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, transverse modes of a continuous string, and physical optics including interference, Fresnel and Fraunhofer diffraction, and resolution, to diffraction of X-rays and electrons by crystals.

Contact Information:

Prof. Jones (mjones@physics.purdue.edu)
Office: PHYS 378
Phone: 765-496-2464
Office Hours: T (2PM – 3PM), Th (2PM – 3PM)

Textbooks:

A. P. French, *Vibrations and Waves*, Norton
Eugene Hecht, *Optics – 4th Edition,* Addison Wesley (optional but 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_Spring2013

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 during the semester administered in the evening and a final exam during finals week. The final exam will be comprehensive with approximately ½ of the exam on the last section of the course.

Grading:

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

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

Course Schedule (approximate):

Week of	Reading	Comments
Jan 7th	Introduction to harmonic motion. *French: Chapter 1*	
Jan 14st	Electromagnetic theory I. *Hecht: Chapter 3*	
Jan 21th	Electromagnetic theory II. *Hecht: Chapter 3*	**No class Monday (MLK jr. Day)**
Mar 28th	Superposition of harmonic waves. *French: Chapter 2, Hecht: Chapter 7*	
Feb 4th	Free vibrations of physical systems. *French: Chapter 3*	
Feb 11th	Forced vibrations of physical systems, resonance. *French: Chapter 4*	
Feb 18th	Coupled oscillators and normal modes. *French: Chapter 5*	
Feb 25th	Normal modes of continuous systems, Fourier analysis. *French: Chapter 6, Hecht: Chapter 11*	
Mar 4th	Progressive waves. *French: Chapter 7*	**Midterm exam**
Mar 11th	**Spring break**	**No classes**
Mar 18th	Propagation of light. *French: Chapter 8, Hecht: Chapter 4*	
Mar 25th	Geometric optics I. *French: Chapter 8, Hecht: Chapter 5*	
Apr 1st	Geometric optics II. *French: Chapter 8, Hecht: Chapter 6*	
Apr 8th	Polarization. *French: Chapter 8, Hecht: Chapter 8*	
Apr 15th	Interference. *French: Chapter 8, Hecht: Chapter 9*	
Apr 22nd	Diffraction. *French: Chapter 8, Hecht: Chapter 10*	
Apr 29th	**Final exam**	