic, the real beauty of physics is that it seeks to **understand the fundamental patterns underlying all of nature in a quantitative and predictive way**. Look around you and you are guaranteed to see examples of how physics impacts your daily life. By appreciating the fundamental concepts of physics, you will discover an elegant framework for describing all that is around you, and even be able to make predictions about novel situations you’ve never been in, and contraptions you’ve never seen before.

Another goal of this course is to illustrate how the scientific method can be used to critically think about whatever arouses our curiosity. If all goes well, mastering the contents of this class will make you the most likely person to answer certain kinds of questions at dinner parties e.g. Why is the sky blue? Is Schrödinger's cat dead or alive? Does salting water make it boil faster? Is an invisibility cloak possible? How many stars are there in the Universe? Even better yet, you may not already know the answer, but you will have the ‘toolbox’ and mindset to carefully reason out the answers to interesting questions.

The course is designed to be non-technical, so there will be no long equations and multiple-page calculations. This can actually be a challenge, because the book of nature is written in the language of mathematics (says Galileo). But instead of fully conversing in this beautiful language, one of my colleagues likes to say that this class will help you ‘eavesdrop’ on this conversation happening all around us. That said, you need to be aware that even a conceptual physics course will not avoid all math. You will work on some quantitative problems including elementary algebra, arithmetic, Pythagorean theorem, etc. You can get a feel for the level of math involved by browsing through the textbook.

A final note: do not expect an easy class. Appreciating the fundamentals of nature will make for a beautiful, but not effortless, journey. I am here to help you along the way.

Text and other supplies and resources

- Conceptual Physics, 12th Edition, by Paul G. Hewitt (Pearson).
- Mastering Physics (<http://www.masteringphysics.com>) – a homework system for our class. All the class assignments will be worked out, submitted, and graded on Mastering Physics. You can get an access code for this site bundled with the textbook if you wish.
- Physics 100 Laboratory Manual. More information at the first laboratory meeting.
- Assignments, notices, grades, and other information will be posted on the course's Blackboard course site.
- For additional help, TAs are available in ACB 431, 10 am to 5 p.m., Monday-Friday. See the schedule at: <http://dornsife.usc.edu/physics/teaching-assistant-resources/> (click on TA Office Hour Schedule)
- Your lab TA also has office hours; ask her/him for details.

Grading

Your grade will be determined by your work on:

- Class participation (5%)
- Homework & projects (20%)
- 2 Midterm Exams (15% each)
- Final exam (25%)
- Lab (20%)

You must receive a passing grade in BOTH the lecture and lab components to pass the course. For example, failing the laboratory portion means failing the entire course.

Frequently asked questions about grading:

- *What exactly is class participation?* In addition to speaking up (asking and answering questions) in class, in-class participation will consist of random 'quizzes'. These quizzes are actually group exercises, meaning you will be allowed (**actually, encouraged**) to discuss the problem with your classmates. In my experience, most students converge to the right answer in these in-class exercises.
- *Is there a predetermined 'grading curve'?* No. The letter grade will be assigned at the end of the semester after I tabulate and ponder all the combined scores of the exams, homeworks, in-class participation, and lab. Individual tests, quizzes, HWs, etc. will not be 'curved'. The final cumulative score of all these components will be.
- *How do I ask for a regrade of an exam problem?* All regrade requests must be submitted in writing within one week after the graded work is returned to you. Write down a clear detailed explanation of why you think the grader missed some appropriate credit, staple it to the original work, and hand it to me in class. Note that requests of the type "I think Problem X should be given more points, please check." will not be entertained.

Homework

There will be weekly homework assignments. Homework assignments will be done through the Mastering Physics (www.masteringphysics.com) site and submitted online. During the first lecture you will be given instructions on how to enroll in the correct Mastering Physics course/assignments for this class.

All assignments are due on Tuesday nights at 11:59 pm. Late homework will be accepted on Mastering Physics but penalized for each hour late by 4%. Online assignments are graded as you

submit them, you will have unlimited attempts to arrive at the correct solution (except for multiple choice questions, obviously!). In computing your course grade, I will drop the lowest score for one assignment; if you fail to submit a particular homework, it will be counted as a zero and will therefore probably be dropped.

You are encouraged to work together on the homework assignments. In fact, the best way to make sure you understand how to answer a question is to see if you can explain it to someone else. However, the final submission must be your own. Don't submit work that is not yours. That would be in direct violation of USC's academic integrity standards.

