

Physics 151L

Course Information

Physics 151L is the first course in the Physics sequence intended for physical science and engineering majors. The subject material is Classical Mechanics and Thermodynamics. The goal of the course is to teach you how to approach and solve physical problems, and to develop an intuition for the important physical properties which affect a given situation. Following this course you should be able to analyze such diverse phenomena as looping roller coasters, satellite orbits, and cars with bad suspensions, and be able to explain to your Aunt Martha why mountaintops are colder than deserts, even though they are closer to the Sun.

This course will make extensive use of Web-based resources keyed to your USC computer account and email address. In particular, required quizzes given before each lecture and all homework assignments will be presented and graded entirely on-line.

The sequence of courses 151-153 is to be considered as a whole, and not as independent nonintersecting courses. In the succeeding courses you will be expected to be able to freely make use of material covered in this course.

I. Course Instructors

<u>Instructor</u>	<u>Pronunciation</u>	<u>Office</u>	<u>Office Hours</u>	<u>Phone</u>	<u>e-mail</u>
Dr. Burke	burke	SSC 102	MW 2-6	821-1228	burked@usc.edu
Dr. Gould	goold	SSC 204	MW 2-3	740-1101	gould@usc.edu
Dr. Johnson	johnson	SSC 201	TTh 10-11	821-1772	johnson1@usc.edu

II. Course Materials

II.A. Required for the Lecture

1. Randall D. Knight, *Physics for Scientists and Engineers: A Strategic Approach with Modern Physics*, with MasteringPhysics (Addison Wesley, Pearson, 2004) \$145.50. This is a shrink-wrapped package of three items: the single volume hard cover text book, a soft cover *Student Workbook*, and a Student Access Kit for MasteringPhysics. If you find it outside the Bookstore for significantly less, it is likely that what you'll get is incomplete. If you find a used copy (unlikely this semester) you will need to separately purchase MasteringPhysics online (\$30). This book will also be used in PHYS 152 and PHYS 153. Your MasteringPhysics code will continue to be valid during the subsequent semesters. *Don't sell your book at the end of this semester.*

II.B. Required for the Laboratory

2. *Laboratory Manual for Physics 151L*, Spring 2004 Edition (USC Dept. of Physics, 2004), \$8.00. This manual is sold only in KAP B16 near your laboratory room, *not the Bookstore*, between the hours of 8:30 am and 5 pm, Monday through Friday. All sales are check or money order only — no credit cards, cash, or discretionary. All sales are final.
3. *Science Notebook* (National Notebook 43-645), \$9.99. Any equivalent notebook with quadrille ruled pre-numbered pages bound into the notebook, with identically numbered pages for copies (either carbon copies or carbonless forms) is acceptable.

III. Administrivia

III.A. Prerequisites

The prerequisite for this course is Math 125 (Calculus I). Math 126 (Calculus II), though not an explicit corequisite, should be considered effectively one, as it is a prerequisite for Physics 152.

III.B. Registration

Your registration for this course consists of three separate parts: a lecture, a “quiz,” and a laboratory. You must be registered for one of each. (The only exception is if you have previously completed the laboratory *and* have received permission to carry its grade into the current semester. In that case you would register only for the lecture and “quiz.”)

	<u>Section</u>	<u>Time/Day</u>	<u>Instructor</u>	<u>Location</u>
Lec	65070R	12 MWF	Dr. Gould	SLH 102
Qz	65071R	5-6:30 Th	Dr. Gould	TBA
Lec	65074R	12:00-1:50 TTh	Dr. Johnson	SLH 100
Qz	65075R	5-6:30 Th	Dr. Johnson	TBA
Lec	65078R	6-7:20 MW	Dr. Burke	SLH 100
Qz	65079R	5-6:30 Th	Dr. Burke	TBA

Associated with each lecture section is its own quiz section. In the Schedule of Classes each lecture is immediately followed by its associated quiz section. All quiz sections meet at the same time, *but do not necessarily meet every week*. The quiz time is reserved in order that a common time can be set aside for the midterms. The dates for the midterms are indicated on the syllabus. The location for each midterm will be announced shortly before it is given. In lectures your instructor will announce if and when there are to be any additional meetings during the quiz section time slot.

