PHYSICS 125Lg: PHYSICS FOR ARCHITECTS

Dr. Däppen

Classes meet:
TTh 10-11:50pm, 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 1-1:50pm (SHS 370),
and by appointment (arranged in person, by phone, or e-mail)

Labs meet:
KAP B25

Lab director:
Gökhan Esirgen, KAP B19, e-mail: esirgen@usc.edu

Departmental-TA Office:
ACB 431 (hours TBA)

Course description (Catalogue):
Fundamental laws and principles of physics with emphasis on the application of physical principles to the problems of architecture.

Expanded Course description:

Physics 125 is a course in introductory physics designed for architecture majors. There are several things that we should keep in mind. First of all, you are taking this course because it contains material (both conceptual and quantitative) that you will need in your future courses in architecture. Since physics is by itself such a well-defined discipline, there is a natural tendency to follow the discipline rather than to relate what we are learning to another discipline (such as architecture). That line of thinking would give students the wrong message that physics is not terribly important for their own career. For that reason, I invite you to ask the question "how does this relate to something that I need to know to become a better architect?" at any time. Hopefully, I will work in enough examples as we go that will make the connections, but whenever asked, I will be happy to come up with more. You should however bear in mind that a given topic might not have immediate applications to architecture but is necessary because it is a background stepping stone to a topic that does have immediate applications to architecture.

The second thing that we should keep in mind is that we will be working on two levels of understanding. The first is getting a conceptual framework for physics. That can be fairly simple e.g. I drop a ball and gravity causes it to accelerate towards the floor. Then the concepts gets a little more complex, e.g., a ball that I throw vertically into the air stops momentarily at the top of its flight but is being accelerated downward the entire flight. Along with the conceptual understanding, we are very much interested in improving your problem solving skills. In physics, "problem solving" means translating a situation, often described in words, into some (algebraic) equations and using those to solve a problem. Developing good problem solving skills requires patience and we will try to provide you with as much help as you need. On the other hand, those very skills may be the most important for your future. They are very much a part of breaking down a complex project into solvable components.
Learning objectives:
On completion of the course, students should have become familiar with topics that are of the most relevance to future architects. We will focus on 1) describing motion (kinematics), 2) the natural laws of motion (Newton’s laws), 3) rotational motion and torques, 4) static equilibrium (why structures don’t fall down) 5) conservation of momentum and energy, 5) properties of materials, including thermal properties, 6) waves (earthquakes, light and sound), and 7) electricity and magnetism. That is a pretty tall order for one semester. However, the properties of materials are fundamentally important for architecture. Equally important is an understanding about things that oscillate (6) and electricity (7).
Here, you will learn about the basics of electrostatics and simple circuits, as well as the laws that govern the generation of electric currents by the motion of magnets. A more general application of these same laws makes transformers possible, which play a fundamental role in the distribution of electric power from the power plant to the user.

Text:
Getting the ”right” textbook for this course is a bit of a challenge. Given the quantitative level of the course, texts assume a two-semester course leaving students with a large and heavy book, forcing us to skip many chapters and sections. I have opted for the following textbook

Young, Hugh D. – *College Physics* (9th Edition)

This textbook will be an indispensable reference for the course. However, because of its wealth of material, you should mainly rely on the lecture to find out how you can manage the relevant material in a much more economical way.
**Tentative Schedule:**

Please note that as the semester evolves, the schedule for homework, midterms, and laboratories may change. The most recent version of the schedule will be posted on Blackboard.

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<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Book Reference</th>
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<tbody>
<tr>
<td>1</td>
<td>1/13-15</td>
<td>Kinematics in 1-D</td>
<td>Ch. 2</td>
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<tr>
<td>2</td>
<td>1/20-22</td>
<td>Vectors, Kinematics in 2-D</td>
<td>Ch. 1.7-8;3</td>
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<td>3</td>
<td>1/27-29</td>
<td>Dynamics, Newton’s Laws</td>
<td>Ch. 4</td>
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<td><strong>Deadline: Dropping without W; Electing P/N: January 30</strong></td>
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<td>4</td>
<td>2/ 3-5</td>
<td>Momentum, Energy</td>
<td>Ch. 8.1-3,8.5-7; Ch. 7</td>
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<td><strong>FIRST MIDTERM EXAM:</strong> Thursday, Feb. 12</td>
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<td>5</td>
<td>2/10-12</td>
<td>Exam Review, Exam</td>
<td>Ch. 9</td>
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<td>6</td>
<td>2/17-19</td>
<td>Kinematics of Rotational Motion</td>
<td>Ch. 10.1,10.6</td>
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<td>7</td>
<td>2/24-26</td>
<td>Statics and Dynamics of Rotational Motion: Torque</td>
<td>Ch. 10.2-3</td>
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<td>8</td>
<td>3/ 3-5</td>
<td>Dynamics of Rotational Motion: Moment of Intertia</td>
<td>Ch. 10.4-5</td>
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<td>9</td>
<td>3/10-12</td>
<td>Angular Momentum</td>
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<td><strong>Spring Recess: March 16-21</strong></td>
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<td>10</td>
<td>3/24-26</td>
<td>Exam Review, Exam</td>
<td>Ch. 11.2-3</td>
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<td>11</td>
<td>3/31-4/2</td>
<td>Waves, Fluids</td>
<td>Ch. 12.1-3,12.5-10</td>
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<td><strong>SECOND MIDTERM EXAM:</strong> Thursday, March 26</td>
<td>Ch. 13.1-3,13.5-6</td>
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<td>12</td>
<td>4/ 7-9</td>
<td>Temperature, Heat, Heat Transport, Thermal Properties of Matter</td>
<td>Ch. 14, Ch. 15.1-4</td>
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<td><strong>Deadline: Dropping with W: April 10</strong></td>
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<tr>
<td>13</td>
<td>4/14-16</td>
<td>First and Second Law of Thermodynamics</td>
<td>Ch. 15.5-7</td>
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<td>14</td>
<td>4/21-23</td>
<td>Electric Charges and Currents</td>
<td>Ch. 16.1-6</td>
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<td>15</td>
<td>4/28-30</td>
<td>Magnetism, Induction, Transformers; Final Exam Review</td>
<td>Ch. 17.1-5</td>
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<td>Ch. 19.1-6</td>
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<td>Ch. 20.1-3,5+8</td>
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<td>Ch. 21.1-3+9</td>
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**ALL STUDENTS (NO EXCEPTIONS) MUST TAKE THE FINAL EXAM, Tuesday, May 12, 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
There will be two midterms and a final in this class. The dates of the exams will be announced repeatedly in class. The First Midterm Exam will be on February 12, 2015 at your regularly scheduled class time, 10am, in the same room where you have lecture. The Second Midterm Exam will be on March 26, 2015, again at your regularly scheduled class time, 10am, in the same room where you have lecture. While the midterm exam dates are to be confirmed, the final exam date and time is “set in stone” by the University. It is on Tuesday, May 12, 11 a.m.–1 p.m. Please be sure that you have no conflicts. You may not take it early. Do not make travel arrangements that prevent you from taking the final. You have to take it at the scheduled time. There are no exceptions.

