

PHYSICS 135AL: PHYSICS FOR THE LIFE SCIENCES I

SPRING 2020

Dr. Chris Sutherland

Email address: cjsuther@usc.edu

Office: SHS 361

Office hours: Mondays & Wednesdays 10:30am-11:30am, Tuesdays & Thursdays 11am-noon, in SHS 363, the conference room across from my office. Take the elevator up and go toward the building that is to the right of the elevator on the third floor. I will also livestream them at <https://www.twitch.tv/sutherlandphys> , it's free to make a Twitch account and you can type questions in the chat for me to answer. I might stream on twitch at other times if there is interest/need from you guys.

Welcome to Physics 135aL! This is the first course in the 2-semester Physics series intended to meet the needs of students majoring in the Natural Sciences other than Physics, Chemistry, or Engineering and who are preparing to enter one of the health-oriented professions.

The subject matter of this course includes mechanics, dynamics, circular motion, momentum, torque, angular motion, fluids, sound, heat and thermodynamics. The goal of the course is to teach you how to approach and solve physical problems and how to develop an intuition for the important physical properties that affect a given situation. Another goal is to cover material and develop physical intuitions so that you perform better on the MCAT. These two goals work well together.

1. COURSE MATERIALS

1.1 Textbook

Open Stax: College Physics (free textbook): <https://openstax.org/details/books/college-physics?Book%20details> . Can download a full PDF here.

1.2 Required for lab

Questions concerning the laboratory should be referred to the Lab Director, Dr. Gokhan Esirgen (KAP B19; Email: esirgen@usc.edu). No lab first week.

General Physics Laboratory Manual (available online through the laboratory *Blackboard* page).

1.3 Other textbooks

- J. Boyle, *Physics: Student Guide with Selected Solutions*, 6th edition, Prentice Hall, 2004. *Study guide for the textbook by Giancoli.*
- Serway and Jewett, *Principles of Physics* (4th or 5th edition) or *Physics for Scientists and Engineers* (8th or 9th edition).

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).

2.2 Registration and administration

Your registration for this course consists of three separate parts: the lectures, a “quiz section,” and the laboratory. You need to register for each of them. An 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.

The Undergraduate Physics Office in ACB 439 deals with all administrative aspects of this class including permission to carry a previous laboratory grade over. Additional help regarding administrative issues is available from Kimberly Burger burgerk@usc.edu in ACB 439

2.3 Disabilities

I need a letter of verification from the DSP office by the end of the second week of classes so we can set up accommodations appropriately.

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. 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:

10% Homework

20% Midterm 1

20% Midterm 2

30% Final exam

20% laboratory

In order to receive a passing grade in the course you need to receive a passing grade in **both** the lecture **and** the laboratory portions. If you miss a lab session due to some emergency, there will

be a makeup week for labs at the end of the semester to make up 1 or 2 missed labs (any more can not be made up).

Broadly speaking, grading is done by the distribution curve of the combined scores of exams. Pretty much everyone in the course gets 100% in the homework and lab portions of the course. 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 is due **before the end of lecture on Wednesdays**. The first homework will be due the second week of classes. Please staple the pages together.

I will automatically drop your two lowest homework scores, and therefore I will not be taking any late homeworks for whatever reason unless explicitly requested by a DSP accommodation. I'm pretty strict about this because accepting late homeworks makes my job harder, so I'd prefer just to drop your two lowest homework scores without question to make both our lives easier.

Honestly, pretty much everyone gets 100% in the homework portion of the course. There's no real point looking up solutions online, because you're just taking away study time for yourself. Use the homeworks to study consistently each week. I'm sure you've heard it before, but **physics is not about memorizing, it's about being able to see a completely new problem you've never seen before and apply the correct physical concept to it and work out a solution.** It's like playing an instrument; it needs consistent diligent practice. Unfortunately, I'm really not lying when I say memorizing the homework solutions won't help you. If you can't solve a homework question, go over the lecture notes, the example solutions, the textbook, work with a friend, or come to my office hours instead of looking up the solution. This will help you do better on the exams, which is really the only important thing in determining your grade in this course.

2.6 Exams

There will be two midterm exams and a final exam. The first midterm will be **Tuesday, Feb.25th, starting at 5pm, location TBA**. The second midterm will be **Tuesday, March.31st, starting at 5pm, location TBA**. Each midterm will last 60 minutes. The final exam will be **Monday, May.11th, starting at 11am, location TBA**. The final exam will last 120 minutes. The midterms will cover the course material incrementally throughout the semester, and the final exam will cover the whole course. *Unfortunately, no exceptions to these dates and times are allowed. No make up exams will be given.*

Previous semesters exams will be posted on blackboard to help you study. The best way to use them is to time yourself and try doing the best you can on the exam, and once the time is up, go

over course material related to the questions you couldn't get, and if you still can't get them, look at the solutions. A study group helps a lot too.

2.7 Calculators and crib 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 may bring a 4"x6" index card, written on both sides, to each of the midterm exams. For the final exam, you are allowed one full 8.5"x11" sheet of paper, written on both sides. These sheets/cards must be in your own handwriting and cannot be photocopies/printouts. Don't copy out examples, only formulas and helpful tips / explanations.