There are also laboratory sections, meeting once a week for three hours. You may choose any laboratory section which suits your schedule.

<u>Lab Section</u>	<u>Time/Day</u>	<u>Open Slots</u>	<u>Instructor(s)</u>	<u>Location</u>
65081R	8-10:50 T	–		KAP B8
65085R	11-1:50 T	–		KAP B8
65089R	2-4:50 T	–		KAP B8
65082R	8-10:50 W	1		KAP B8
65086R	11-1:50 W	–		KAP B8
65090R	2-4:50 W	–		KAP B8
65093R	5-7:50 W	–		KAP B8
65083R	8-10:50 Th	–		KAP B8
65087R	11-1:50 Th	–		KAP B8
65091R	2-4:50 Th	–		KAP B8
65084R	8-10:50 F	6		KAP B8
65088R	11-1:50 F	–		KAP B8
65092R	2-4:50 F	–		KAP B8

III.C. Disabilities

The inclusion of the following statement has been requested by the DSP office:

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

IV. Grading

Your final course grade will be based upon the following components:

Component	Weight	Minimum Requirement
Readings/ Quizzes	15%	Submit at least 80%
Homework	20%	Submit at least 75%
Laboratory	20%	Pass
Midterms	30%	Pass
Final Exam	15%	Pass

As indicated in the above table, in order to receive a passing grade in the course (*i.e.* at least a D-) you must, at a minimum, pass the laboratory, pass the midterms (cumulatively), and pass the final exam, and must submit at least the stated fraction of quizzes and homework sets. For example, even if you get the highest grade in the course on the final examination, if you blow off one of the course components and do not meet the stated minimum requirement you will not pass the course. While this may appear rather draconian, we hope that by making clear our expectations in advance, everyone will make a serious effort in each component of the course, thereby making this class a success.

All students in this course will be given the same homework assignments, the same laboratory projects, and the same examinations, and will be graded on a common scale.

IV.A. Readings/ Quizzes

Before every lecture you are required to (1) complete the assigned reading and (2) complete an on-line quiz based upon this reading or upon the previous lecture material. You will find the reading assignment on the course web site, where the pre-lecture quizzes will also be delivered. All quizzes are due before midnight before your lecture. Note: Being an on-line quiz, timing is based on a seven-day week, not five-day, so that for Monday classes the “night-before” deadline is *not* on Friday night, but rather is on Sunday night.

IV.B. Homework

Homework assignments are due every week on Tuesday night before midnight. All homework assignments are provided on the course web site, and are graded at the time you submit them. In computing your course grade, we will drop the lowest two homework scores; if you fail to submit a particular set, it will be counted as a zero and will likely be one of the dropped scores.

We expect that it will take you approximately 6 hours to complete each homework set. These homework sets are the central way you will learn physics. “Understanding” physics does not mean knowing the words, having read the book. Instead, “understanding” implies having developed the ability to solve physics problems you have not seen before.

Homework problems will range from the trivial to the difficult. Midterm and final examination questions will more closely resemble (and in isolated instances may be identical to) homework problems on the difficult end of the spectrum. Experience shows a strong positive correlation between total homework scores and total exam scores. It is for these reasons that you are encouraged to attempt *every* homework problem, even if you are not able to complete each one.

The counsel to do your own homework does *not* mean that you cannot work with other students in the class. To the contrary, we recommend students work together, where feasible, in deciding how to solve problems. Of course, working together does *not* mean simply copying solutions from each other. That action is a violation of academic integrity standards. There is, however, a large difference between simply copying and learning by cooperating. Take advantage of this opportunity.

IV.C. Laboratory

Physics 151 laboratories will meet during the first week of classes. If you do not attend this first meeting, you may be dropped from the lab section if there is a waiting list for that section.

You may find it convenient to purchase your Laboratory Manual when you come to the first meeting of the laboratory the first week of classes, since it is sold at the stockroom window just down the corridor from the lab. At every laboratory meeting after this week you must bring your Laboratory Manual and Notebook. The Manual will explain how your Notebook should be prepared in advance of each week's meeting.

The laboratory grade will be derived from your ability to perform experiments, lab notebook plus analysis, laboratory quizzes, and two lab practicals.

