Grande Prairie Regional College
Department of Science and Technology

PC 1310 – Mechanics

Winter Session, 2004
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	Jaime P. Santiago J209 539-2865 santiago@gprc.ab.ca
Lecture	TR 08:30 – 09:50 J228
Laboratory	F 10:00 – 12:50 J103
Seminar	R 12:00 – 12:50 J227
Textbook	*Engineering Mechanics, Statics and Dynamics, 9th Edition* by R. C. Hibbeler, Prentice Hall *University Physics, 11th Edition* by Hugh D. Young and Roger A. Freedman, Pearson/Addison-Wesley
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% (U of A Common Exam, Monday, February 22, 2004 at 19:00) Final Exam 50% (U of A Common Exam, date TBA) ***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)	**No. of 1.5 hour lectures**	**Concepts to be Learned**
Introductory Material H: 1.1–1.5 Y & F: 1.1–1.5	1.5	Fundamental quantities, idealizations, absolute Newtonian space and time, frames of reference, dimensional analysis
Kinematics of Rectilinear Motion H:12.1–12.3 Y & F: 2.1–2.6	3.5	Absolute motion along a line; position, speed, displacement, velocity and acceleration; constant and variable acceleration; erratic motion
Kinematics of Planar Motion H:12.4-12.7,12.9,12.10 Y & F: 3.1-3.5	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 H:13.1, 13.2, 13.4, 13.5, 8.1 Y & F: 4.1-4.6, 5.1	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 H:13.3, 9.1, 9.3 Y & F: 5.2-5.5	1.5	Internal and external forces; centers of mass and gravity; Newton's laws of motion for systems of particles
Work and Energy H: 14.1-14.6 Y & F: 6.1-6.4, 7.1-7.4	2.5	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 H: 15.1-15.4, Y & F: 8.1-8.5	3.5	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 H:16.1-16.3, 17.1-17.4 Y & F: 9.1-9.3, 10.1-10.3	2.5	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 H: 15.5-15.7 Y & F: 10.5-10.7	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

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 22	Hibbeler: 1-8, 12-8, 12-12, 12-16, 12-22
2	January 29	Hibbeler: 12-28, 12-36, 12-44, 12-54,12-64
3	February 5	Hibbeler: 12-72, 12-80, 12-88, 12-91, 12-96
4	February 12	Hibbeler: 12-104, 12-116, 12-128, 12-184, 12-196
5	February 26	Hibbeler: 13-4, 13-12, 13-28, 13-32, 13-40
6	March 4	Hibbeler: 13-42, 13-56, 13-60, 13-68, 13-80
7	March 11	Hibbeler: 14-4, 14-32, 14-80, 14-84, 14-95
8	March 18	Hibbeler: 15-20, 15-28, 15-40, 15-48, 15-52
9	March 25	Hibbeler: 15-60, 15-68, 15-80, 15-86, 15-89
10	April 7	Young & Freedman, Chapter 9: Problems 22, 31 Young & Freedman, Chapter 10: Problems 4, 16, 19

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 9/16	Acceleration Due to Gravity
7	January 23/30	Non-Uniform Motion
8	February 6/13	Atwood's Pulley
9	February 27/March 5	Conservation of Mechanical Energy
10	March 12/19	Collision: Ramp
11	March 26/April 2	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.