

# PHYSICS 135AL: PHYSICS FOR THE LIFE SCIENCES

## FALL 2014

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Welcome to Physics 135aL! This is the first course in the physics sequence for students majoring in the life sciences or preparing to enter a health-related profession. Physics 135aL will cover the most basic concepts of classical mechanics, sounds, fluids, and thermodynamics. These physical theories explain a huge variety of phenomena directly accessible to our senses, and have revolutionized technology and our understanding of nature.

### 1. COURSE MATERIALS

#### 1.1 Required for lectures

D. C. Giancoli, *Physics: Principles with Applications*, 7<sup>th</sup> edition, Prentice Hall, 2013.

#### 1.2 Required for lab

*General Physics Laboratory Manual* (available online through the laboratory *Blackboard* page). Questions concerning the laboratory should be referred to the Lab Director, Dr. Gokhan Esirgen (KAP B19; Email: esirgen@usc.edu).

### 2. GUIDELINES

#### 2.1 Mathematics prerequisites

Mathematics is the language of physics. However, only minimal mathematical knowledge will be assumed for this course. The prerequisite for this course is a working knowledge of elementary algebra and trigonometry. Use of trigonometry will be restricted to simple situations (*i.e.*, almost entirely right triangles). Your textbook has a brief review in Appendix A.

#### 2.2 Registration and administration

Your registration for this course consists of three separate parts: the lectures, a “quiz section,” and the laboratory. You must register for each of them. The only exception is that, if you have previously completed the laboratory and have received permission to carry its grade into the

current semester, then you would register only for the lecture and the “quiz section.” The “quiz section” is the time slot allocated to the midterms.

*Attention:* Students who are repeating 135aL must obtain written permission from the Undergraduate Physics Office (ACB 439) in order to be excused from repeating the laboratory. A copy of the written memo must be turned in to the instructor *during the first week of classes*.

*The Undergraduate Physics Office in ACB 439 deals with all administrative aspects of this class. Additional help regarding administrative issues is available from Beverly Ferguson in ACB 439 with phone number 740-1140 and email address bferguso@usc.edu.*

### **2.3 Disabilities**

Students who need to request accommodation based on disability are required to register each semester with the Office of Disability Services and Programs (DSP). This office can be found at STU 301 with phone number 231-740-0776. A letter of verification to the instructor from the DSP is needed for the semester you are enrolled in. If you have any further questions please contact the DSP or the instructor.

### **2.4 Grading**

Your grade will be determined according to the following key:

*80% lectures:*

- 5% homework
- 19% Midterm 1
- 19% Midterm 2
- 37% Final exam

*20% laboratory*

In order to receive a passing grade in the course (D or above) you must receive a passing grade in **both** the lecture **and** the laboratory portions. In addition, you must receive a passing grade on the **final examination**. Each semester a few students fail to complete the laboratory experiments and consequently fail the entire course. Please don't let this happen to you. If you miss a lab session due to some emergency, make sure to arrange a lab make-up session as soon as possible with your lab TA.

Broadly speaking, grading is done by the distribution curve of the combined scores of exams, homework, and lab. No rigid percentage marks (such as, e.g., a rule that 90% corresponds to an A-, or similar) are used. Further details about the grading procedure are given in class.

## 2.5 Homework

Homework is assigned each week and will be due the following week on Thursday before 6 pm (see schedule on page 8). Please turn in the homework to my mailbox on the second floor of the Seaver Science Center (across from SSC 218). *No late homework will be accepted. Please make sure to staple together multiple sheets. All work submitted as loose pages will not be graded.*

We expect that it will take several hours to complete each of your 15 homework sets. The homework sets are the central means by which to master the course material, and, consequently, to perform well in the exams. “Understanding physics” does not mean knowing the words by heart and reading the textbook. “Understanding physics” implies the development of the necessary skills to solve physics problems you have not seen before. This means being able to translate real-life situations into the mathematical framework of physics, and making quantitative predictions which can then be related back to the real world. A common misconception is that physics is about “plugging numbers into formulas.” In almost all physics problems you will need to be able to combine a several different physical and mathematical concepts in a novel way. The lectures and homework assignments are designed to help you achieve these goals, and do well in the exams.

Homework problems will range from trivial to difficult. Midterm and final exam questions will resemble (and perhaps in some isolated cases even be identical to) many of those problems. We urge you to attempt every homework problem, even if you are not able to complete each one.

We encourage you to discuss homework problems with your fellow students. This does not imply, however, simply copying solutions from each other. You can learn a tremendous amount by cooperating and explaining to each other how to analyze a problem, but everyone must turn in independently written solutions. Based on our previous experience, you will learn more physics, and earn a higher grade, if you take the homework problems as an opportunity to learn, which implies making mistakes! If you carefully review your mistakes after receiving the graded homework sets, you will be very unlikely to repeat the same mistakes in future (and, in particular, in the exams).

