

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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Lab: PHYS337

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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_Spring2016

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 10th, 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 11 th	Introduction to harmonic motion. <i>French: Chapter 1</i>	
Jan 18 th	Free vibrations of physical systems. <i>French: Chapter 2</i>	No class Monday (MLK jr. Day)
Jan 25 th	Damped oscillations. <i>French: Chapter 3</i>	
Feb 1 nd	Forced vibrations and resonance. <i>French: Chapter 4</i>	
Feb 8 th	Coupled oscillating systems. <i>French: Chapter 5</i>	
Feb 15 th	Coupled systems of many oscillators. <i>French: Chapter 6</i>	
Feb 22 th	Waves in continuous media. <i>French: Chapter 7</i>	
Feb 29 th	Waves in 3 dimensions. <i>French: Chapter 7</i>	
Mar 8 th	Impedance and reflections. <i>French: Chapter 8</i>	Midterm exam on March 10th
Mar 14th	Spring break	No classes
Mar 21 th	Geometric optics I. <i>French: Chapter 8, Hecht: Chapter 5</i>	
Mar 28 th	Geometric optics II. <i>French: Chapter 8, Hecht: Chapter 6</i>	
Apr 4 th	Polarization. <i>French: Chapter 8, Hecht: Chapter 8</i>	
Apr 11 th	Interference. <i>French: Chapter 8, Hecht: Chapter 9</i>	
Apr 18 st	Diffraction. <i>French: Chapter 8, Hecht: Chapter 10</i>	
Apr 25 th	Review	
May 2-7	Final exam week	Final exam has yet to be scheduled.