GENERAL INFORMATION

About the course

By the end of 19th century the elaborated framework of classical physics has been fully developed for understanding a wide variety of natural phenomena. The 19th century is usually considered to have been the golden age of classical physics. By 1890 it appeared that the "three big elephants" of the classical physics: Newtonian Classical Mechanics, Maxwell's Electromagnetic Theory, and Thermodynamic and Statistical Physics have successfully generalized man's knowledge of nature accumulated through out the centuries. Only a few seemingly minor experimental observations remained unexplained. Paraphrasing one famous physicist, by 1890 everything that was in nature for physics to explain has been largely explained with the exception of a few phenomena, in particular, "the failure" of Michelson Interferometer experiment and the Black Body Radiation. It is very ironic that efforts of physicists to explain classically these two observations led to the demise of classical physics and the birth of what we know as Modern Physics. These two phenomena along with the great experimental discoveries of the last decade of 19th century (such as the discoveries of electrons, ions, X-rays, and radioactivity) provoked the appearance of *two brilliant theoretical ideas* - ***energy quantization*** *by Planck and* ***special/general relativity*** *by Einstein* - ideas that revolutionized the field of physics.

The goal of this course is: 1) to give you a glimpse of the great experimental and theoretical discoveries at the turn of the 20th century, 2) to introduce to you two revolutionary theories: relativity and quantum theory (ideas that "shattered the dogmatic beliefs" of classical physics), 3) to convince you that classical physics is merely a limiting case (large masses, low speeds) of the more general physical picture, and finally, 4) to demonstrate to you the existence and importance (!) of the subatomic world.

We'll spend roughly four weeks on special relativity, seven weeks on the quantum theory of light and quantum mechanics, two weeks on the nuclear physics, a week on fundamental particles and a week or so on cosmology.

Lecturer

The lecturer and coordinator for PHY 330 is Dr. Kiril A. Streletzky. His office is in SI124, email address: k.streletzky@csuohio.edu, phone 2433.
Any comments/suggestions about the course are strongly encouraged. *Please don't hesitate to come with your questions to my office hours – that is what they are for!*

Meeting Times

Lecture: M and W: 4:00-5:50 pm, MC 313
Office Hours: M, T, W, Th, F 10:00-11:00am, or by appointment, SI 124

Academic Calendar Related to PHY 330

First day of the class:	Aug 27
Last day to add:	Aug 31 (at 8pm)
Labor Day:	Sep 3 (No classes)
Last day to drop:	Sep 7 (at 8pm)
Columbus Day:	Oct 8 (No classes)
Last day to withdraw:	Nov 2
Veterans Day:	Nov 12 (No classes)
Thanksgiving Recess:	Nov 22-Nov 25 (No classes)
Last day of the class:	Dec 7
Final Exam:	Dec 10 (4-6 pm)

Textbook

The main textbook for PHY 330 is Fundamentals of Physics, 7 or 8thedition, by D. Halliday, R. Resnick, J. Walker (John Wiley & Sons, Inc.) Parts 4 and 5. The book is abbreviated hereafter as HRW. The reading assignments and some of the assigned problems are from this book (you would need to double-check the numbers of the assigned problems if you are using 8th edition).

For additional sources you are encouraged to use the following Modern Physics textbooks, which can be found through the Ohio-Link or borrowed from me for a short period of time (a day at a time):

1) Modern Physics for Scientists and Engineers (third edition), by J. R. Taylor, C. D. Zafiratos, M. A. Dubson (Prentice Hall, 2004). The book is abbreviated hereafter as T&Z. Some of the assigned text problems and study examples will be from this book.

2) Modern Physics, by R. A. Serway, C. J. Moses, C. A. Moyer (Harcourt, 1989). A few of the assigned text problems and study examples will be from this book.

There are many similar modern physics books written in a variety of styles. CSU library has several of them. You may look at some to decide which style appeals to you.

Course evaluation

Your grade will be calculated as follows:

Exams (4)	51%
Homework (14) (Each HW – 2%)	28%
Quizzes (12) (Each Quiz - 1%)	12%
Individual Lab Project	5%
Summary HW/Term Paper	4%

Examinations

Three Exams will be given to you during regular lecture period, on the following dates:

EXAM #1	(10% of your grade)	Monday, September 24, 2007	(MC 313)
EXAM #2	(10% of your grade)	Monday, October 29, 2007	(MC 313)
EXAM #3	(11% of your grade)	Monday, November 26, 2007	(MC 313)

The final exam is scheduled for December 10 (Monday) at 4:00-6:00pm

Final EXAM	(20% of your grade)	Monday, December 10, 2007	(TBA)

Occasionally students need to miss a scheduled exam due to special circumstances. If you notify the lecturer at least 24 hours before the exam, there will be no penalty.

All Exams are in-class, **cumulative**, and closed book. You will need a calculator. No formulas will be given on the front page of the exam sheets. ***You are responsible for providing yourselves with necessary formulas. You may (and are encouraged to!) bring to the exam one (!) sheet of 8.5 x 11 in. paper with formulas and comments that you think you might need.*** You are NOT (!) allowed to have the worked examples from any source on your help sheet though. At the end of the exam, before passing your work to the instructor staple the help sheet to your exam.

Study Guides

The Study Guides for the course will be given to you on bi-weekly basis. They include comments on the subject. Since PHY 330 is a survey course, there will be some skipping around the text (especially at the later stages) and we will have a discussion of topics that are not in the main text. To be sure that you are studying the intended material you are expected to attend lectures, read the study guides, and check the syllabus which might be updated as the course progresses.

