

**PHYSICS 15c, Spring 2006**  
**WAVES**  
**SYLLABUS**  
(updated Feb 2)

**PROFESSOR**

Jenny Hoffman      jhoffman@physics.harvard.edu    Lyman 344      384-9487  
Office Hours: *tentatively* Tuesday 2:30-3:30pm in Lyman 344;  
                                 Thursday 7:30-9pm in Winthrop dining hall; or by appointment

**HEAD TEACHING FELLOW**

Jacob Barandes      barandes@physics.harvard.edu    Lyman 532      496-2227  
Office Hours: *tentatively* Monday afternoon, Thursday 2:30-3:30pm

**LAB INSTRUCTOR**

Tom Hayes            hayes@physics.harvard.edu          Jeff 258          495-4740  
Office Hours: *by appointment*

**LAB TEACHING FELLOW**

Andrey Pashin        pashin@fas.harvard.edu            --                  780-5064  
Office Hours: *by appointment*

**STAFF ASSISTANT**

Barbara Drauschke   drauschk@physics.harvard.edu    Jeff 348          495-4320  
Office Hours: Monday-Friday, 9am-5pm

**MAIN TEXTBOOK** (strongly recommended!)

*waves*, berkeley physics course – volume 3

by Frank Crawford (McGraw-Hill, 1968)

(This book is out of print, so it has been reprinted for you as a sourcebook, available at the Coop for ~\$40. Used copies are sometimes available on Amazon for more \$.)

**SUPPLEMENTARY TEXTBOOKS** (in rough order of usefulness)

*The Physics of Waves*, by Howard Georgi

*The Physics of Vibrations and Waves*, 6<sup>th</sup> ed., by H. J. Pain

*Introduction to Wave Phenomena*, by Hirose & Lonngren

*Vibrations and Waves*, by A. P. French

*Optics*, 4<sup>th</sup> ed., by Eugene Hecht

**LECTURES**

Tuesday and Thursday, 1:00-2:30pm, Science Center A.

**LABS**

The lab component of this course will consist of 8 labs: 5 in-class, 3 take-home.

More information about labs can be found at:

<http://www.people.fas.harvard.edu/~thayes/15c/>

## **SECTIONS**

Sections meet once each week and are taught by Jacob Barandes. Sections will consist of 1 hour of structured problem solving (& review of lecture material, if necessary), and ½ hour of Q&A. The purpose of these sections is to work through examples relevant to the homework problems, and to discuss questions in a smaller classroom setting.

Sections will be held on Tuesday & Wednesday afternoon/evening. Exact times will be arranged according to student needs, via class survey. Sections will begin the week of February 6. Attendance is *strongly* advised.

## **WEBSITE**

Course website: <http://courses.fas.harvard.edu/~phys15c>

Problem sets, solutions, announcements, and other useful things will be posted on the web site. You are responsible for checking the website regularly.

## **PROBLEM SETS**

There will be one problem set each week, due Friday at 3pm. Solutions will be posted on the website as soon as problem sets are collected. New problem sets will generally be posted on the web on Thursday evenings (8 days before they are due). To receive full credit on a problem, it must not only be correct, but also written up *neatly*, with clear explanations involving *words*. A good rule of thumb is to ask yourself if a classmate would be able to understand your solution. No credit will be given for a string of equations leading to the correct answer. Except in *very unusual* circumstances, we will not accept late homeworks. But we will drop your lowest homework score when computing your final grade. Any requests for extensions should be made to Jacob.

## **STUDY GROUPS**

You are encouraged to work together on problem sets (but the work that you hand in must be your own, of course). If you need help finding a study group, please ask Jacob for assistance.

## **QUIZZES**

A quiz will be given in the middle of each lecture. You may work together on these. They will be checked *for attendance only* and are therefore nothing to be worried about. In fact, you will probably end up looking forward to them, since they provide a nice way to break up the 1.5-hour lecture.

## **EXAMS**

There will be two midterm exams (during the regular 1.5-hour class) and a final exam (3 hours). The midterms will be on Tuesday, March 14 and Tuesday, April 25. The final will be on Monday, May 22.

## **GRADING**

Problem Sets 40%, Labs 10%, Midterms 10% each, Final exam 30%.

Lec Date	Crawford	Georgi	Pain	H & L	Class topic (subject to update...)	Lab
1	2-Feb	1.1-3	p1-12	1.1-3	SHO review, linearity	
2	7-Feb	n/a	ch2	1.4-6, ch3	complex numbers, differential eqns	
3	9-Feb	3.1-3.2	ch3	1.7	damped, driven SHO	
4	14-Feb	<i>will fill in future readings as we get a better sense of the class</i>			coupled oscillators	simple pendulum
5	16-Feb				mechanical waves	
6	21-Feb			energy & momentum	Fourier series	
7	23-Feb			sound		
8	28-Feb			LC transmission	coupled pendulum	
9	2-Mar			LC transmission		
10	7-Mar			reflection	$\mu$ wave xmission	
11	9-Mar			Fourier analysis		
	14-Mar			<b>MIDTERM (thru lecture 9)</b>		
12	16-Mar			Dispersion		
13	21-Mar			higher dimensions	$\mu$ wave receivers	
14	23-Mar			spherical waves & Doppler		
	28-Mar			<b>SPRING BREAK</b>		
	30-Mar			<b>SPRING BREAK</b>		
15	4-Apr			E&M waves	Lasers I	
16	6-Apr			reflection & refraction		
17	11-Apr			E&M radiation	Lasers II	
18	13-Apr			E&M waves in matter		
19	18-Apr			interference	Lasers III	
20	20-Apr			diffraction		
	25-Apr			<b>MIDTERM (thru lecture 18)</b>		
21	27-Apr			geometrical optics		
22	2-May			wave applications in current research		
23	4-May			quantum mechanics		
	9-May			<b>reading period</b>		
	11-May			<b>reading period</b>		
	16-May			<b>reading period</b>		
	22-May			<b>FINAL EXAM</b>		