PHYSICS 15c, Spring 2008
WAVES
SYLLABUS
(updated Feb 6)

PROFESSOR
Jenny Hoffman   jhoffman@physics.harvard.edu   Lyman 334   384-9487
Office Hours: Tuesday 3-4pm in Lyman 344;
        Thursday 8-9:30pm in Kirkland dining hall; or by appointment

TEACHING FELLOW
Michael Kagan   makagan@fas.harvard.edu   Lyman 532   496-2227
Office Hours: *tentatively* Thursday 3-4pm

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

LAB INSTRUCTORS
Dilini Pinnaduwage   pinnaduw@fas.harvard.edu   --   --
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Office Hours: *by appointment*

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

RECOMMENDED TEXTBOOKS
Introduction to Wave Phenomena, by Hirose & Lonngren
  Krieger Publishing 2003, ISBN 1-57524-231-1
The Physics of Waves, by Howard Georgi
  available **free** online: http://www.people.fas.harvard.edu/~hgeorgi/new.htm

SUPLEMENTARY TEXTBOOKS
  (for alternative explanations, in case you need another perspective)
waves, by Frank Crawford
The Physics of Vibrations and Waves, 6th ed., by H. J. Pain
Vibrations and Waves, by A. P. French
Optics, 4th ed., by Eugene Hecht

PREREQUISITES
Physics 15b or 153, or written permission of Dave Morin or Prof. Georgi.
Mathematics at least at the level of Mathematics 21b taken concurrently is required.
Linear algebra and differential equations are used extensively. Students taking
Mathematics 21b concurrently will likely find that some concepts are introduced in
Physics 15c before they have seen them in Mathematics 21b. Some students may
wish to postpone Physics 15c until they have completed Mathematics 21b.

LECTURES
Tuesday and Thursday, 1:30-3pm, Science Center A.

You are encouraged to read the textbook in advance and bring questions to the lectures. In case you do miss a lecture, the course will be videotaped, and you may contact the teaching staff for access to a particular lecture video.

LABS
The lab component of this course will consist of 8 labs. The first five, before spring break, will be in-class. The last three, after spring break, will use a laser kit that you will take home with you, although in-class help sessions will be available.

SECTIONS
Sections meet once each week and are taught by Michael Kagan.

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 4. Attendance is strongly advised.

WEBSITE
Course website: http://isites.harvard.edu/icb/icb.do?keyword=k26741
Problem sets, solutions, labs, 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 4pm. Solutions will be posted on the website as soon as problem sets are collected. Except in *very unusual* circumstances, we will not accept late problem sets. Any requests for extensions should be made to Michael.

Eleven problem sets will be given during the semester. The 11th problem set is optional and will be due during the Reading Period. If you do complete the 11th set, you may use it to replace the lowest score among the earlier problem sets.

STUDY GROUPS
You are encouraged to work together on problem sets (but the work that you hand in must be your own, of course). The best way to find a study group is to attend office hours. If in doubt, please ask Michael for assistance finding a study group.

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 Thursday, March 6 and Thursday, April 17. The final will be on Thursday, May 22.

GRADING
Problem Sets 34% (for 10), Labs 16% (for 8), Midterms 10% each, Final exam 30%.

Physics 15c, Spring 2008 Tentative Schedule

Date		Lecture topic (subject to change...)	Reading	Homework	Lab
1/31 (Thu)	1	SHO review, linearity	H&L 1.1-5		
2/5 (Tue)	2	Complex numbers, differential eqns	H&L ch3	#1, due 2/8	
2/7 (Thu)	3	Damped, driven SHO	H&L 1.6-7; G ch2	(lectures 1,2)	
2/12 (Tue)	4	Coupled oscillators	G ch3	#2, due 2/15	Simple pendulum
2/14 (Thu)	5	Mechanical waves	H&L ch2, 4.1-3	(lectures 2,3)	
2/19 (Tue)	6	Energy & momentum	H&L 4.4-6	#3, due 2/22	Coupled pendulum
2/21 (Thu)	7	Fourier analysis	H&L 13.1-5; G ch6	(lectures 4,5)	
2/26 (Tue)	8	Information & energy transmission	G ch10	#4, due 2/29	Fourier series
2/28 (Thu)	9	Momentum transmission & sound	H&L ch5	(lectures 6,7,8)	
3/4 (Tue)	10	Physics in your ear			
3/6 (Thu)		**MIDTERM (thru Fourier analysis)**			
3/11 (Tue)	11	Sound: Dopper, shock waves	H&L ch8	#5, due 3/14	Two-week lab:
3/13 (Thu)	12	Musical instruments, standing waves	H&L ch6	(lectures 9,10)	Driven, Damped
3/18 (Tue)	13	Boundaries, higher dimensions	H&L ch7	#6, due 3/21	Simple Harmonic
3/20 (Thu)	14	LC transmission lines	H&L 9.1-4; G 8.4	(lectures 11,12)	Oscillator
3/25 (Tue)		**SPRING BREAK**			
3/27 (Thu)		**SPRING BREAK**			
4/1 (Tue)	15	E&M waves	H&L 9.5	#7, due 4/4	
4/3 (Thu)	16	Reflection & refraction	H&L 9.6	(lectures 13,14)	
4/8 (Tue)	17	Reflectivity, Brewster's angle		#8, due 4/11	Lasers (home):
4/10 (Thu)	18	Accelerating charges	H&L ch10	(lectures 15,16,17)	Polarization
4/15 (Tue)	19	E&M waves in matter	H&L 9.7		
4/17 (Thu)		**MIDTERM (thru reflection)**			
4/22 (Tue)	20	Interference & diffraction	H&L ch11	#9, due 4/25	Lasers (home):
4/24 (Thu)	21	Geometrical optics	H&L ch12	(lectures 18,19)	Ruler Diffraction
4/29 (Tue)	22	Applications, current research		#10, due 5/2	Lasers (home):
5/1 (Thu)	23	Quantum mechanics		(lectures 20,21)	CDs and DVDs
5/6 (Tue)		**reading period**		#11, due 5/9	
5/8 (Thu)		**reading period**		(lectures 22,23)	
5/13 (Tue)		**reading period**			
5/22 (Thu)		**FINAL EXAM**			