2.8 Laboratory

Questions concerning the laboratory should be referred to the Lab Director, Dr. Gokhan Esirgen (KAP B19; Email: esirgen@usc.edu). I basically have no control over the lab, sorry!

Physics 135aL laboratories **start during the first week of class**. The laboratory policies are in the introduction to the Lab Manual.

Read the description of the experiment before coming to the laboratory so that you can do the pre lab quiz. The pre lab quiz must be done before This will help you understand the experiment and you will be more efficient. If you get P's on all the pre lab quizzes, lab performance, and written portions you will get 100% in the lab portion of the course. E's are not necessary, though about 25% of you will be getting them every lab. Labs are handed in at the end of the lab, so you don't take them home with you. *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.* **There is a makeup week at the end of the semester to make up maximum 1 or 2 missed labs.**

If you miss a lab session it is your responsibility to make arrangements with your TA to make up the missing experiment. **TA's are not allowed to accept students from outside their section, so don't show up to another section unannounced.**

3. SUPPORT

Here is what the physics department has available for students to help them. Your home department may have other resources!

3.1 Lecture

Please come to lecture! There will be group activities almost every class that aren't graded but are used to help me track attendance for struggling students.

3.2 Laboratory TAs

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) from 10am-4pm. 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

I will have five hours of office hours each week, but these office hours will be open to all of the courses that I teach. Office hours will be held in SHS 361. If a large number of students show up to office hours, we will also use the conference room in SHS 363, where I will entertain questions from students in a group setting. Most of my time is filled by teaching or office hours, but if I'm in my office, you're welcome to stop by for a quick question. You can also make an appointment to see me if you cannot make it to any of the office hours listed on the first page of the syllabus. In this case, it is best to contact me by email at least one day before you'd like to meet, or see me immediately after class. This semester I have 250 students so my apologies in advance if I'm not able to meet you outside my regular office hours / class time for some reason.

4. ELECTRONIC ASSISTANCE

4.1 Blackboard

Everyone registered in this course should find a link to the course in their *Blackboard* account. All information about the course and the lab 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*.

4.2 Email

This is the best way to get in touch with me. My email is cjsuther@usc.edu. Please include “Phys 135a” in the subject line because I’m teaching multiple courses. **Please no questions about the homework.** This is just to make my inbox a bit more manageable. Study groups, my office hours, the TA office hours should be enough resources to complete the homework. However if you believe there’s a typo or I forgot to upload something, please do contact me. Contact me about anything else besides the homework; general physics questions, course questions, your standing in the course, personal questions, business opportunities, donations... (jk)

4.3 Social Media

I have an Instagram, Twitter, Youtube, Twitch, TikTok, OnlyFans (jk), all @sutherlandphys. I plan on shamelessly using some subset of these. Please let me know if you think of something useful for me to post there for you guys. Please also let me know if I’m being “cringe”.

5. ACADEMIC INTEGRITY

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

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

6. 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 Chris Gould, gould@usc.edu, 213-740-1101, SSC 204.

7. SOME USEFUL DATES

January 13 th	Classes Begin
January 20 th	Martin Luther King Jr's Birthday
February 17 th	President's Day
February 25 th	Midterm 1
February 28 th	Last day to drop class without a mark of "W," and last day to change enrolment option (no refund though)
March 16 th -20 th	Spring Break
March 31 st	Midterm 2
April 3 rd	Last day to drop class with mark of "W"
May 1 st	Spring semester classes end
May 11 th	Final Exam

8. COURSE SCHEDULE

Here's the best way to do well in the course: You should read through the relevant chapters prior to coming to the lectures each week, and review the lecture notes after each lecture before attempting the homework problems. You should also attempt end of chapter problems from our textbook for extra practice (this will help a lot).

#	Week of	Topic	Reading
1	Jan.13 th	Intro to Physics units and Vectors, Kinematics	Ch.1, Ch.2
2	Jan.20 th	Kinematics	Ch.2
3	Jan.27 th	Kinematics in 2D, Newton's Laws	Ch.3, Ch.4
4	Feb. 3 rd	Applications of Newton's Second law, Friction	Ch.4, Ch.5

5	Feb.10 th	Uniform Circular Motion	Ch.6
6	Feb.17 th	Work, Energy, and Energy Resources	Ch.7
7	Feb.24 th	Midterm 1 Review + Midterm 1 (Feb.25th)	Ch.1-7
8	Mar.2 nd	Linear Momentum and Collisions	Ch.8
9	Mar.9 th	Statics and Torque	Ch.9
10	Mar.16 th	Spring Break	
11	March.23 rd	Rotational Motion and Angular Momentum	Ch.10
12	March.30 th	Midterm 2 Review + Midterm 2 (Mar.31st)	Ch. 8-10
13	April.6 th	Fluids	Ch.11, 12
14	April.13 th	Sound	Ch.17
15	April. 20 th	Heat and Thermodynamics	Ch.14, 15
16	April.27 th	Final Exam Review	All
*** FINAL EXAM Monday, May 11th from 11:00am to 1:00pm, Location TBA***			