PC1080 - Introduction to University Physics I

Fall Session - 1999

University of Alberta Equivalent - Physics 108

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This is a non-calculus course in physics for students without Physics 30. Vectors, forces in equilibrium, linear and rotational motion, dynamics of particles, and oscillations are topics of study.

Prerequisite: Pure Mathematics 30

Note: This course is intended to be taken in sequence with PC 1090. Not available to students with Physics 30, unless by prior consent from the Department. Credit may be obtained for only one of PC 1080, 1010, 1410, or 1310.

Term	*September to December, 1999*
Lecture	*Tuesday, Thursday and Friday, 8:30 - 9:50 a.m., J226*
Laboratory	*Monday, 2:30 - 5:20 p.m.* *J103*
Instructor	*Dr. Jaime P. Santiago* *J209* *539-2865*
E-mail	santiago@gprc.ab.ca

PC1080 - Introduction to University Physics I

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		8:30 – 9:50 Tuesday, Thursday, Friday, J226 14:30 – 17:20 Monday, J103
Web Page	www.gprc.ab.ca/courses_and_programs/engineering/pc1080.html		
Lecture Topics	System of units, dimensional analysis Experimental errors, propagation of errors, signficant figures Scalars and vectors Distance, displacement, speed, velocity and acceleration Kinematics with constant acceleration, freely falling bodies Graphical analysis Kinematics in two dimensions; projectile motion Relative motion Force and mass; Newton's Laws of Motion, Free-body diagrams Universal gravitation Normal force, friction Uniform circular motion, satellites Work and energy, kinetic energy, Work-Energy Theorem Gravitational potential energy, conservation of mechanical energy Power Impulse and momentum, conservation of linear momentum, collisions Rotational kinematics, rolling motion Torque, static equilbrium Rotational dynamics, work and energy Angular momentum, conservation of angular momentum Elasticity, Young's, shear and bulk modulus, Hooke's Law Simple harmonic oscillator, simple pendulum, forced oscillations and resonance		
Laboratories	Ten laboratory experiments performed every week expanding on the concepts learned in the lecture.		
Assignments	All homework for marking is due at 8:30 a.m. on Tuesdays unless otherwise specified.		
Marks Distribution	Problem Sets Laboratory Work Term Exams Final Exam	10 % 20 % 30 % 40 %	Students must pass the lab to pass the course.
Required Texts	J. D. Cutnell and K. W. Johnson: *Physics, 4th Edition* University of Alberta: *Physics Laboratory Manual*		

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Lecture Schedule - Fall 1999

CHAPTER	TOPIC	TIME (Days)	CONCEPTS TO BE LEARNED
1	Introduction and Mathematical Concepts The nature of physics; system of units, experimental errors; trigonometry review; Vectors	3	Course introduction; System of units, unit conversions; dimensional analysis; experimental errors, propagation of errors; trigonometry review; scales and vectors, vector additon
2	Kinematics in One Dimension	4	Displacement, speed, velocity, acceleration; kinematics for constant acceleration; applications of kinematics equations; Freely falling bodies; graphical analysis
3	Kinematics in Two Dimensions	2	Kinematical variables in two dimensions; kinematics equations in two dimensions; Projectile motion; Relative motion
4	Forces and Newton's Laws of Motion	5	Newton's Laws of Motion, Newton's Law of Universal gravitation, mass and weight; normal force; static and kinetic friction; applications of Newton's Laws of Motion
5	Dynamics of Uniform Circular Motion	3	Uniform circular motiion, centripetal force, banked curves; satellites in circular orbits; apparent weightlessness;
6	Work and Energy	4	Work done by a constant force; kinetic energy and the Work-Energy Theorem; gravitational potential energy; conservative and non-conservative forces, conservation of energy; power; work done by variable forces
7	Impulse and Momentum	4	Impulse and momentum, conservation of linear momentum; collisions in one and two dimensions; center of mass, center of gravity
8	Rotational Kinematics	3	Rotational motion and angular displacement; angular velocity and acceleration, equations of rotational kinematics; angular and tangential

			variables; centripetal and tangential forces, rolling motion
9	Rotational Dynamics	5	Torque; static equilibrium; Newton's 2nd law for rotational motion about a fixed axis; rotation work and energy; angular momentum and impulse; conservation of angular momentum;
10	Elasticity and Simple Harmonic Motion	4	Elastic deformation; Young's modulus, shear and bulk modulus; Hooke's Law and the ideal spring; simple harmonic motion; the simple pendulum; damped and forced harmonic motion; resonance