If you miss a laboratory period, it is *your responsibility* to make arrangements with your T.A. to make up the missing experiment. Your T.A. will not make this arrangement for you. *You cannot make up a missed experiment by attending a different laboratory section.* T.A.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, Gökhan Esirgen, KAP B19, 740-1138, esirgen@usc.edu.

IV.D. Examinations

There will be two midterm examinations and a Final Examination. The midterm exams will last 60 minutes and will be given during the weekly "quiz" period to all sections simultaneously. The midterms will cover material incrementally through the semester. The Final Exam will last 120 minutes and will be comprehensive of the entire semester.

There are no scheduled make-up examinations for either the midterms or the Final Exam.

V. Assistance

You have a variety of opportunities for assistance available to you. Here we list a non-exclusive set of these opportunities. Your home department or housing unit may provide others.

V.A. Lectures

Don't underestimate the value of questions *during* the lecture period. In large lectures, many students are reluctant to pose questions which they fear may seem silly to either their cohorts or the instructor. This probably includes you. Almost always, if one student asks a question, there are several others who have been bothered by the same thing. Often such questions tell the instructor

what is not clear to the students. Stopping the lecture and getting everyone together on the issue is much more useful than simply letting a lecture continue without clarification.

A portion of each week's lecture time will be devoted to illustrative examples, including some from the assigned homework sets. This is natural considering that midterm questions frequently are derived from homework problems.

V.B. Lecturer Office Hours

For more personal attention you can come to the office hours of your instructor listed on page 1 of this document. If at all possible, come to the regularly scheduled office hours listed there. However, it may be possible to schedule an appointment at a different time by phoning or e-mailing your instructor with the request. E-mail is preferred.

V.C. Your Laboratory T.A.

All laboratory teaching assistants are graduate students, usually pursuing a Ph.D. in Physics. They are all capable of answering any question you have regarding subject material. Usually your lab T.A. can answer your question immediately, whether at the beginning or the end of the lab period. However, some problems you pose may be ambiguous, and will require some thought, so that your T.A. will need some time to think. In either event, you should regard your laboratory T.A. as a resource not only for the laboratory, but also for all physics questions.

V.D. T.A. Office Hours - SGM 409

January 20 - May 3

All laboratory teaching assistants have office hours in SGM 409 for the assistance of students in all 100-level physics courses. The offices will be staffed with at least one TA from 9-4, Monday through Thursday through the Study Days before Final Exams. The schedule of every TA's office hours will be constructed during the first week of classes and will be posted outside the Office Hours room and maintained on the Departmental Web site at <http://physics.usc.edu/Undergraduate/TAofficehours.html>. If you find the room unoccupied in contradiction to the posted schedule, inform your instructor.

V.E. Published Solutions

Images of midterms and final examinations from previous semesters are available on the course Web site as described below in section VI.B. Paper copies of these solutions will not be provided. We do not expect that paper versions should be necessary, but you may, of course, print out any solutions from our Web site which you find necessary. Solutions to all homework sets are also available at any time after you have submitted them for grading.

V.F. Supplemental Instruction Program

<http://www.usc.edu/dept/LAS/si>

Supplemental Instruction (SI) is an academic program designed to improve student performance in this course and in several other traditionally difficult courses. It is free and does not require academic credit. Each week there will be several sessions led by an SI leader who will be working together with the instructor and attending the same lectures as you do. At the time this document was printed, the SI leaders had not yet been assigned. When they are assigned, you will find their names and contact information on the course web site and on the SI site above. For further information, contact Judy Haw at 740-5295, or an SI leader.

V.G. Other Books

There is no shortage of alternative textbooks to Knight's *Physics*. Some of these will be in Leavey Library (*not* Seaver Library) including:

- Tipler and Mosca, *Physics for Scientists and Engineers*, Fifth Ed. (Freeman, 2004).
- Halliday, Resnick, Walker, *Fundamentals of Physics*, v.1, Sixth Ed. (Wiley, 2001).
- Resnick, Halliday, Krane, *Physics*, v.1, Fifth Ed. (Wiley, 2001).
- Serway and Jewett, *Physics for Scientists and Engineers*, Sixth Ed. (Brooks/Cole, 2004)
- Young and Freedman, *University Physics*, Eleventh Ed. (Benjamin-Cummings, 2004)

Each of these texts is calculus-based and is used in numerous universities throughout the country.