Homework

Homework will be collected and graded on a regular basis. The homework assignments (HW) should be turned in by you according to the schedule in the syllabus. Each HW will have a specific due time indicated on it. Please submit it by this due time in person or through the white envelope in front of my office. Your solutions should be readable and have sufficient explanation to communicate your way of thinking to the reader. Bare formulas with an answer and no apparent logic won't be tolerated. Homework solutions will be regularly posted on my board (across from SI 126) after the submission deadline. While late homework will be penalized, a homework submitted **AFTER** solutions **are posted WON'T be accepted**.

Quizzes

As means of getting a feedback from you, making you think about the covered material, and in order to evaluate your performance *before* the test (before it is too late!) roughly a quiz per week will be given to you for solving. Some of the quizzes will be in class, some – take home. The quiz problems are in general similar in complexity to the test problems. ***Please keep in mind my quiz policy***, according to which you are allowed to make up your quiz during my office hours *before* the quiz is returned to you. Quizzes should help you learn the material, prepare for the exams, and get accustomed to my style of teaching.

Individual Lab Project (5% of your final grade)

Unfortunately PHY 330 is not being taught in parallel with the lab. It is especially sad, since it is hard to underestimate the significance of experimental discoveries of the late 19^{th} and the early 20^{th} centuries to Modern Physics. While you will have a chance to take the Modern Physics Labs course in the future* (Spring 09 - see the Note below), I have decided to give you at least a little of exposure to exciting modern physics

experiments in this class. The essence of your Individual Lab Project will be **one** experiment (your choice, but not more than 2 students per experiment) from the list of 5 modern physics experiments offered by the College Physics PHY 222 or one of the two experiments from PHY 335. You are to do this experiment in your own time, write a report according to PHY 222 or PHY 335 Lab Manuals (answering my additional questions about the experiment), present the results to the class in the form of 5-minute presentation, and submit a detailed lab report.

If you choose one of the PHY 222 experiments, you are strongly encouraged to attend the scheduled PHY 222 lab session for your chosen experiment with students of PHY 222. During lab sessions a TA makes a presentation to introduce the experiment in the beginning of lab and is there to help you with your lab questions later.

If you choose one of the PHY 335 experiments, you are asked to do them during the scheduled times indicated below.

Here is the list of experiments:

1) Michelson Interferometer (PHY 335), Oct 23, SI 140 (3pm-6pm)
2) Blackbody Radiation (PHY 335), Oct 30, SI 140 (3pm-6pm)
3) Relativistic Electron (PHY 222), Nov 6, SI 141 (8am-9:50am or 1pm-2:50pm)
4) Photoelectric Effect (PHY 222), Nov 13, SI 141 (8am-9:50am or 1pm-2:50pm)
5) Hydrogen Spectrum (PHY 222), Nov 20, SI 141 (8am-9:50am or 1pm-2:50pm)
6) Radioactivity (PHY 222), Nov 27, SI 141 (8am-9:50am or 1pm-2:50pm)
7) Bubble Chamber (PHY 222), Dec 4, SI 117 (8am-9:50am or 1pm-2:50pm)

If you can not attend scheduled PHY 222 or PHY 335 experiment you still need to do your experiment during *the week* when this experiment is scheduled. Choose a convenient day/time in the corresponding week and let me know. I should be able to let you in, make sure that everything works, and give you a short version of lab introduction.

The lab report for the Individual Lab Project is due on/before Dec 12.

* Note: CSU Physics Department is offering a separate course called Modern Physics Lab, PHY 335. Next time it is offered in the Spring 09 as a 4-credit laboratory course.

Summary Homework/Term Paper (4% of your final grade)

The Summary Homework (4% of your grade) will include typical problems on the most important ideas covered by the entire course and will have a size of roughly 2 regular homework assignments. If you don't want to do the Summary HW and if your average two weeks before the end of the semester permits (>91%) you will be allowed to work on a short term paper instead of the Summary Homework. The subject of a term paper should be discussed with the lecturer individually (examples include an additional topic of interest not covered in class, in-detail analysis/design of another modern physics experiment, or a study of the Cleveland history of Michelson experiment)

The Summary Homework/Term paper is due on the day of the final (Dec 10).

Course Postings

All the material pertaining to this course including homework with solutions, study guides, sample exams, office-hours schedule, and the schedule of lectures and conferences will be regularly posted/updated on my board across from SI 126 AND the course webpage http://www.csuohio.edu/physics/streletzky/PHY330/PHY330-F07.html.

Course Hints

a) Practice, practice, practice, ...

You can only learn physics by solving lots and lots of practice problems. The Study Guides contain some exercises – study them carefully. The textbook (HRW) considers many important Sample Problems – work on these problems. Also, HW assignments will have a list of Suggested Problems – always look through these problems after you are done with your homework. Finally, the additional sources or any other modern physics books will have multiple examples of problem solving. Solve as many problems as you can find the time for. Make sure you clearly write down the solutions to all of these problems/exercises in your notebook. You'll find this notebook invaluable when preparing for the exams.

b) Working together

Students can learn a lot from each other. You are encouraged to work together on problem solving and on understanding the theory. However, do not simply copy each other's problem solutions. After you think you know how to solve a problem write out the solution in your own language with enough detail to make sure that you can understand it later.

c) Notes on Formulas and Equations

Do not blindly learn formulas because formulas stripped of physical context are meaningless. You will know them by heart after solving a sufficient number of problems in which you use them.

d) Accuracy of calculations

Numerical answers should be given to 3 significant digits whenever is possible.