

# Course information, PHY 300, Fall 2008

## Prof. Chris Jacobsen

**Course Description, PHY 300 Waves and Optics:** The physics of oscillations and waves, from mechanical waves to light waves to electron waves. Topics include resonance and normal modes of coupled oscillators, the wave equation and wave propagation, interference and diffraction, polarization and imaging, coherence, and lasers. Three lecture hours and one three-hour laboratory per week.

Prerequisite: PHY 132/134 or 142 or 126/127

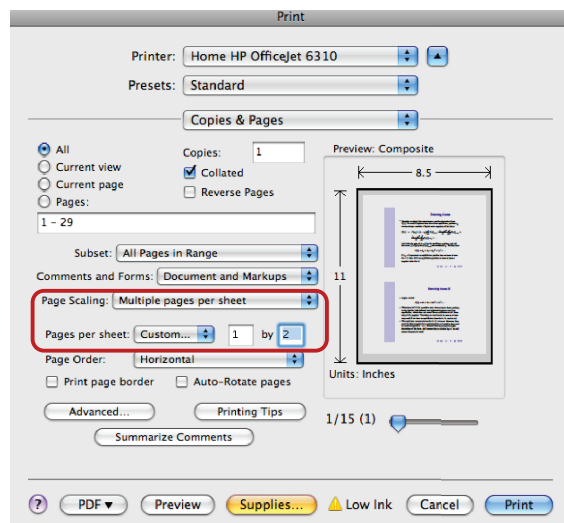
Corequisite: MAT 203 or 205 or AMS 261

4 credits

## 1 Basic course information

The schedule for the course, and contact info for the instructors, is given at <http://tinyurl.com/5sofbb> which really points to <http://xray1.physics.sunysb.edu/~jacobsen/phy300s2008/>. Most of the course material will be presented on lecture notes that I'll project from my laptop. I'll try to make the notes available on the course web page in advance of each lecture, but I'll usually do a slight touchup after each lecture and repost the final version sometime after class. The lecture notes consist of Adobe Acrobat .pdf files; if you print them, you might use the print layout option in Acrobat to put two file pages on one printed output page (see Fig. 1). For the cognoscente, these notes have been generated using the Hannover theme in the `beamer` package in  $\text{\LaTeX}$ , which is a typesetting language frequently used by mathematicians and physicists. For those who want to play around with it,  $\text{\LaTeX}$  is available for free for nearly any computing platform; MacTex is a good package for the Mac, MikTeX is one of the packages available for Windows, and most Linux distributions provide an automatic installation mechanism (`rpm`, `apt-get`, etc.) for installing  $\text{\LaTeX}$ .

Figure 1: The course lecture notes use extra large fonts for easy viewing on a  $1024 \times 768$  pixel projector. However, if you print out the notes you're burning through lots of paper unnecessarily since a 300 dpi printer produces the equivalent of about  $2400 \times 3000$  pixels. Therefore if you want to print the lecture notes out, you might consider using the *Multiple pages per sheet* option in Adobe Acrobat.



This course uses two textbooks, but they are both inexpensive: *Vibrations and Waves* by A.P. French (Norton, 1971), and *Introduction to Modern Optics* by G.R. Fowles (2<sup>nd</sup> ed., Dover, 1975). Don't be misled by the dates of these books—they're good books, and they cover most of the essentials of what we'll do. We'll cover more recent developments, and supplement the treatment of these two books, with the

lecture notes provided in class.

You might also be aware of two other books:

- *Optics* by Eugene Hecht (Pearson, 2001): this is the most commonly used undergraduate textbook on optics. Some find it to be a bit too wordy, but it's a good book.
- *Principles of Optics* by Max Born and Emil Wolf (Cambridge, 1999). It's not light reading (it's a graduate level reference book) but it is *the* definitive reference on most of optics. The 1999 edition is the 7<sup>th</sup> edition; the first edition was published in 1959 but it has been continually updated. Max Born was born in 1882 and played a pivotal role in the development of quantum mechanics. Emil Wolf (born 1922) was one of his students and has been a lion in optics in the U.S. while at the University of Rochester (now retired?).