V.H. Study Groups

One of the most effective ways to learn new material is to teach it to others. To this end, we encourage you to work together in learning the material, and in doing homework assignments. If you have friends also enrolled in the course, in any section, feel free to discuss homework problems, *approaches* to solutions, and even solutions, though again you are cautioned not to simply copy each other's solutions.

In order to facilitate the formation of study groups, we will prepare a list of students enrolled in Physics 151, ordered by housing unit. This list will contain names and housing units only — no phone or room numbers will be listed in the interest of preserving the privacy of those students who would prefer other arrangements.

V.I. Engineering Peer Tutoring <http://www.usc.edu/dept/engineering/esa/>

The Engineering Peer Tutoring Program Office is located in Hedco (Petroleum) Building, Room 115, and provides two kinds of services. It provides free individual and group tutoring with tutors screened by the School of Engineering. Its hours are 9:00 am - 8:00 pm Monday-Thursday, and 9:00 am - 5:00 pm on Friday. Regular review sessions are planned. The Program's web site is contained within the Engineering Student Affairs web site given above. From there click on "Special Programs" on the left, and then "Peer Tutoring Program" in the next list. For more information contact Maura Jenkins in the Engineering Student Affairs Office, OHE 106, 740-3881, engrtutr@usc.edu.

V.J. Center for Academic Support <http://www.usc.edu/student-affairs/asn/CAS/>

The Center for Academic Support provides, among other things, free tutoring in many subjects. For further information visit the above web site, call 740-0776, email study@usc.edu or visit them in STU 301.

V.K. Tutors

The Department of Physics and Astronomy does not recommend tutors. The principal function of a tutor is to enforce a regular study of course material. This function, however, is served as well by working together with other students in the course — and it's much less expensive.

VI. Electronic Assistance

Everyone in this class has convenient access to the USC network. If you do not already know what your account name is, you should use your favorite Web browser to reach www.usc.edu/firstlogin/ and follow the instructions there. To get help on using the USC network you can use the Help screens available within USC's central home page. There is also a primer written specifically for students which is available from ISD at www.usc.edu/isd/publications/stuprimer/. For certain functions you will need to use your USC account, *not one from an external Internet Service Provider, such as AOL*. While it is simpler to use your USC account directly, depending upon your circumstances you may be able to access your USC account from an external ISP using VPN software also available from ISD.

VI.A. e-mail

Your instructors use e-mail to communicate with each other and with the laboratory T.A.s. You can use e-mail to make appointments to speak privately with your instructor, or to just ask questions about physics that you don't want to ask publicly.

VI.B. Course Web Site

<http://physics.usc.edu/Classes/151/>

Physics 151's home page is at the URL listed above, but you can always search for it by starting at the USC home page and following the obvious links through the Department of Physics and Astronomy.

Under this home page you will find a copy of the syllabus, homework assignments, important news and announcements, and solutions to homework sets and examinations in this and previous semesters.

VI.C. ActivPhysics OnLine

<http://www.aw-bc.com/knight/>

Interactive tutorials expanding upon the material in lectures and the textbook. You are encouraged to explore this site. Note: some reading assignments and online quizzes will be based in part upon activities found on this site.

VI.D. Grades Reporter

phys151grades@usc.edu

You can get your current grades in Physics 151 any time, anywhere. The Department of Physics and Astronomy has implemented a Grades Reporter that can be accessed electronically. By sending e-mail to phys151grades, from your USC e-mail account (and only that address), you will receive, in seconds, e-mail containing your currently recorded grades, along with your rank and corresponding class averages. In your request you need not put anything in the subject or body of the message (unless your mail client requires it, of course). The simple act of sending the message will generate the reply. Ordinarily, at the end of every report you will find a message with any late-breaking news for the class, such as room assignments for the examinations.

If you send a request from a non-USC account (or a USC account other than the one you registered on the attached first-day Registration/Questionnaire) the Grades Reporter will tell you that it does not know who you are. You must use the same USC account for all course-related activities. If the Grades Reporter responds with what you believe to be an incorrect grade, then discuss this with your instructor immediately, or send him e-mail directly.

