

Registrar's Office

**PHYSICS 1410 - MECHANICS**  
**FALL SEMESTER, 1994-95**  
**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 fulfills 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. Mitra  
Office: J215  
Telephone: 539-2981

**Class Schedule:**

Lecture	M/W/F	10:00 - 10:50	J 229
Seminar	R	13:30 - 14:20	J 227
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 indicated 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. 5	<u>Labour Day, NO LAB</u>
Sept. 12	Graphical and Error Analysis (Experiment #1)
Sept. 19	Addition of Vectors (Handout)
Sept. 26	Kinematics (Experiment #2)
Oct. 3	Acceleration Due to Gravity (Experiment #3)
Oct. 10	<u>Thanksgiving Day, NO LAB</u>
Oct. 17	<u>Midterm Exam, DURING LAB HOURS</u>
Oct. 24	Atwood's Pulley (Experiment #4)
Oct. 31	Conservation of Energy (Experiment #7)
Nov. 7	Collision: Ramp (Experiment #8)
Nov. 14	Moment of Inertia (Experiment #9)
Nov. 21	Bending of Beam (Experiment #10)
Nov. 28	Young's modulus (Handout)

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

- Week No. 1    **INTRODUCTION**  
Sept. 5-9      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, Acceleration**  
Sept. 12-16    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 acceleration vectors, motion in two dimensions with constant acceleration.**  
Sept. 19-23    Reading: Chapter 4, Section 4.1 - 4.2

**Quiz No. 1 - September 22**

- Week No. 4    **Kinematics in Two Dimensions: Projective Motion, uniform circular motion, relative velocity.**  
Sept. 25-30    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, Forces of friction**  
Oct. 3-7        Reading: Chapter 5, Sections 5.8 - 5.9
- Week No. 6    **Dynamics: Circular Motion**  
Oct. 10-14     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 13**

- Week No. 7    **Work and Energy: Work done by constant force, work done by varying force. The scalar product of vectors, kinetic energy, power and mass energy relation.**  
Oct. 17-21     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. 24-28     Reading: Chapter 8, Sections 8.1 - 8.4

PC 1410 continued:

- Week No. 9      Work energy theorem and its applications,  
Oct. 31 -      quantization of energy.  
Nov. 4      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      Collision in one and two dimensions centre of mass,  
Nov. 7-11      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 10

- Week No. 11 Rotational Kinematics: -  
Nov. 14-18      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 Rotational Dynamics: -  
Nov. 22-26      Rolling motion of rigid 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 - December 1

- Week No. 13 Equilibrium of Rigid Bodies:  
Nov. 28 -      Conditions of equilibrium, centre of gravity,  
Dec 2      examples of rigid objects in equilibrium, elastic properties of solids.  
Reading: Chapter 12, Sections 12.1 - 12.3

- Week No. 14 Equilibrium of Rigid Bodies:  
Dec. 5-9      Stress, strain, elastic constants and problem solving.  
Reading: Chapter 12, Section 12.4 and Review