PHYS273 and 273H

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Meeting times:

Lectures	Room 1410 Tu Thu 9:30-10:45 am
Recitation and Discussion	Room 1402 Fr 9:00-9:50 am

Textbooks: Introduction to Wave Phenomena, by Hirose & Lonngren
Krieger Publishing 2003
ISBN: 1-57524-231-1

Physics for Scientists and Engineers, by Tipler and Mosca, 5e, Vol. II,
W.H. Freeman and Co. 2004.
ISBN: 0-7167-0810-8

Alternative textbooks: Although the texts listed above are required, there are a number of other undergraduate texts available on the topic of waves. A few that I am familiar with are:

Vibrations and Waves by A.P. French
W.W. Norton & Company
ISBN: 0393099369

The Physics of Vibrations and Waves by H.J. Pain
John Wiley and Sons; 6th edition (June 13, 2005)
ISBN: 047001296X

While you are responsible for the material covered in the required texts as well as any supplementary material presented during the lecture, you might find it useful to refer to another text on occasion. Often, when a person feels stuck or an explanation isn't clear, an alternative point of view is just the ticket, so if you find yourself in this situation, stop by the library and give these

a look. The book by French is very old, and doesn't include a great deal of applications, but it is very clear, very short, and very readable. It might help some who are struggling with the math. The book by Pain is on a higher level and is more encyclopedic.

1 Assignments, Exams and Grades:

If you are enrolled in PHYS273, your final grade will be based on:

WebAssign problems:	10%
written problems:	10%
participation in Friday recitation:	10%
Exam 1:	20%
Exam 2:	20%
Final Exam:	30%

WebAssign is an interactive homework utility. You will be given WebAssign problems to do each week, where you will enter your answers online and be given instant feedback on whether you answers are correct. You will be given several chances on each problem, so if you miss the first time, rework the problem and try again! Since you get several tries, with a little effort you should get a very high score.

About WebAssign:

1. Go to http://www.webassign.net/ and hit "login" or directly to https://www.webassign.net/login.html

2. Enter your username, institution, and password. If you have problems, contact me personally, and I will tell you the username and password.

   - Your username is your UMD Directory ID (LDAP), the same as your username for WebCT.
   - Your institution is "umd".
   - Your password is initially set to your student ID number. Change it once you log in.

3. You have free access to WebAssign for the first two weeks of class, and after that, you must purchase an access code. The price is about $15. You have until Tuesday, February 12, 2008 at 12:00 AM EST to enter an access code. Do not delay payment. There are two ways to pay:

   - Paying on-line with a credit card.
   - Buying a WebAssign Student Access Code Card at a bookstore (UBC or MBX). They should be available at the customer service counter, not on the shelves. Scratch off the silver coating to reveal the individual access code. Log in to WebAssign and enter the access code.
   - If you have problems, see http://www.webassign.net/info/support/problems.html#access

4. WebAssign Student Guide is available at
   https://www.webassign.net/info/guide/index.html

Written problems will be assigned to hand in each week, generally on Tuesdays unless otherwise noted. *They must be handed in by the end of class on the due date or they will not be accepted!* A couple of representative problems will be randomly selected from the homework to be graded. In order to maximize your homework grade, be sure that your work is neat and clear, so that it may be easily followed by the grader. Show all of your work and be sure to include diagrams where appropriate.

Participation in Friday recitation and discussion sessions is mandatory. Our short Friday sessions will be devoted to group activities and discussions. You will be graded on your level of class participation, so you are expected to attend and contribute. You will be allowed two absences to the Friday sessions over the course of the semester. All other Friday absences will count as a zero against your recitation score. Don't intentionally skip two recitation sessions early in the semester, or you may end up with a low score if you get sick or have an unexpected circumstance later in the semester.