VII. Laboratory Schedule

The tentative schedule of laboratory experiments to be performed is shown below. You will receive a more complete schedule in the laboratory's first meeting. In case of conflict between the schedule below and that given to you in the laboratory, the schedule below is superceded.

Week Of	Experiments
Jan. 12	Organizational Meeting – Bring the Lab Manual
Jan. 19	I Presentation and Analysis of Data by Means of Graphs
Jan. 26	II Measurements and Experimental Errors
Feb. 2	III Free Fall
Feb. 9	V Atwood's Machine
Feb. 16	VI Conservation of Momentum
Feb. 23	Laboratory Practical Examination #1
Mar. 1	— Two-Dimensional Collisions
Mar. 8	VII Fluid Flow
Mar. 15	No Laboratory Meetings (Spring Recess)
Mar. 22	VIII Moment of Inertia of a Rigid Body
Mar. 29	IX Simple Harmonic Motion
Apr. 5	X Ideal Gas Law and the Absolute Zero of Temperature
Apr. 12	Laboratory Experiment Make-Ups This Week Only – Schedule with TA by April 9
Apr. 19	Laboratory Practical Examination #2
Apr. 26	Laboratory Practical Examination Make-Ups #1/#2

VIII. Syllabus

Why Things Change Part I — Motion and Newton's Laws

#	Week of	Topics	Reading
1	Jan. 12	Dimensional Analysis, Estimation, Concepts of Motion	Ch. 1
January 19, Martin Luther King, Jr. Day — University Holiday			
2	Jan 19	1D Kinematics: Displacement, Velocity, Acceleration, Vectors	Ch. 2 Ch. 3
3	Jan 26	Dynamics: Newton's Second Law, Free Body Diagrams, Weight, Friction	Ch. 4 Ch. 5
4	Feb. 2	Motion in a Plane: Projectile Motion, Relative Motion, Circular Motion	Ch. 6 Ch. 7
5	Feb. 9	Newton's Third Law: Multiple Bodies, Action-Reaction Pairs	Ch. 8
February 16, Presidents' Day — University Holiday			
M	Feb. 16	Review and Midterm I: Thursday, February 19, 5:00 - 6:30 pm Location: To Be Announced	

Why Some Things Stay the Same Part II — Conservation Laws Part III — Applications of Newton's Laws

#	Week of	Topics	Reading
6	Feb. 23	Linear Momentum, Impulse, Conservation of Linear Momentum, Collisions, Angular Momentum	Ch. 9
7	Mar. 1	Energy and Work: Kinetic Energy, Potential Energy, Elastic Collisions, Work by Variable Forces, Thermal Energy, Conservation of Energy	Ch. 10 Ch. 11
8	Mar. 8	Rotational Kinematics and Dynamics: Torque, Moment of Inertia, Rolling Objects, Angular Momentum Revisited	Ch. 13
March 15-20, Spring Recess			
9	Mar. 22	Gravity, Simple Harmonic Oscillation, Pendula	Ch. 12 Ch. 14
M	Mar 29	Review and Midterm II: Thursday, April 1, 5:00 - 6:30 pm Location: To Be Announced	

It's All About Energy
Part IV — Thermodynamics

#	Week of	Topics	Reading
10	Apr. 5	Temperature, Ideal Gases, Elementary Thermodynamic Processes, First Law of Thermodynamics: Work, Heat, and Conservation of Energy	Ch. 16 Ch. 17
11	Apr. 12	Calorimetry, Specific Heat, Microscopic Model of Ideal Gases: Pressure, Temperature, Entropy	Ch. 17 Ch. 18
12	Apr. 19	Second Law of Thermodynamics: Work from Heat Engines, Refrigerators, Ultimate Limit to Efficiency	Ch. 19
13	Apr. 26	Entropy, Final Examination Review	
Last Day of Classes: Friday, April 30			
Final Examination: Tuesday, May 4, 8:00 am - 10:00 am (all chapters) Important: This is one of the "Exceptions" in the Schedule of Classes. Location: To Be Announced			

Other Important Dates:

January	30:	Last day to add or drop without mark of "W"
March	2:	California Primary Election
April	9:	Last day to drop with mark of "W"
April	20:	Jimmy Carter attacked by "Killer Rabbit," 1979
May	4-11:	Final Examination Period