Please check your scores on the web site every once in a while. Sometimes (hopefully not too often) we mislay someone's homework or mistype a score. If something goes astray, you'll catch it before it's too late.

Lectures

I beg you to ask questions during class. Questions are fun to discuss and help identify points that have not been explained well. And don't be shy. It is very likely that whatever is bothering you is bothering others as well. So my answering questions and getting everyone together on the issue is much more useful than simply continuing to lecture.

Laboratory

Physics is first and foremost an experimental science, and the laboratory is an essential part of our course. Besides, the university's General Education requirement mandates a laboratory component. So the bottom line is that you need to register for a Physics 100Lg laboratory section. Labs will be held in SGM 300 and will meet once every two weeks. Be sure to attend the first lab meeting so that your spot is not given away.

For all issues regarding the laboratory component of this course, you should contact (1) your TA and (2) the laboratory director, Mr. Joseph Vandiver (vandiver@usc.edu, SGM 309). Additional information on lab policies and procedures is provided in the Laboratory Manual and during your first lab meeting.

Examinations

There will be two midterm examinations and a final examination. The midterm exams will last 45 minutes each. The midterms will cover material incrementally through the semester. The final exam will last 90 minutes and will be comprehensive of the entire semester. **There are no make-up examinations for either of the midterms or the Final Exam.** The tests are closed-book, but sheets summarizing some essential information will be provided.

Students with special examination requirements as documented by the Office of Disability Services and Programs (see below) must present their paperwork to me as soon as possible after the start of classes, and absolutely no later than two weeks prior to the first midterm.

Students with disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in GFS 120 and is open 8:30 am – 4:30 pm, Monday through Friday. Website for DSP: <http://dsp.usc.edu> and contact information: (213) 740-0776 (Phone), (213) 740-8216 (FAX), ability@usc.edu (Email).

Academic Integrity

Students who violate university standards of academic integrity are subject to disciplinary sanctions, including failure in the course and suspension from the university. Since dishonesty in any form harms the individual, other students and the university, policies on academic integrity will be strictly enforced. We expect you will familiarize yourself with the USC academic integrity guidelines.

The Trojan Integrity Guide (A Guide to Understanding and Avoiding Academic Dishonesty) can be found at: <https://sjacs.usc.edu/files/2015/03/tio.pdf> The Undergraduate Guide for Avoiding Plagiarism can be found at <https://sjacs.usc.edu/files/2015/03/tig.pdf> A Guide for Graduate Students can be found at <https://sjacs.usc.edu/files/2015/03/GradIntegrity.pdf>

Student Ombudsman

All courses in the Department of Physics & Astronomy have an assigned Student Ombudsman to serve students as a confidential, neutral, informal, and independent resource when they wish to discuss issues concerning their course without directly confronting their instructor. The Student Ombudsman for this course is Prof. Chris Gould, gould@usc.edu, 213-740-1101, SSC 204.

Course Contents

Broadly speaking, the lectures will cover four main parts, each of which corresponds to particular sections/chapters in the book. The specific parts of the book will be listed on blackboard during the semester, along with additional reading and online material:

1. Mechanics
 - Translational/Rotational Motion, Forces, Momentum and Energy Conservation
2. Physical Matter
 - States of Matter (gas, fluid, and solid)
 - Waves and Sound
3. Electricity and Magnetism
 - Electrostatics and Electric Current
 - Electromagnetic Waves (Light)
4. Modern Physics
 - Light and Quanta
 - Atoms and the Nucleus
 - Special Relativity

Please note that the list above is subject to small changes and tweaks throughout the semester. Depending on the level of interest and student response, we may choose to delve more deeply into certain topics. In addition to these fundamental topics, I will occasionally bring up scientific topics that come up in the news as we go along, and see if we can design special projects that relate new advances to the course's contents. In fact I consider this to be one of the most important class goals: using your knowledge to gain a deeper and better understanding of global scientific issues.

Important dates for Fall 2019 (continued on next page)

August 26	Classes Begin
September 2	Labor Day, University Holiday
September 13	Last day to register and add classes. Last day to drop a class without a mark of "W," except for Monday-only classes, and receive a refund
October 4	Midterm I (subject to change)

October 11	Last day to drop a course without a mark of "W" on the transcript only
October 17-18	Fall Recess
November 8	Midterm II (subject to change)
November 15	Last day to drop a class with a mark of "W"
November 27 – Dec 1	Thanksgiving Holiday
December 6	Fall semester classes end
December 7-10	Study days
December 16	Final Exam, 8 – 10 am