## 2 Homework

Homework problems will typically be assigned on Monday. I will give you a few minutes at the start of class on Wednesday to ask some questions about the homework, and it will be due the following Monday.

You will not get a good grade in this course if you try to cram the night before exams, or simply read through the textbook. You learn physics by *doing* physics, and you learn more by doing more. Doing the homework is crucial to doing well in the course. Regarding homework, I absolutely encourage you to work on homework with a classmate or classmates. Just keep in mind that exams are solo efforts (as a sports coach would put it, "practice like you play"). Even if you work with someone else to make initial sense of the problem, sit down by yourself to write up your homework solution so that you practice what you need to do on an exam.

## 3 Laboratory

Labs give you a chance to get a glimpse at some of the classic experiments which have either led to or confirmed important understandings in optics. The laboratory manual will be provided week-by-week on the course web page. Print out a copy for yourself before each lab.

You will be required to perform the experiments described in the laboratory manuals that you find on the course web page. Before you begin these experiments, you must present a writeup as you enter the lab. This pre-lab writeup should be written on a separate piece of paper. Nobody can perform an experiment without presenting the writeup *first*. Your writeup should describe the physical ideas you plan to explore, the way you will go about exploring them, and your anticipated results. It need not be more than a page or two, but it is not length limited either. Write it into your lab notebook and have the lab TA sign it. This writeup will not be graded but the TA's signature is required *before* you can start to work on the experiment; you should then save this sheet of paper and staple it into your lab notebook when you hand in your final lab report.

After you have completed your measurements and recorded them in your lab books immediately following the writeup you have prepared before, you have to analyze your results and compare with the expectations in your writeup. The full lab report must be handed in to the "PHY 300 lab section 1" box in room A-131 by 4:30 PM on the Monday following Wednesday's lab. Because you do not have so much time to complete it, you need to be well prepared beforehand! The lab report will be graded on a scale from 0 to 10. Your grade does *not* depend on whether you obtained agreement of your results with the expectation, but only upon how well you perform your work.

You have to complete *at least* nine of the ten labs scheduled for this semester. If you miss a lab, you can make up for this on one of the two scheduled makeup dates. If you complete all ten labs, the lab with the lowest score will be dropped from your average.

## 4 Exams

The exams will all be in-class exams on the dates indicated in the schedule on the course web page. I will provide you with an equation sheet a few days before the exam, and you will be able to use calculators. If you miss an exam, you will receive a zero for that test unless the absence is due to medical reasons, which must be justified by a written note from your doctor or dentist. In this case, you will be allowed to take a make-up exam as soon as the medical condition permits.

## 5 Grades: whadyagottadoo?

Grades are what you earn, rather than what your instructor gives. You have to do well on exams, homework and quizzes, and the reading/writing assignment. The grade split for PHY 300 is shown at right.

Exam I	20%
Exam 2	20%
Final exam	25%
Homework	10%
Lab	25%

## 6 Help!

Make use of office hours. Do not hesitate to ask for appointments outside of office hours. Come see me on your own, or if you think I'm too scary, come see me with a classmate.

## 7 Special requirements

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, 128 ECC Building, (631) 632-6748:

<http://studentaffairs.stonybrook.edu/dss/>

They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the campus EHS web site:

<http://www.sunysb.edu/facilities/ehs/fire/disabilities.shtml>

## 8 Academic honesty

Please read the statement on the undergraduate physics web page on student ethics and academic honesty:

[http://www.physics.sunysb.edu/Physics/ugwebpage/ug/node25\\_mn.html](http://www.physics.sunysb.edu/Physics/ugwebpage/ug/node25_mn.html)

We will apply those standards to this class.