The midterm exams will cover the course material incrementally throughout the semester, and the final exam will cover the whole course. A missed exam will prevent you from passing unless you have approval from your professor before the exam because of an extreme emergency.

All exams are closed book. Other than pens and pencils, the only things you can bring are non-programmable calculators. 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. The formula sheets will be and attached to the midterms and final. 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).

Grading:
The percentages for the course grade will be:

- Midterm One 15%
- Midterm Two 15%
- Final 35%
- Laboratory 20%
- Homework 15%

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.
In the week of each midterm, and on the last day of class, exam I will carry out reviews for the midterms and final exam, respectively.
Homework

There are tentatively 10 homework sets

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<tr>
<th>Homework #</th>
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<td>1</td>
<td>Jan. 13</td>
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<td>8</td>
<td>Mar. 24</td>
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<td>9</td>
<td>Mar. 31</td>
<td>Apr. 9</td>
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<td>10</td>
<td>Apr. 7</td>
<td>Apr. 16</td>
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Please note that homework is a big deal. That is simply because, working through homework problems is the best learning tool that we have. Knowing how to do homework problems is the best way to prepare for tests as well. The key is to have a good approach. We will discuss the advantages of studying in groups and the most effective way to interact in the lecture.

The most important thing to gain from homework is the development your own framework to solving problems. During the exams, there will be no one to help you. As mentioned before, the schedule for homework (as well as for midterms and laboratories) may change. The most recent version of the schedule will be posted on Blackboard. 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 one assignment provided all other scores are perfect according to the following policy:

As mentioned above, homework will count for 15% in the overall score. Each of the 10 homework scores will be given equal weight, and each set with a perfect score gives 1.67%. I will cap the total homework score at 15%. This means that you can obtain the maximum homework score of 15% already with 9 perfect assignments. And you will have a possibility to “repair” deficiencies in individual scores by turning in more than 9 assignments!

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 always 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.
Each student has to be enrolled in a laboratory section. Because of limited laboratory space, the actual lab period is shorter than the nominal one (two instead of three hours), but all of the labs can be accommodated within the 2 hour period. **Be sure to attend every laboratory. This is particularly true for the first lab, which will start on Friday of the first week. Students need to be present with a printout of the manual pages for the first experiment, available from the laboratory session on blackboard (20151_phys_125_50332: Physics for Architects).**

Please 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. The purpose of the labs is to give you a “hands-on” experience with measurements and physical phenomena. In some cases, you may see the physics demonstrated in the lab before it is covered in the lecture. Physics is an experimental science and therefore the laboratory is a very important part of this course. Physics 125gL 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. Please read it carefully.

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. Gökhan Esirgen (KAP B19; Email: esirgen@usc.edu).

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.** In particular, the laboratory might mandate that you 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.
SUPPORT

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

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) Homework Assignments and Homework Solutions,
ii) Handouts, and
iii) 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.

Lecture

Physics is often considered a complex subject. Mostly that impression comes from the skill required to take ordinary situations and extract the important information (often eliminating irrelevant details) and casting a problem solution in mathematical terms. This skill is learned in phases. In not particular order they are:

- Introduction to concepts. This introduction comes from reading the appropriate sections of the textbook.
- Attending lectures. Often the concept is illustrated by demonstrations and examples. And the lectures help with navigating through to overwhelming material in the textbook.
- Problem solving. After observing examples in the textbook and the lecture, students can learn the most by being actively involved in solving homework problems.
- Hands on exposure to physics in the laboratory. I consider this experience to be very important. We are continuing to improve our laboratories and welcome any suggestions.

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.
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.

General Physics-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.

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.

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 .