

PC1090 - Introduction to University Physics II

Winter Session - 1999

University of Alberta Equivalent - Physics 109

3(3-1.5-3)UT

This is a non-calculus course in physics for students without Physics 30, to be taken in sequence with PC 1080.

Waves, sound, fluids, geometrical and physical optics, heat and thermodynamics.

Prerequisite: PC 1080

Note: Credits may be obtained for only one of PC 1000, 1090, 1300 or 1370.

Term	<i>January to April, 1999</i>
Lecture	<i>Monday, Wednesday, Friday 10:00 - 10:50 a.m., J202 Thursday, 8:00-9:20 a.m., J202</i>
Laboratory	<i>Thursday, 3:00 - 5:50 p.m. J103</i>
Instructor	<i>Dr. Jaime P. Santiago J209 539-2865</i>
E-mail	<i>santiago@gprc.ab.ca</i>

PC1090 - Introduction to University Physics II

Course Information – Winter 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 – 10:50 Monday, Wednesday, Friday 08:00 - 9:20 a.m. Thursday 15:00 – 17:50 Thursday
Web Page	www.gprc.ab.ca/courses_and_programs/engineering/pc1090.html	
Lectures	Mass density, pressure; Pascal's Principle, Archimedes Principle; Equation of Continuity, Bernoulli Equation, Poiseuille's Law; temperature and temperature scales, thermometers; linear and volume expansion; heat and internal energy, specific heat capacity; phase change, latent heat, phase equilibrium, humidity, convection, radiation and conduction of heat; ideal gases, kinetic theory; Zeroth and First laws of thermodynamics, thermal processes, heat engines; second law of thermodynamics, entropy; waves, waves on a string; sound waves, sound intensity and sound level; Doppler effect, superposition, interference and beats; standing waves; geometrical optics, plane and spherical mirrors; index of refraction, Snell's law, total internal reflection, polarization, dispersion; thin lenses, optical instruments; double slit, thin films; diffraction, diffraction gratings.	
Laboratories	Nine laboratory experiments performed every week expanding on the concepts learned in the lecture. Microsoft WORD and EXCEL may be used to analyze and write the report. The laboratory instructor will provide more information at the first lab.	
Assignments	All homework for marking is due at 10:00 a.m. on Wednesdays unless otherwise specified.	
Marks Distribution	Problem Sets Laboratory Work Chapter Tests Midterm Exam Final Exam	10% 15% 15% 25% 35% Students must pass the lab to pass the course.
Required Texts	J. D. Cutnell and K. W. Johnson: <i>Physics, 3th Edition</i> University of Alberta: <i>Physics Laboratory Manual</i>	
Materials	3.5" floppy disk if using software in laboratory.	

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Lecture Schedule - Winter 1999

TOPIC	TIME (Wks)	CONCEPTS TO BE LEARNED
Fluids	2	Mass density, pressure, Pascal's Principle, Archimedes Principle, Equation of Continuity, Bernoulli's Equation, viscous flow
Temperature and Heat	1	Temperature scales, thermometers, linear and volume thermal expansion, heat and internal energy, specific heat capacity, latent heat and phase change, humidity
Heat Transfer	1	Convection, conduction and radiation of heat
Ideal Gases	1	Molecules, molecular mass, the Mole and Avogadro's number; the ideal gas law; kinetic theory of gases; diffusion
Thermodynamics	1.5	Zeroth and First laws of thermodynamics, thermal process, specific heat capacity; Second law of thermodynamics, entropy; heat engines, Carnot's principle and the Carnot engine, refrigerators and heat pumps; Third law of thermodynamics
Waves and Sound	1	Waves, speed of a wave, waves on a string, sound, speed of sound, intensity of sound, decibels; the Doppler Effect
Superposition and Interference	1	Superposition principle, constructive and destructive interference; diffraction, beats; transverse and longitudinal standing waves; musical instruments
Reflection of Light	0.5	Waves fronts and rays; the reflection of light; image formation by plane and spherical mirrors; the mirror equation and magnification
Refraction of Light	1	Index of refraction, Snell's Law, total internal reflection; polarization; dispersion; thin lenses, image formation by lenses; the lens equation and magnification, lens combinations, optical instruments
Interference and the Wave Nature of Light	1	Double slit, thin films, diffraction gratings

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Laboratory Schedule - Winter 1999

Lab. No.	Date	Title
1	January 14	<u>Constant Volume Gas Thermometer</u>
2	January 21	<u>Standing Waves on a String</u>
3	January 28	<u>Speed of Sound in Air</u>
4	February 4	<u>Properties of Fluids</u>
5	February 11	<u>Terminal Velocity</u>
6	March 11	<u>Oscilloscope</u>
7	March 18	<u>Geometrical Optics</u>
8	March 25	<u>Interference of Light</u>
9	April 2	<u>Mechanical Equivalent of Heat</u>