PHYSICS 422 – Waves and Oscillations

The course covers the physics of waves and oscillations including sound, elastic, and electromagnetic waves. Topics range from the theory of simple harmonic oscillators, wave propagation in continuous media, and physical optics including interference, Fresnel and Fraunhofer diffraction, and resolution, to diffraction of X-rays and electrons by crystals.

Contact Information:

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Office Hours: T (1PM – 2PM), Th (1PM – 2PM) or by appointment

Textbooks:

A. P. French, *Vibrations and Waves*, Norton
Eugene Hecht, *Optics – 4th Edition,* Addison Wesley (strongly recommended)

Lecture:

M,W,F 3:30 p.m. – 4:20 p.m.
Room 112 PHYS
Course Webpage:
http://www.physics.purdue.edu/~mjones/phys42200_Spring2015

Responsibility of the student:

Attendance at lecture is required. It is assumed that the reading for the class is completed prior to the lecture.

Homework:

Homework assignments will be posted in advance in class and on the course webpage and are to be turned in the date they are due. No homework will be accepted late. At most one homework assignment will be dropped when computing the final grade if it is to the student's advantage.

Homework solutions must include complete, legible explanations of your work. It must be easy for the reader to follow your reasoning. If it takes the grader longer to figure out your reasoning than it took you to write out your solution, something is wrong!

Exams:

There will be a midterm exam scheduled for Thursday, March 12th, to be administered in the evening, and a final exam during finals week. The final exam will be comprehensive but focus primarily on the last half of the course.

Grading:

The final letter grade for the course will be determined based on the following:

Homework – 40%
Midterm – 30%
Final exam – 30%

This grading scheme is slightly changed compared with previous years in that it places more weight on the assignments. However, we now demand that the quality of the solutions be higher than we required in the past. Part of the grade on the homework will be assigned to the clarity of the solution.

Course Schedule (approximate):

Week of	Reading	Comments
Jan 12th	Introduction to harmonic motion. *French: Chapter 1*	
Jan 19th	Free vibrations of physical systems. *French: Chapter 2*	**No class Monday (MLK jr. Day)**
Jan 26th	Damped oscillations. *French: Chapter 3*	
Feb 2nd	Forced vibrations and resonance. *French: Chapter 4*	
Feb 9th	Coupled oscillating systems. *French: Chapter 5*	
Feb 16th	Coupled systems of many oscillators. *French: Chapter 6*	
Feb 23th	Waves in continuous media. *French: Chapter 7*	
Mar 2nd	Waves in 3 dimensions. *French: Chapter 7*	
Mar 9th	Impedance and reflections. *French: Chapter 8*	**Midterm exam on March 12th**
Mar 16th	**Spring break**	**No classes**
Mar 23th	Geometric optics I. *French: Chapter 8, Hecht: Chapter 5*	
Mar 30st	Geometric optics II. *French: Chapter 8, Hecht: Chapter 6*	
Apr 6th	Polarization. *French: Chapter 8, Hecht: Chapter 8*	
Apr 13th	Interference. *French: Chapter 8, Hecht: Chapter 9*	
Apr 20st	Diffraction. *French: Chapter 8, Hecht: Chapter 10*	
Apr 27th	Review	
May 4-9	**Final exam week**	**Final exam has yet to be scheduled.**