All of the homework problems will be from the textbook. Solutions to the homework sets will be posted on *Blackboard* after the due dates.

## 2.6 Exams

There will be two midterm exams and a final exam. The midterms will be given during the quiz section. The midterms will cover the course material incrementally throughout the semester, and the final exam will cover the whole course.

*Please note carefully the date and time of the midterms and the final examinations (see Sec. 8). No exceptions to these dates and times are allowed. If you have a conflict, please attend to it immediately.*

There will be *no make-up exams given for any tests in this course*. A missed exam will prevent you from passing unless you have approval from your professor *before the exam* because of an *extreme* emergency.

## **2.7 Calculators and formula sheet**

Only non-programmable calculators are allowed during exams. In order to free you to focus on “understanding physics” rather than “learning physics by heart” you will be given access to the collection of formulas on blackboard. It is your responsibility to understand the meaning of the various symbols, and in what situations the different mathematical relationships apply (and in what situations they do not apply).

## **2.8 Laboratory**

Physics is an experimental science and therefore the laboratory is a very important part of this course. Physics 135aL laboratories *will meet* during the first week of class. Each week you will have in the laboratory either a discussion meeting or an experiment. The laboratory policies are clearly spelled out in the introduction to the Lab Manual. Read it carefully.

Read the description of the experiment carefully *before* coming to the laboratory. This will help you understand the experiment and you will be more efficient. You must complete all laboratory assignments at the “Pass” level. Then your laboratory grade will be derived from laboratory quizzes, lab performance, the lab midterm, and the lab final. *As noted previously, it is necessary for you to pass the laboratory portion of the course in order to pass the course as whole, and to pass the lab you must complete all experiments.*

If you miss a lab session it is your responsibility to make arrangements with your TA to make up the missing experiment. Your TA will not make that arrangement for you. *Do not simply attend another laboratory section unannounced. TA's will not accept students in the laboratory who are not registered in their section without prior official arrangements.*

Questions concerning the laboratory should be referred to the Lab Director, Dr. Gokhan Esirgen (KAP B19; Email: esirgen@usc.edu).

### 3. SUPPORT

You have a variety of opportunities for support available to you.

#### 3.1 Lecture

Do not underestimate the value of questions during the lecture period. In large lectures, many students are reluctant to pose questions which they fear might seem silly to their instructor or to their peers. Almost always, if one student asks a question, there are several other students who were wondering about the same issue. Often such questions tell the instructor what material might benefit from a more detailed discussion. Usually, a portion of each lecture will be devoted to illustrative examples, sometimes taken from previous homework sets, and questions help the instructor select those problems which you've had the greatest difficulties with. Some exam problems may closely resemble homework problems or problems discussed during lectures.

#### 3.2 Laboratory TA's

All lab TA's are graduate students, usually pursuing a PhD in physics. They are all capable of answering any questions you might have regarding the course material covered in the lectures or in the lab. Usually your lab TA can answer questions immediately, either at the beginning or at the end of the lab period. However, some problems you pose may require some additional thought. In either event, you should regard your TA as a resource not only for the laboratory but also for lecture-related questions.

#### 3.3 TA office hours

All physics TA's have office hours in ACB 431 for the assistance of students in 100-level physics courses. The TA office hours will be arranged during the first week of class and posted on the door of ACB 431. TA office hours take place most days (usually Monday through Thursday) and last for several hours each day. Usually there is a different TA available each hour. Sometimes it helps to hear different people answer the same physics question, so if you feel that you did not understand the TA's explanation you might want to see a different TA a little bit later on the same day or on another day. *This is an excellent resource should you need immediate help.*

#### 3.4 Instructor office hours

If you wish to speak to the instructor outside lectures, the instructor's office number and office hours are shown at the beginning of this *Syllabus*. If you are unable to make these office hours, please feel free to contact your instructor *via email* to try to arrange some other time to meet. Please note, however, that your instructor's schedule will be very busy and, as a result, it may be difficult to find a time to meet outside regular office hours. Only rarely will it be possible to meet at less than a few days' notice, so please plan ahead to avoid disappointment.

### **3.5 Electronic assistance**

Everyone registered in this course should find a link to the course in their *Blackboard* account. All information about the course will be posted on *Blackboard* at

<http://blackboard.usc.edu>.

At this address, you will find this *Syllabus*, *important announcements*, *useful hints about some of the homework problems*, as well as *examinations from previous semesters*. Sample exams should only be considered as samples illustrating the types of problems given in previous Physics 135aL exams. Solutions to your homework sets (after the due date) will be placed on *Blackboard*.

