Grande Prairie Regional College
Department of Science
PC 1310 – Mechanics

Winter Semester – 2004-05
4.3(3-1-1.5) 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	Desh Mittra J215 539-2981 dmittra@gprc.ab.ca
Lecture	TR 08:30 – 09:50 J204
Labs	F 10:00 – 12:50 J103
Seminar	W 2:30 – 3:20 J229
Textbook	*Engineering Mechanics, Statics and Dynamics, 10th Edition* by R. C. Hibbeler, Prentice Hall *University Physics, 11th Edition* by Hugh D. Young and Roger A. Freedman, Pearson/Addison-Wesley
Lab. Manual	*Physics 130, En Ph 131 Laboratory Manual* Department of Physics, University of Alberta
Marks Distribution	Problem Sets 5% Seminars 5% Lab. work 20% (Students must pass the lab to pass the course.) Midterm Exam 20% (U of A Common Exam, Monday, Feb.28, 2005 at 19:00 – 20:30) Final Exam 50% (U of A Common Exam, Tuesday, April 19, 2005 at 9:00 – 11:30) ***Note that satisfactory performance on the exam and the aggregate mark is required in order to pass this course. "Satisfactory performance" is defined by U of A every year.***
Course Website	http://www.gprc.ab.ca/departments/physics and follow the links.

Lecture Topics

Topic Sections in Hibbeler (H) and Young and Freedman (Y & F)	**Dates of lectures**	**Concepts to be learned**
A. Introductory Material H: 1.1–1.5 Y & F: 1.3–1.5	Jan. 4, 6	Fundamental quantities, idealizations, absolute Newtonian space and time, frames of reference, dimensional analysis
B. Kinematics of Rectilinear Motion H:12.1–12.3 Y & F: 2.1–2.6	Jan. 11, 13	Absolute motion along a line; position, speed, displacement, velocity and acceleration; constant and variable acceleration; erratic motion
C. Kinematics of Planar Motion of a particle H: 12.4-12.7,12.9,12.10 Y & F: 3.1-3.5	Jan. 18, 20 25, 27	Position, displacement, velocity and acceleration in 2 dimensions; Cartesian components; projectile motion; normal and tangential components; absolute dependent motion; relative motion
D. Dynamics of a Particle H: 13.1, 13.2, 13.4, 13.5 Y & F: 4.1-4.6	Feb. 1, 3, 8 10	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
E. Systems of Particles H: 13.3, Y & F: 5.1-5.5	Feb. 15, 17	Internal and external forces; centers of mass and gravity; Newton's laws of motion for systems of particles
F. Work and Energy H: 14.1-14.6 Y & F: 6.1-6.4, 7.1-7.3	Mar. 1, 3, 8, 10	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
G. Linear Momentum and Impulse H: 15.1-15.4, Y & F: 8.1-8.5	Mar. 15, 17, 22, 24	Definition of linear momentum; principle of impulse and momentum; systems of particles; conservation of linear momentum for a system of particles, collisions
H. Introduction to Kinematics and Dynamics of a Rigid Body H: 16.1-16.3, 17.1-17.3 Y & F: 9.1-9.5, 10.1-10.4	Mar. 29, 31	Rigid bodies; angular displacement, velocity and acceleration; kinetic energy; moment of inertia; torque (moment of force); Newton's laws for rotational motion
I. Angular Momentum and Impulse H: 15.5-15.7 Y & F: 10.5-10.6	Apr. 5, 7, 12	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

Note: Hibbeler is the primary text for sections A. -G., while Young and Freedman is the primary text for sections H. -I.

*****Note that you have seen friction problems in Statics (PC 1300). Reading Week is 21-25 February. The midterm exam is on Monday, 28 February, 1900-2030 hrs, and could be based on material up to about the middle of "the dynamics of the particle", (simple problems involving friction)*****

Calculator Policy

Only approved calculators are allowed in any exam. Using an unapproved calculator in an exam is considered cheating and you will be held liable for that action. Check the following U of A website for a list of approved calculators.

http://www.engineering.ualberta.ca/students/calculator.asp#approved

Assignments

Problem Set	Due Date	Problems
1	January 20	Hibbeler: 12-4, 12-9, 12-11, 12-14, 12-20
2	January 27	Hibbeler: 12-12, 12-21, 12-15, 12-16, 12-60
3	February 3	Hibbeler: 12-74, 12-82, 12-94, 12-97, 12-102
4	February 10	Hibbeler: 12-106, 12-110, 12-178, 12-188, 12-207
5	February 17	Hibbeler: 13-2, 13-10, 13-21, 13-28, 13-38
6	March 3	Hibbeler: 13-56, 13-68, 13-76, 13-80, 13-81
7	March 10	Hibbeler: 14-4, 14-12, 14-24, 14-34, 14-39
8	March 17	Hibbeler: 14-76, 14-92, 15-6, 15-30, 15-52
9	March 24	Hibbeler: 15-58, 15-67, 15-79; Y & F 9.6, 9.86
10	March 31	Young & Freedman, 10.16, 10.64, 10.70, 10.74, 10.83
11	April 7	
12		

Note: ***Assignments are due at the start of the class on the dates indicated above.*** **No late assignments will be accepted.**

Laboratory Work

Experiment No.	Date	Title
6	January 7/14	Acceleration Due to Gravity
7	January 21/28	Non-Uniform Motion
8	February 4/11	Atwood's Pulley
9	February 18/March 4	Conservation of Mechanical Energy
10	March 11/18	Collision: Ramp
11	March 25/April 8	Moment of Inertia (Download lab instructions.)

Note: ***Lab reports are due at 1:00 p.m. one week after the lab is performed.*** **No late reports will be accepted.**

Grades

Letter Grade	*4-Point Equivalent*	*Designation*
A+	4.0	Excellent
A	4.0	
A-	3.7	First Class Standing
B+	3.3	
B	3.0	Good
B-	2.7	
C+	2.3	Satisfactory
C	2.0	
C-	1.7	
D+	1.3	Minimal Pass
D	1.0	
F	0.0	Fail

The University of Alberta will only accept for transfer credit courses where a student obtains a grade of C- or higher. All course work will be marked out of 10 or in percent. A weighted average will be computed after all course work is done before final assignment of letter grades.