

December 26, 2009

Physics 230

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WELCOME TO THE EXCITING WORLD OF PHYSICS!

PHYSICS 230, Sections 2534 and 2535

Lecture sections 2534 and 2535: W, F 11:00-12:15 PS 177

Homework session: Section 2534: W: 1:00-1:50 in PS117; Section 2535: W 2:00-2:50 in PS117

Lab: Section 2534: M 11:00-2:00 PS 117; Section 2535: M 2:00-5:00 PS 117

Midterms and Final: Sections 2534 and 2535: Midterms on Mondays during lab times: M1: March 1, M2: April 12; M3: May 17. FINAL Sections 2534 and 2535: Monday May 24: 10:30 to 12:30 in room PS177

PHYSICS 230, Section 2106

Lecture sections: T-TH 11:00-12:15 PS 175

Homework session: T: 1:00-1:50 in PS117

Lab: TH 2:00-5:00 PS 117

Midterms and Final: Midterms on Thursdays during lab times 2-5: M1 February 25; M2 April 1; M3 May14

FINAL: Tuesday May 25: 10:30 to 12:30 in room PS175

Office Hours in PS137: M,T,W,TH,F 10:30-11, M:1:30-2, W 12:30 to 1; F: 12:30 to 2 Ask me for special time arrangements.

Results for PHYS-230 course outcomes. Students will be able to...

1. PHYS-230: Physics for Engineers and Scientists B: Heat and Electro-Magnetism

A continuation of Physics 130. Fundamentals of thermodynamics, electricity, and magnetism.

SLO#1. correctly identify and apply one or more of the following skill sets or principles to solve a problem in thermodynamics at the calculus level: temperature, heat, thermal expansion, kinetic theory,

the ideal gas law, PV diagrams, internal energy, specific heat, the laws of thermodynamics, heat engines and entropy.

SLO#2. correctly identify and apply one or more of the following skill sets or principles to solve a problem concerning static electric charges at the calculus level: Coulomb's law, electric fields and their superposition, Gauss' law, the electric force, the electric potential and capacitance.

SLO#3. correctly identify and apply one or more of the following skill sets or principles to solve a problem concerning moving charges and/or time-varying fields at the calculus level: electric current, resistance, Biot-Savart law, magnetic fields, magnetic force laws, Ampere's law, Faraday's law, Maxwell's equations and plane electromagnetic waves.

When you hand in a lab report, midterm, or final, always write your last NAME first, then your middle and first name (if this applies.) Write your whole name in **CAPITAL LETTERS**. This is important, because I do not want to have cases with mistaken identities.

I post lecture notes and homework problems on the website. We use the book by Serway, 7th edition, chapters 19 through 34.) I post all my lectures on my website.

I expect you to do the homework problems and come with questions to the homework sessions. Start working on chapter 19 immediately. Download the lecture notes for chapter 19, as well as the supplemental 1 (uncertainty calculations) and 2 (path integrals and vector operators) and the homework problem set for chapter 19.

Problems I solve in class should get your special attention, as many of them reappear in midterms. During our discussion sessions I will discuss homework problems of the latest two chapters on which I lecture. During our very first homework session I lecture on uncertainty calculations and a few other things. You don't need to prepare any homework assignments for that first session. Handouts and additional material, including homework problems and solved practice tests (as soon as I have some), appear as pdf files on the web address below. **Study them carefully.** Some handouts cover material as I present it in class, which is what counts. Download them, print them out and collect them in a special folder with your class notes and homework. **Study them carefully. Website address:**

<http://www.heisingart.com/230.htm>

All lecture notes and homework problems, including practice midterms and finals are posted on the website. I will make minor changes if I discover typos.

I want to help you as much as possible. By the way, I am not only a physicist but also a philosopher and poet, as you will soon discover.

My particular interest in physics is quantum mechanics and its relationship with thinking. I mention this to you to show that contrary to common beliefs, art and science can and should go very well together. If you have any interest in some of this maybe we have some common ground to share. I have written a book called "Dancing With Maya" which shows how quantum

physics limits all knowledge in a very fundamental way, thus leaving open the possibility of creative and intelligent thinking as can be found in some poetry, mythology, and religions. If you are interested in this you can download a copy of "Dancing With Maya" from my website.

I received my bachelor degree at the Sorbonne (Paris), and my Master's as well as my Ph.D. at the University of Karlsruhe in West Germany.

This physics course is designed to introduce students who are majoring in science. Prerequisites are a good knowledge of algebra and trigonometry. I will put a lot of emphasis also on giving you an introduction into physics as a world view. I highly recommend that you do not attempt this class until after you know how to use calculus.

Apart from a text-book you will need a scientific calculator with statistics functions and a storage device to save your work during the lab. Bring your lab top (if you have one) to the lab session on Thursdays.

