

PHYS273 and 273H

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Meeting times: Room 1410 Tu Thu 9:30-10:45am
Room 1402 Fr 9:00-9:50am

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 Office Hours:

Your professor is not going to designate regular office hours for two reasons: a) a large group never succeeds in agreeing on a time that's good for everyone, and b) in practice, nobody ever shows up for designated office hours anyway. That doesn't mean that you are not welcome to come to my office if you need additional help. It simply means you have to take the initiative to make an appointment by phone or by email. I will be more than happy to speak with you in my office unless: a) you want me to explain 4 chapters worth of material 20 minutes before an exam (you laugh, but it's happened...) or b) you basically want me to do your homework for you moments before it is due or you want help with your homework before you have given it a serious attempt on your own.

Your teaching assistant is also available to assist you outside of class.

2 On the importance of waves:

The topic of waves, and more generally periodic motion, is ubiquitous throughout physics. You will see many of the ideas presented here pop up again and again in your courses in areas as disparate as AC circuits, quantum mechanics, optics, orbital motion..etc., etc. It is really important that you learn the material well enough to really use it and apply it in a practical way, and not just enough to parrot answers on an exam. If you are a physics major,

and you don't leave this course with an "operational knowledge" of wave phenomena, it will come back to haunt you. Really.

3 The Anonymous Question Box:

Often, students are unwilling to ask questions out loud or admit that they are confused for fear of appearing ignorant in front of their peers, or worse yet, nerdy and uncool. This tends to limit class participation to a small band of "teacher's pets" and even they tend to speak up only when they are sure they are right. This is a real handicap to your instructor since finding out what you do know is less helpful than finding out what you don't know. Wrong answers are often more instructive for lesson planning purposes than correct ones. After all, it is a big waste of time if the entire class period is spent on what you already know. If you are confused, chances are, you are not the only one.

Your instructor has devised an ingenious workaround to circumvent this problem. A few minutes before the beginning of each class, a box will be placed well below eye level near the back door of the lecture hall. If a student has a question, or feels there is a point that requires clarification, (s)he may write it on a scrap of paper, and discreetly drop it in the question box as (s)he leaves the room. Your instructor will then try to incorporate this point, where appropriate, in future lectures and class activities.

4 Tips for effective learning

Although your instructor is happy to help and will try her best to explain things clearly in class and provide additional help when needed, this will only go so far in helping you learn the material. The ultimate responsibility for learning rests squarely on the student, since really gaining a working knowledge of any topic requires thought and practice, and much of this will take place outside of the class.

Here are some suggestions:

- Get together with classmates outside of class and discuss the topics that have been presented. Try to explain the concepts to one another.

You may find that it is much easier to follow an explanation during lecture than trying to explain it yourself.

- If you are confused, try asking a peer for help. You may find that a peer is better at explaining things to you than your professor because your peer will choose words and examples that are more appropriate for someone on your level. Also, studies show that often times in these interactions, the “explainer” benefits more intellectually from the interaction than the “explainee”. (Remember that if one of your classmates asks you for help.)
- Instead of just reading your book, get a piece of paper and try following along with examples in the the book.
- Really make an effort to do homework problems on your own before asking for help. Even if you ultimately can’t succeed in doing the problem without some assistance, you will find that the answers will “stick” better if you have really struggled with it before getting help. Also, confronting the question head on will help you articulate where you are stuck.
- Make use of the fact that you live in the information age. The world wide web was invented by physicists and there is a virtual cornucopia of information out there. Google any of your favorite wave topics and you are likely to find java applets that assist in your visualization, in depth discussions of applications that interest you, diagrams, explanations, examples, etc.

5 Grading:

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

Homework:	25%
Exam 1	20%
Exam 2	20%
Final:	35%

Homework: Roughly one homework assignment will be given per week. A couple of representative problems will be randomly selected from the home-

work 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.

Exams: You may bring one 3x5 inch recipe card to each exam with as much information as you can cram on it. You are expected to bring a scientific calculator.

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. More specific directions will be given a few weeks into the semester.

6 About “academic integrity”:

Some students find it helpful to work in groups on homework. This practice is not discouraged, 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”.

7 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.) Pro-

fessor 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.

One good way to get to know some graduate students and faculty in the department is to attend "physics tea" at 3:30pm Monday, Wednesday, and Thursday in the front lobby, where you can purchase an excellent cup of coffee at the bargain price of \$1 and, more importantly, you will have the opportunity to interact informally with people who may be doing things that interest you and just generally get plugged in to the Maryland Physics community.

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