Grande Prairie Regional College
Department of Science and Technology

PC 1310 – Mechanics

Winter Session, 2001
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	Jaime P. Santiago J209 539-2865 santiago@gprc.ab.ca				
Lecture	M	11:30 – 12:50 J229	F	10:00 – 11:20 J201	
Laboratory	W	14:30 – 16:00 J103		16:00 – 17:20 TBA	
Seminar	M	15:30 – 16:20 J229			
Textbook	Engineering Mechanics, Statics and Dynamics, 8th Edition R. C. Hibbeler Prentice Hall Fundamentals of Physics, 6th 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	Problem Sets	5%			
	Seminars	5%			
	Laboratory Work	20% (Students must pass the lab to pass the course.)			
	Midterm Exam	20% (February 23, 2001)			
	Final Exam	50% (U of A Common Final Exam, date TBA)			
	Note that satisfactory performance on the exams is required in order to pass this course.				

Lecture Topics

Topic	Lectures/ Days	Concepts to be Learned
Introductory Material	1	Fundamental quantities, dimensional analysis, idealizations
Kinematics of Rectilinear Motion	3	Absolute motion along a line; position, speed, displacement, velocity and acceleration; constant and variable acceleration; erratic motion
Kinematics of Planar Motion	4	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	4	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	1	Internal and external forces; center of mass and gravity; Newton's laws of motion for systems of particles
Work and Energy	3	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	3	Definition of linear momentum; Principle of Impulse and Momentum; systems of particles; conservation of linear momentum for a system of particles, collisions
Introduction to Rigid Body Dynamics	3	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	2	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 19	Hibbeler: 1-13, 1-16, 12-7, 12-12, 12-18
2	January 26	Hibbeler: 12-22, 12-27, 12-32, 12-53, 12-63
3	February 2	Hibbeler: 12-84, 12-97, 12-98, 12-102, 12-107
4	February 9	Hibbeler: 12-119, 12-126, 12-179, 12-183, 12-198
5	February 16	Hibbeler: 13-3, 13-11, 13-27, 13-33, 13-47
6	March 9	Hibbeler: 13-56, 13-61, 13-67, 13-72, 13-81
7	March 16	Hibbeler: 14-5, 14-13, 14-35, 14-81, 14-95
8	March 23	Hibbeler: 15-18, 15-27, 15-43, 15-48, 15-54
9	March 30	Hibbeler: 15-61, 15-68, 15-82, 15-86 HRW: Ch. 11 – 28P, 44P
10	April 9	HRW: Ch. 11 – 54P, 56P, 57P Ch. 12 – 12P, 14P

Laboratory Work

Lab. No.	Date	Title
1	January 10/17	Kinematics of Non-uniform Motion
2	January 24/31	Acceleration Due to Gravity
3	February 2/14	Atwood's Pulley
4	February 21/ March 7	Conservation of Mechanical Energy (Note: There is a lab during midterm week.)
5	March 14/21	Collision: Ramp
6	March 28/ April 4	Moment of Inertia

The following was taken directly from the U of A ENPH 131 website. It also applies to you!

ENPH 131 Assignments (January - April 2001)

There will be ten assignments throughout the term, each consisting of five problems taken from the course textbooks. Announcements reminding you of the assignments will be made in class on Wednesdays with the assignment normally due at 4:00 PM on Thursday one week later. Assignments are to be placed in the appropriate drop-box in the corridor between V-Wing and the Physics building. Solutions will be posted in the glass cabinets in the same location.

Please note the following:

1. Use the correct format for engineering assignments.
2. You must use engineering paper.
3. Show all your work.
4. Diagrams should be reasonably sized, neat, and legible. All quantities and coordinate conventions should be defined. Diagrams are COMPULSORY for problems involving FBDs and Mass-Acceleration diagrams. **In order to force good work habits errors or omissions in these diagrams will be HEAVILY penalized.**
5. Messy work will not be marked. **This will be strictly enforced.**
6. Your assignment pages MUST be stapled.
7. Make sure your name and section number are on the top of each page. Assignments submitted to the wrong section will be considered lost and given a mark of zero
8. Late assignments will be accepted only with a note from Student Health or your physician.
9. Marked assignments will be returned one week later and kept on file for several weeks. Unclaimed assignments will be destroyed.

This course is NOT about remembering formulas. In fact there are very few formulas used in the course. The problems listed below are the MINIMUM that you should do out of the textbook. You should attempt as many other problems as you can. In that way, you will see how the laws of mechanics can be applied in a wider variety of problems, and get you better prepared for the exams. If you have difficulty with any problems, see your instructor - they will be glad to help, and suitably impressed by your initiative!

Exam problems almost never closely resemble any homework problem or class example!! Understand what you are doing and WHY.