
Physics 223

WAVES, OPTICS and THERMODYNAMICS

<http://www.physics.pdx.edu/~larosaa>

Spring-2002
Room SB1 107
Mon & Wed 17:15-18:30 PM

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Office Hours: M & W: 18:45-19:15
T: 12:00 – 1:00 p.m.

Text*: Fundamentals of Physics: 6th Edition; by Halliday, Resnick and Walker

Grading:

<u>1st</u> Midterm exam	30 %
<u>2nd</u> Midterm exam	40%
<u>Final</u> exam	40%

(There is not mistake in the percentages given above. However passes the 100% will get an A. Curving methods will not be applied to the final grades.)

Lecture Notes They will be available in the Library Reserved Room, after the class sessions.

Solved problems set Will be available in the Library Reserved Room.

Students who typically do well in this course:

They have active participation in class.

Solve a minimum of 10 questions or problems of each chapter.

Syllabus updates Check updates at <http://www.physics.pdx.edu/~larosaa/>
Syllabus will be updated as the course progresses.

<u>Date</u>	<u>Covered Chapters</u>	<u>Highlight topics</u>
4/01	Ch-16 Oscillations	Simple harmonic motion (SHM)
4/03	Ch-16 Oscillations	Amplitude and frequency in SHM Damped simple harmonic oscillator, Quality factor Q. Forced oscillations and Resonance.

04/08	Ch-17 Mechanical Waves-I	Transverse and longitudinal waves, traveling waves, WAVE EQUATION, wave on a stretched ring, energy of waves in a string.
04/10	Ch-18 Mechanical Waves-II	Reflection and transmission of waves at a boundary. Constructive and destructive interference of harmonic waves. Beats: interference between waves of slightly different frequency. Standing waves and resonance (string fixed at one end string fixed at both ends.)

04/15	Ch-18 Mechanical Waves	Sound waves, the Doppler Effect
04/17	<u>1st</u> Midterm exam	30 % (Chapters 16, 17,18)

04/22	Ch-34 Electromagnetic waves	Maxwell Equations, Heinrich Hertz's experiment. Analytical description of EM waves propagation: WAVE EQUATION. Speed of light. Light propagating through a material <i>appears</i> to travel at speed lower than in vacuum.

			Propagation of electromagnetic energy: Poynting vector. Light wave-particle duality.
04/24	Ch-34	EM waves	Polarization: vectorial character of EM waves. Linear and circularly polarization. Polarizers. Huygens' principle to describe light propagation (geometrical point of view). Snell's law. Total internal reflection.

04/29	Ch 34	EM waves	Exploiting the vectorial character of EM waves: polarization by reflection and Brewster angle. Chromatic dispersion: index of refraction depends on the light frequency. Why is the sky blue?
05/01	Ch-35	Images	Image formation with thin lenses. Image formation using spherical mirrors.

05/06	Ch-35	Images	Optical Instruments: compound microscope, refracting telescope.
05/08	Ch-36	Interference	Phase shift experienced by reflected and refracted EM waves upon incidence on an interface. Similarities with mechanical waves. EM waves at a interface. Concept of phase and phase shift.

05/13	Ch-36	Interference	Interference from Thin films. Coherence. Intensity in double slit interference. Michelson's interferometer.
05/15	Ch-37	Diffraction	Diffraction and the wave theory of light. Diffraction by a single slit. Diffraction by a circular aperture. Diffraction by a double slit.

05/20	Ch-37	Diffraction	Diffraction gratings. Dispersion and resolving power.
05/22	2nd Midterm Exam		40 % (Chapters 34-37)

05/27	Memorial Day Holiday – University closed		
05/29	Ch-19	Thermodynamics	Temperature and heat. Zeroth Law of Thermodynamics.
	Ch-20	Kinetic Theory of gases	Heat and work. Temperature scales. The First Law of Thermodynamics. Heat transfer

06/03	Ch-21	Kinetic Theory	
06/05	Ch-21	Second Law of Thermodynamics	

06/10	Monday, 17:30 - 19-20 p. m.	Final Exam (Comprehensive)	40%

* Other References

- Paul A. Tipler, "Physics" Volumes 1 and II, Fourth Edition. These two books will be available in the Library Reserved Room.
- R. Feynman, R. Leighton, M. Sands; "The Feynman Lectures On Physics"; Vol-I and II; Addison-Wesley; QC21.2.F49 1989. This is an excellent reference, conveying a deeper understanding of physics concepts.
- Ronald Lane Reese, University Physics, Brooks/Cole Publishing Company, 2000. This reference will be available in the Library Reserved Room.