I will also introduce and use complex numbers and functions, to be used with currents and waves. In addition I will use vector operators like grad, div, curl to describe the equations of electromagnetism. I will dedicate some extra time to their study and practice. Recommended books are **Mathematical Methods in the Physical Sciences, by Mary L. Boas, and Handbook of Mathematics by Bronshtein-Semendyayev**. Check them out on Amazon or other websites. There are special handouts on these topics, all available for you to download from the website.

On this website www.heisingart.com you will also find more paintings of my wife and wildlife photography by myself. Eagles, hawks, beavers, river otters, animals and landscapes from our very area around here. Don't forget nature over the study of physics. It is the ultimate reality.

If during and outside of the lectures you want me to explain something in physics or mathematics, ask!

Attendance, Participation, and Official Record

I expect you to attend every class, lab, and work-session, and to catch up on any classes missed by getting lecture notes from classmates (not from me!).

NOTE: The worst thing you could possibly do to yourself is to miss a class.

If you must be absent, it is not necessary to call or explain. But if you miss three or more classes, your standing in the class may be endangered, and you should discuss your progress with me. I expect you to take notes during class and to work at home with these notes. Consult a dictionary and use the spell checker in Word! Make sure you understand everything in them, and, if necessary, make appropriate corrections. Ask me as to the pronunciation of words. Start a vocabulary book with foreign expressions and definitions. If you don't understand something in the lecture or in the book, let me know it, so that everyone can benefit from my explanations. Problems I solve in class have a tendency to show up in midterms.

I am interested in what you think and feel about physics, mathematics, my lecture, your educational process, and so forth. Let us talk! In that way we shall have a lot of fun together.

The responsibility for keeping your enrollment status straight with the college and with me rests on you. Note that you are not enrolled in the class until you have received a computer printout with this class printed on it. This is particularly important if you add the class late.

CLASS WORK

The class consists of 3 hours in lectures (two 75 minute sessions), work-sessions (1 hour), and lab-work (3 hours), 1hour =50 minutes. Read every chapter and corresponding lecture notes before and after the lecture. Annotate your book with remarks using a color pen and or color markers.

Study the lecture notes and make sure that you understand the critical issues at hand. There is material which is not covered in the book, like complex numbers, derivative operators, line integrals, surface integrals, Stokes theorem. Make sure you study these areas particularly well. On such occasions you have to take particularly good notes and ask if you don't understand something. The lecture notes are particularly helpful in such situations. To repeat: Problems I do in class have an uncanny way of ending up in the midterms. In your notes, use color pens and markers to emphasize important concepts, laws to be remembered, questions to be asked, etc.

Taking good notes is a skill you must develop as early as possible. I know that it is difficult to listen and to take notes at the same time. This is where your preparation comes in. Don't take notes of everything I say, but it is a good rule to copy at least all I write on the board. Slow me down, or at least you may try to. I know the required speed in order to cover the material. I WANT TO HELP YOU! ASK QUESTIONS.

Homework, pertaining to the specific chapters is contained in the downloadable pdf files with the appropriate name like, for example, ch19 homework.pdf. This is usually one or two pages. I do not grade your homework. Try to solve them as well as you can, and use them as a study tool. We will solve most of them together in the discussion sessions. Again, some of these problems will show up in the midterms. If you don't attend the discussion sessions you are setting yourself up for failure in the class. The same holds for not attending the lectures, in which I teach some material which is not contained in the text-book. It is part of the lecture notes of course.

LAB reports of Lab N must be handed in **before the beginning** of Lab N+1. We will be able to have about 10 labs total. **For every day you turn in your lab too late you will get 1 negative lab point. The total of your negative points will be added to your your final lab grade.** You must **have a 65% final lab-grade** in order to receive a passing grade (C) in the class. If you are not present during more than 2 lab sessions without a valid excuse and without making the lab up during the make-up sessions (see below) you will not get a passing grade. **Talk with me before it is too late, if you have problems!**

There will be two makeup labs, where you can make up a lab you have missed due to sickness, or improve the grade of a lab **up to 8.5 (B) points**. You can make up two of the preceding labs per make-up session. This means that you cannot make up lab 1, 2, 3, 4 during the second makeup session. **Theoretical labs cannot** be made up because I have no way of checking whether you copied them from another student after my corrections. In other words, you can make up 4 labs out of the total number of labs and improve those labs up to 8 points, if your labs are otherwise deemed perfect by me. Copying a lab from someone else is cheating and will have serious consequences like getting 0 points on the lab without possibility of making it up or even a failing grade for the whole class. When labs contain homework problems, those will be worth 2 points out of 10, and they cannot be made up. **These two points are automatically deducted from your lab grade if you hand the lab in late. In other words, if a lab contains homework problems and you hand them in late, the maximum points you can get is 6. Made up labs must have your notes and previous lab stapled to them.**

