

SEP 08 2000

PC1300 - Wave Motion, Optics and Sound

Fall Session - 1999

University of Alberta Equivalent - Physics 130

3.8(3-0-1.5)UT

This course includes: geometrical optics, optical instruments, oscillations, waves, sound, interference, and diffraction.

Prerequisite: Pure Mathematics 30, 31 and Physics 30

Corequisite: MA1000

Note: Restricted to Engineering students only.

Term	<i>September to December, 1999</i>
Lecture	<i>Tuesday and Thursday, 10:00-11:20 a.m., J201</i>
Laboratory	<i>Tuesday, 2:30 - 5:20 p.m. J103</i>
Instructor	<i>Dr. Jaime P. Santiago J209 539-2865</i>
E-mail	santiago@gprc.ab.ca

PC1300 - Wave Motion, Optics and Sound

Course Information – Fall 1999

Instructor	Jaime P. Santiago Office Phone E-mail	Department of Science and Technology J209 539-2865 santiago@gprc.ab.ca								
Schedule	Lecture Laboratory	10:00 - 11:20 a.m. Tuesdays and Thursdays, J201 2:30 - 5:20 p.m. Tuesdays (one half of class every other week), J103								
Web Page	www.gprc.ab.ca/courses_and_programs/engineering/pc1300.html									
Lectures	Oscillations, simple and damped harmonic oscillators; Waves, waves on a string, superposition principle, interference, phasors, Standing waves and resonance; Sound, interference and intensity; Sources of musical sounds; Beats, Doppler Effect; Light as a wave, em spectrum, index of refraction, polarization; Laws of reflection and refraction, dispersion, total internal reflection; Plane and spherical mirrors, spherical refracting surfaces, thin lenses; Optical instruments; Young's experiment, intensity in double slit, thin films; Single slit diffraction, intensity in single slit, diffraction by a circular aperture; Diffraction by double slit; Multiple slits, intensity, diffraction grating									
Laboratories	Five laboratory experiments performed every two weeks expanding on the concepts learned in the lecture. Microsoft WORD and EXCEL will be used to analyze and write the report.									
Assignments	All homework for marking is due at 8:30 a.m. on Tuesdays unless otherwise specified.									
Marks Distribution	<table border="1"> <tr> <td>Problem Sets</td> <td>15%</td> </tr> <tr> <td>Laboratory Work</td> <td>20%</td> </tr> <tr> <td>Term Exams</td> <td>25%</td> </tr> <tr> <td>Final Exam</td> <td>40%</td> </tr> </table>	Problem Sets	15%	Laboratory Work	20%	Term Exams	25%	Final Exam	40%	Students must pass the lab and the final examination to pass the course.
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Final Exam	40%									
Required Texts	David Halliday, Robert Resnick and Jearl Walker: <i>Fundamentals of Physics, 5th Edition</i> University of Alberta: <i>Physics Laboratory Manual</i>									
Materials	3.5" floppy disks Engineering paper									

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Lecture Schedule - Fall 1999

TOPIC	TIME (Wks)	CONCEPTS TO BE LEARNED
Oscillations	2	Simple harmonic motion, energy in SHM, simple harmonic oscillator, simple pendulum, torsion pendulum, physical pendulum, damped oscillations, forced oscillations and resonance
Waves	2	Wave concept, types of waves, wavelength, frequency and speed, waves on a stretched string, energy and power, phasors, standing waves and resonance
Sound	2	Sound waves, speed of sound, interference, intensity and sound level, sources of musical sound, beats, the Doppler Effect
Light	1.5	Light as a wave, electromagnetic spectrum, speed of light, index of refraction, variation of intensity with distance, radiation pressure and polarization, reflection and refraction, dispersion, total internal reflection, polarization by reflection
Geometrical Optics	2	Plane and spherical mirrors, spherical refracting surfaces, thin lenses, optical instruments
Interference	1.5	Interference and diffraction, coherence, Young's double slit experiment, intensity in double slit, thin films
Diffraction	1.5	Single slit diffraction, intensity in single slit, diffraction by a circular aperture, double slit diffraction, multiple slits, diffraction grating

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Assignment Schedule - Fall 1999

No.	Date Due	Chapter	Problems
1	Sep 21	16	16E, 23P, 27P, 29P
2	Sep 28	16	38P, 48P, 87P, 60E
3	Oct 5	17	10E, 29P, 32P, 35P
4	Oct 12	17	38P, 43P, 56P, 64P
5	Oct 26	18	8P, 19P, 22P, 26P, 44P
6	Nov 2	18 34	53P, 60P, 82P 54P, 65P
7	Nov 9	34 35	72P, 82P, 83P 12P
8	Nov 16	35	16P(a,b,c,d,g), 20P(a,c,d,e)
9	Nov 23	35	22P, 35P, 37P, 48P
10	Nov 30	36	13P, 28P, 33P, 39P
11	Dec 7	36 37	58P, 71P 17P, 42P, 54P

Solutions to Problem Sets are in Adobe PDF format.



They require Adobe Acrobat reader. [Download it now for Free!](#)

Problem Set No.

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Laboratory Schedule - Fall 1999

Lab. No.	Date	Title
1	September 14	Introduction to lab, Microsoft Word and Excel
2	September 21/28	Oscillations of a Spring
3	October 5/19	Standing Waves on a String
4	October 26/November 2	Speed of Sound in Air
5	November 9/16	Geometrical Optics
6	November 23/30	Interference of Light

Printed lab reports are due one week after the lab is performed.

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Examinations

Term Examinations are

- worth 25 % of the course mark
- to be written on Thursday, 14 October, 1999 and in November (date to be announced later)
- a formula sheet will be provided

Click to download solution to Midterm exam

Download the [Adobe PDF](#) version or a zipped [Word 97](#) version of the formula sheet.

Final Examination

- worth 40% of the final grade
- final exam date to be announced.
- a formula sheet will be provided

Old final exams may be downloaded here. They are in zipped Word 6.0/95 format.

[1996 Final Exam](#)

[1995 Final Exam](#)