### **4. OBTAINING YOUR GRADES**

You will be able to access your grades in Physics 135aL via *Blackboard* at

<http://blackboard.usc.edu>.

### **5. ACADEMIC INTEGRITY**

Homework assignments may be discussed with other students, and help is available as noted above. *Under no circumstances should students seek out homework solutions from alumni of Physics 135aL or from any solution sets or manuals.*

Failure to abide by these rules will result in an automatic zero for the assignment involved and a report to the Office for Academic Integrity. Violations may also result in an F for the course.

An overview of the USC academic integrity policy may be found at

<http://www.usc.edu/student-affairs/SJACS/forms/AcademicIntegrityOverview.pdf>

As mentioned above, working hard on the homework sets is the best preparation for the exams. You would hurt yourself, as well as your fellow students, by cheating.

**6. FEEDBACK**

Feedback regarding all aspects of these lectures is very much appreciated and welcome at any time. Please get in touch with your instructor via email, after lectures, or during office hours.

**7. SOME USEFUL DATES**

August 25	Spring semester classes begin
September 1	Labor Day (University Holiday)
September 12	Last day to drop class without a mark of "W," and last day to change enrolment option
October 1	Midterm 1
November 5	Midterm2
November 14	Last day to drop class with mark of "W"
November 26-29	Thanksgiving recess
December 5	Fall semester classes end
December 12 8-10am	Final exam

**8. COURSE SCHEDULE**

Homework assignments below are the *Problems* and *not the Questions*. You should nevertheless try to answer the Questions as a preparation for doing the Problems. Turn in your assignments at the beginning of class on the due dates indicated. Late homework will not be accepted.

You should read through the relevant chapters prior to coming to the lectures each week, and review them again after each lecture before attempting the homework problems.

Week	Start date	Chapter assignment and subject	Homework problems	Due date
1	8/25	Chapter 1: Introduction Chapter 2: 1D kinematics	Chapter 1: 13 Chapter 2: 4, 12, 16, 29, 32, 38, 44, 48, 66, 71.	9/4
2	9/1	Chapter 3: Vectors, 2D kinematics	Chapter 3: 8, 23, 27, 30, 36, 41, 48, 50, 64, 67	9/11
3	9/8	Chapter 4: Dynamics, Newton's laws	Chapter 4: 11, 13, 16, 24, 27, 32, 35, 49, 57, 76.	9/18
4	9/15	Chapter 5: Circular motion, gravity	Chapter 5: 5, 7, 15, 17, 19, 23, 27, 32, 49, 54, 64.	9/25
5	9/22	Chapter 6: Work and energy Exam review	Chapter 6: 10, 13, 20, 25, 33, 38, 40, 44, 54, 90.	10/7
6	9/29	Chapter 7: Linear momentum	Chapter 7: 7, 12, 13, 18, 26, 29, 35.	10/9
<b>Midterm 1 on 10/1 (5:00pm – 6:30pm): Chapters 1 – 5; Room TBD</b>				
7	10/6	Chapter 7: Linear momentum Chapter 8: Rotational motion	Chapter 7: 42, 49, 51. Chapter 8: 6, 7, 13, 19, 20, 21, 23	10/16
8	10/13	Chapter 8: Rotational motion	Chapter 8: 27, 29, 33, 36, 46, 47, 55, 58, 66, 72.	10/23
9	10/20	Chapter 9: Bodies in equilibrium	Chapter 9: 4, 8, 12, 18, 20, 23, 27, 30, 33, 39.	10/30
10	10/27	Chapter 10: Fluids	Chapter 10: 5, 11, 14, 17, 23, 25, 34, 46, 53, 57, 97	11/12
11	11/3	Chapter 11: Vibrations and waves Exam review	Chapter 11: 5, 13, 19, 22, 25, 31, 42, 47, 53, 55, 73.	11/14
<b>Midterm 2 on 11/5 (5:00pm – 6:30pm): Chapters 6 – 9; Room TBD</b>				
12	11/10	Chapter 12: Sound	Chapter 12: 5, 6, 14, 17, 22, 31, 34, 37, 40, 49, 51, 62.	11/20
13	11/17	Chapter 13: Temperature	Chapter 13: 5, 15, 20, 28, 34, 37, 40, 51, 81, 84.	11/25
14	11/24	Chapter 14: Heat	Chapter 14: 7, 12, 15, 19, 29, 33, 37, 44, 45, 55.	12/3
15	12/1	Chapter 15: Introduction to thermodynamics	Chapter 15: 5, 10, 13, 23, 27, 31, 37, 62, 67, 68	TBD
<b>Final exam on 12/12 (8am – 10am): Chapters 1 – 15; Room TBD</b>				