I give three midterms at 100 points each. There will be a comprehensive final for 200 points. I have the following Grading Policy: The labs (L) and each of three midterms (M1, M2, M3) count for 100 points; the final (F) counts for 200 points; **I drop the worst of the first two midterm grades (called “Min”), in case that is of advantage to your final grade.** I also reward outstanding participation in the class with extra points (at my discretion)! **Grade modifications for midterms are only possible within one week after the midterm was scheduled. This means you must discuss an issue concerning your midterm immediately, and not wait until the end of the semester.**

On a 100 scale your class grade will be determined by this formula:

$M1+M2+M3-\text{Min}=M$; F = final.

a) if $L>80$, $(M+L+F)/5$; or b) $(M+2L+F)/6$ if $F>119.5$; or c) if $F>100$, $(3M+F/2+L)/8$; or

d) $(M/2+3F+L)/8$ if $L>75.0$; e) $[2(M1+M2+M3)+L+F/2]/8$ if $F>100$; f) if $L>80$ and $M>100$ then $F/2$ is your final number of points.

whichever is better. As you can see, in formula d) the final accounts for 2/3 of the grade. in f) it counts for 100% but only if your lab average is better than 80.0. If your labs are very good they also influence the grade heavily (up to 33%), but only if your final is at least 120 points. If your midterms are very good I will count them as 2/3 of the grade in c). For those who take all three midterms with good results, formula e) might be of advantage.

Do not let your lab reports slip. The last day to hand in made up labs will be the day of the last regularly scheduled lab before the finals week.

A = 90.0 points or more, B = 77.0 to 89.0 points, C = 62.0 to 76.0 points, D = 48.0 to 61.0 points, F = 0 to 47.0 points.

I will not grant special opportunities to make up a grade or a lab outside of the rules laid out here for everyone. There will be no exceptions. Specifically, don't send me e-mails explaining how hard you worked and how much you need a C, or B, to maintain your GPA or to get into a specific college. Your grade is in your hands for a whole semester. I expect you to work hard.

Because of my elaborate formula, which evens out inequities, I do not grade on a normal curve! After the first midterm, feel free to discuss your progress individually with me. It is relatively easy to get a C, it is much more difficult to get a B or even an A grade. Remember that you must not only have decent grades but that above all you must have a comprehension of the material presented. This is of utmost importance if you want to succeed later at a four year college.

If you have questions during the class, ask immediately. It is much more fun to work together! If you work hard, you will be successful and enjoy the class. Don't wait with your studies until the day before the midterms, it will be too late. Work regularly and do the assigned homework problems as much and as well as possible.

PHYSICS 230 LAB PRESENTATIONS

All mathematical formulas must be written by the “Word” equation editor or better yet by the program Mathtype which I introduce to you during our first lab session. Bring your lab top to the class if you have one.

If you use Office 2003, download the program Mathtype from the internet for free: google Mathtype 5.2c and go to the download site. Download the program, execute it and register is with the number: MTWE521-001154-19S61 It will be integrated into the Word Program, Windows version only upto Word 2003. It does not work with Word 2007, which has an equation editor built in. In this case you don't need to download Mathtype but use the equation editor.

Here are some rules to follow for the lab presentations:

Most important for your reports is a clean, logical, and comprehensive presentation of your lab work. Use the following approach: Divide your presentation into three major parts:

A. Purpose and theory.

1. Describe and derive the major formulas to be used and verified in the lab. Derive the formulas as shown in the lab by the instructor. ***Everything I write on the board during the beginning of the lab must be on your write-up in Word.*** Use EXCEL for graphs and statistics, whenever possible. The computers in the computer room have all necessary programs installed. Learn how to move schedules and graphs from Excel into Word. Use *equation editor (Mathtype)* in Word for your formulas. Include pictures of your lab setup. Do not make photocopies, or other copies, of each other's work. **This is cheating and will result in 0 points for the student who copied and the student who allowed the copy.** Staple your dated and signed lab notes and raw data to the back of your report. It is proof that you have done the lab. Otherwise, I must assume that you copied it from someone.

2. Description of the experiment. Use drawings!

B. Organize your results in easily readable tables with explanatory headlines. Include error calculations or estimated errors as percentages and absolute errors.

C. Concluding remarks, only if meaningful.

Every report must have your name, the name and number of the lab, your class and section, the date, as well as the names of your partners. Write your report using a word-processor like Word. (Use proper English with proper spelling and grammar. I deduct points for mistakes, bad presentations, and sloppiness!)

Put all material used during the lab back to its appropriate place. Note that the labs are very important for your grade.

GOOD LUCK AND SUCCESS TO YOU ALL

There will be pdf files on many chapters on the web, covering topics in class in the way I teach them. Download them and study them, together with your notes.

<http://www.heisingart.com/230.htm>