PHYSICS 1410 - MECHANICS

FALL SEMESTER, 1993-94
GRANDE PRAIRIE REGIONAL COLLEGE

Information and Course Outline

Introduction:

PHYSICS 1410 is the first semester of a two semester calculus based first year physics sequence. Together with PHYSICS 1430 it fulfils the first year physics requirement for any science program. The course covers the major topics in classical mechanics. Calculus concepts are used throughout the course in definitions and derivations, and calculus techniques are used in some applications.

Instructor:

D. Mittra
Office: J215
Telephone: 539-2981

Class Schedule:

Lecture	M/W/F	10:00 - 10:50	J 229
Seminar	R	13:30 - 14:20	J 229
Laboratory	M	15:00 - 17:50	J 103

Prerequisite: MA 30 and PC 30

Corequisite: MA 1130 and 1140

Texts:

Physics for Scientists and Engineers, 3rd ed., Raymond A. Serway
Saunders College Publishing, 1990.
Physics 1410/1430 Laboratory Manual

Student Evaluation:

Assignments	10%
Quizzes	10% (4 at 2.5% each)
Midterm Test	20%
Laboratory	20%
Final Exam	40%

A passing mark in the lab is required to obtain a passing mark in the course.
Assignments will be given on a weekly basis as indicated in the attached schedule.
Quizzes will be given during the seminar hour as indicate in the attached schedule.

Lab Schedule:

Laboratory exercises will be performed during the laboratory hour according to the schedule below. Lab reports are to be written in a hard bound lab book and to be handed in for marking one week after the lab is performed.

Sept. 6	Labour Day, NO LAB
Sept. 13	Addition of Vectors (Handout)
Sept. 20	Kinematics (Experiment #1)
Sept. 27	Acceleration Due to Gravity (Experiment #2)
Oct. 4	Atwood's Pulley (Experiment #3)
Oct. 11	Thanksgiving Day, NO LAB
Oct. 18	Midterm Exam, NO LAB
Oct. 25	Conservation of Energy (Experiment #6)
Nov. 1	Moment of Inertia (Experiment #7)
Nov. 8	Collision: Ramp (Experiment #8)
Nov. 15	Moment of Inertia
Nov. 22	Hook's Law (Experiment #13)
Nov. 29	Bending of Bean (Experiment #9)

PHYSICS 1410 **COURSE OUTLINE AND TEST AND ASSIGNMENT SCHEDULE**

Week No. 1 INTRODUCTION
Sept. 6-10 Reading: Chapter 1
Vector and scalar quantities, addition of vectors
Reading: Chapter 2, Sections 2-1 to 2-4

Week No. 2 Kinematics in One Dimension: Speed, Velocity,
Sept. 13-17 Acceleration
Reading: Chapter 3, Sections 3.1 to 3.4
Kinematics in One Dimension: Falling Bodies

Week No. 3 Kinematics in Two and Three Dimension: Velocity and
Sept. 20-24 acceleration vectors, motion in two dimensions with constant acceleration.
Reading: Chapter 4, Section 4.1 - 4.2

Quiz No. 1 - September 23

Week No. 4 Kinematics in Two Dimensions: Projective Motion,
Sept. 27 - uniform circular motion, relative velocity.
Oct. 1 Reading: Chapter 4, Sections 4-3 to 4-6
Dynamics: Laws of Motion (Newton's)
Force, inertia, weight, application of Newton's laws.
Reading: Chapter 5, Sections 5.1 - 5.7

Week No. 5 Dynamics: Applications of Newton's Laws of Motion,
Oct. 4-8 Forces of friction
Reading: Chapter 5, Sections 5.8 - 5.9

Week No. 6 Dynamics: Circular Motion
Oct. 11-15 Newton's Law and uniform circular motion, motion in the presence of resistive forces, the fundamental forces of nature.
Reading: Chapter 6, All sections except 6.3

Quiz No. 2 - October 14

Week No. 7 Work and Energy: Work done by constant force,
October 18 work done by varying force. The scalar product of vectors, kinetic energy,
-22 power and mass energy relation.
Reading: Chapter 7, Sections 7.2 - 7.6

Oct. 21 review during regular class time and Mid term exam during lab.

Week No. 8 Relativistic kinetic energy.
Oct. 25-29 Reading: Chapter 8, Sections 8.1 - 8.4

PC 1410 continued:

Week No. 9 Nov. 1-5	Work energy theorem and its applications, quantization of energy. Reading: Chapter 8, Section 8.5, 8.6, 8.7 and 8.11 Linear momentum and its conservation (2 particle system) Reading: Chapter 9, Sections 9.1, 9.2, 9.3
Week No. 10 Nov. 8-12	Collision in one and two dimensions centre of mass, system of particles Reading: Chapter 9, Sections 9.4 - 9.8 Rotational motion - rotational angular velocity and acceleration. Rotational motion with constant angular acceleration. Reading: Chapter 10, Section 10.1 - 10.2

Quiz 3 - November 11

Week No. 11 Nov. 15-19	Rotational Kinematics: - Relationship between angular and linear velocity and acceleration. Rotational motion with constant angular acceleration. Reading: Chapter 10, Sections 10-2 to 10-4, 10-7,
Week No. 12 Nov. 22-26	Rotational Dynamics: - Rolling motion of ridgid bodies, vector product and torque, angular momentum, rotation of rigid body about a fixed axis. Reading: Chapter 11, Sections 11.1 - 11.5

Quiz No. 4 - November 25

Week No. 13 Nov. 29 - Dec 3	Equilibrium of Rigid Bodies: Conditions of equilibrium, centre of gravity, examples of rigid objects in equilibrium, elastic properties of solids. Reading: Chapter 12, Sections 12.1 - 12.3
Week No. 14 Dec. 6-9	Equilibrium of Rigid Bodies: Stress, strain, elastic constants and problem solving. Reading: Chapter 12, Section 12.4 and Review