

Grande Prairie Regional College
Department of Science and Technology

PC 1310 – Mechanics
 Winter Session, 2002
 4.3(3-1.5-3)UT
 U of A Equivalent – EN PH 131

Course Outline

This course includes: kinematics and dynamics of particles; gravitation; work and energy; linear momentum; angular momentum; systems of particles; introduction to dynamics of rigid bodies are covered in the course.

Prerequisite: MA 1000, EG 2300

Corequisite: MA 1010 Pre- or Corequisite: PC 1300

Note: Restricted to engineering students only.

Instructor	Jaine P. Santiago J209 539-2865 santiago@gprc.ab.ca										
Lecture	T 1:30 – 2:20 J227 W 10:30 – 11:20 J202 F 11:30 – 12:20 J229										
Laboratory	R 8:30 – 11:20 J103										
Seminar	R 14:30 – 15:20 J202										
Textbook	Engineering Mechanics, Statics and Dynamics, 9 th Edition R. C. Hibbeler Prentice Hall Fundamentals of Physics, 6 th Edition Richard Resnick, David Halliday and Jearl Walker John Wiley and Sons										
Laboratory Manual	Physics 130, En Ph 131 Laboratory Manual Department of Physics University of Alberta										
Marks Distribution	<table style="width: 100%; border: none;"> <tbody> <tr> <td style="width: 70%;">Problem Sets</td> <td style="text-align: right;">5%</td> </tr> <tr> <td>Seminars</td> <td style="text-align: right;">5%</td> </tr> <tr> <td>Laboratory Work</td> <td style="text-align: right;">20% (Students must pass the lab to pass the course.)</td> </tr> <tr> <td>Midterm Exam</td> <td style="text-align: right;">20% (Friday, February 22, 2002)</td> </tr> <tr> <td>Final Exam</td> <td style="text-align: right;">50% (U of A Common Final Exam, date TBA)</td> </tr> </tbody> </table> <p>Note that satisfactory performance on the exams is required in order to pass this course.</p>	Problem Sets	5%	Seminars	5%	Laboratory Work	20% (Students must pass the lab to pass the course.)	Midterm Exam	20% (Friday, February 22, 2002)	Final Exam	50% (U of A Common Final Exam, date TBA)
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Lecture Topics

Topic	Lectures/ Days	Concepts to be Learned
Introductory Material	1	Fundamental quantities, dimensional analysis, idealizations
Kinematics of Rectilinear Motion	5	Absolute motion along a line; position, speed, displacement, velocity and acceleration; constant and variable acceleration; erratic motion
Kinematics of Planar Motion	5	Position, displacement, velocity and acceleration in 2 dimensions; Cartesian components; projectile motion; normal and tangential components; absolute dependent motion; relative motion
Dynamics of a Particle	5	Newton's Laws of Motion for a single particle, inertial frames of reference; Newton's Law of Universal Gravitation; friction, Cartesian components; normal and tangential components, circular motion; central force motion
Systems of Particles	2	Internal and external forces; center of mass and gravity; Newton's laws of motion for systems of particles
Work and Energy	6	Work done by a force; kinetic energy; Principle of Work and Energy for a particle, systems of particles; power and mechanical efficiency; conservative and non-conservative forces, potential energy, Law of Conservation of Energy
Linear Momentum and Impulse	4	Definition of linear momentum; Principle of Impulse and Momentum; systems of particles; conservation of linear momentum for a system of particles, collisions
Introduction to Dynamics of a Rigid Body	4	Rigid bodies; angular displacement, velocity and acceleration; kinetic energy; moment of inertia; torque (moment of force); Newton's laws for rotational motion
Angular Impulse and Momentum	4	Definition of angular momentum (moment of momentum) and impulse; angular momentum of a rigid body; Principle of Angular Impulse and Momentum; Conservation of Angular Momentum

Assignments

Problem Set	Due Date	Problems
1	January 15	Hibbeler:
2	January 22	Hibbeler:
3	January 29	Hibbeler:
4	February 5	Hibbeler:
5	February 12	Hibbeler:
6	March 12	Hibbeler:
7	March 19	Hibbeler:
8	March 26	Hibbeler:
9	April 2	Hibbeler: HRW:
10	April 9	HRW:

Laboratory Work

Expt. No.	Date	Title
6	January 17	Acceleration Due to Gravity
7	January 31	Non-Uniform Motion
8	February 14	Atwood's Pulley
9	March 7	Conservation of Mechanical Energy
10	March 21	Collision: Ramp
11	April 4	Moment of Inertia