Exams are meant to test your understanding and ability to apply concepts covered in the course. I therefore do not expect you to memorize constants and equations. You may bring one recipe card with equations written on it to the first exam, two recipe cards to the second exam (the card you made for the first exam plus one additional card), and one full sheet of paper to the final exam. I will give you the value of any constants you need. Although the main focus of the exams will be problem solving, most exams will contain at least one question with a written part to verify that you understand and can explain the physical concepts. You are also expected to bring a scientific calculator to exams. Make up exams will not be given without a doctor's note.

If you are enrolled in PHYS273H:

The formula above will determine 90% of your grade.

For the remaining 10%, you are to choose a topic of your choice relating to modern applications of waves, write a paper, and present it to the class. Some cool examples of topics could be cell phone technology, optical fibers, doppler radar, detection of gravitational waves (interferometry),... All topics must be cleared with your professor before you commence writing your paper. If you are enrolled in PHYS273H, please pick up a copy of the specific directions for this assignment at the front of the room.

2 About "academic integrity":

Some students find it helpful to work in groups on homework. This practice is strongly encouraged, however, make sure that you use this as a forum for sharing ideas, and not a place to simply copy your classmates' answers. Simply copying someone else's answers could be dangerous because a) homework is one of the best ways to practice your skills and test your understanding, and b) if more than one person turns in the same wrong answer with the same incorrect logic, it will be

clear to the grader that cheating has occurred, and this will result in everyone involved getting a zero on the whole assignment. When it comes to exams, the university has rather stern policies on cheating. The message is, "don't go there".

3 Tentative Schedule

All dates are *very* approximate. Exact topics to be covered will be frequently updated on the course website. Exams will be announced at least two weeks in advance. Note that the two texts used in the course cover the material in a different order. The course website will clearly indicate which topics are covered. It is strongly recommended that you read the relevant text before the lecture.

week	**topics and texts**
Jan 29	H&L Ch 1.1-1.3 T&M: Review Chapter 14
	H&L Ch 3 - complex numbers and series
	solving SHM with complex exponentials and H&L Ch 1.4
Feb 5	damped hormonic motion - see H&L section 1.6 and T&M Ch14
	Oscillating E&M circuits (H&L 1.4 and T&M Ch 29)
	Damped RLC circuits, H&L 1.6, T&M 29-5
	Forced oscillations, H&L Section 1.7 T&M section 29-6
Feb 12	Traveling waves, H&L Chapter 2, reference T&M Chapter 15
	superposition of waves, beats, wave and group velocities, dispersion (H&L 2.6-2.7)
Feb 19	mechanical waves, general solutions of the wave equation; energy density (H& L Chapter 4)
Feb 26	Sound H&L Chapter 5
March 4	Fourier analysis (Chapter 13.1-13.4)
March 11	Standing Waves (Chapter 6)
March 17	spring break
March 24	Spherical waves (Chapter 7)
	The Doppler effect (Chapter 8)
April 1	Sonic booms and Cerenkov radiation (H&L 8.5)
	review of Maxwell's equations and displacement current
	the premittivity and permeability of free space (T&M 30-1, 30-2, 30-3, H&L 9.1)
April 8	EM waves and the Poynting vector (T&M 30-3 & (H&L 9)
April 15	cables and transmission lines, reflections (H&L 9)
April 22	Diffraction and Interference (H&L Chapter 11, Chapter 33)
April 28	The rest of the semester: Geometrical optics (H&L Chapter 12, T&M Chapter 32)

4 Physics TODAY!

All professors in the department of physics are actively involved in cutting edge research. (Newton and Maxwell couldn't explain *everything,* although many uninspired textbooks will lead you to this erroneous conclusion.) Professor Hoffman's specialties are particle physics, and a relatively new field called particle astrophysics. You can find out about one of her latest projects at http://icecube.wisc.edu. She will occasionally draw from her research experiences to enrich you with relevant modern day examples of "waves in action".

More generally, you are physics students in one of the largest, most active physics departments in the United States- make sure you exploit that! As physics majors, you are especially encouraged to speak with members of the department whose research interests you, to get an idea of how "real physicists" spend their time, and what topics are really hot in physics in the 21st century.

Finally, let's look forward to having a FUN semester!