91-92

GRANDE PRAIRIE REGIONAL COLLEGE
PHYSICS 130
COURSE OUTLINE
FALL 1991

INSTRUCTOR:	Sukhvir Sandhu
OFFICE:	C204
OFFICE HOURS:	10:30 a.m.- 12:00 p.m., 1:00-2:00 p.m. or by appointment
PHONE:	539-2831 or 539-2810
EQUIVALENCY:	Physics 30 (Grade 12 Physics)
PREREQUISITE:	MA 120 or MA 130 placements, PC 120 Recommended: at least 5 or 6 in MA 20/120 and PC 20/120
TEXT BOOK:	Elements of Physics, Ninth Edition Authors: Alpheus W. Smith, John N. Cooper
REFERENCE BOOK:	Modern Physics, by Dull, Metcalf, Williams
SUPPLIES:	Binder, Looseleaf, Plain Paper, Stapler, Pencil and Pen, Calculator with trig functions and exponential functions, Math set.
COURSE GOALS:	This course is designed to provide the students an understanding of basic concepts and principles of physics (laws of vectors, force, motion, equilibrium, work, power and energy; Electrostatics and current electricity; Electromagnetism). The student will develop problem solving skills and gains an appreciation of the physics of modern society.
ATTENDANCE:	Regular attendance is expected from all students and is essential for passing the course. Students who miss classes will find themselves falling behind and failing. Note that students missing 20% or more of the classes will not be permitted to write the final exam. Classes will start right on time, so please arrive a few minutes early.

TESTS, QUIZZES AND EXAMS:

There will be several tests and quizzes throughout the term. Absence from tests, quizzes or exams will result in a mark of 0, unless previous arrangement is made with the instructor or absence is for medical or other legitimate reasons.

LABS:

There will be several labs during the course, starting in the second week of the semester. This important component of the course is designed to introduce basic laboratory skills and problem-solving and reinforce concepts introduced in lectures!

Attendance is compulsory for labs and missing labs will reduce your grades considerably.

Lab reports are due one week after the lab is done. Failure to submit three or more labs will result in being barred from the final exam.

Handouts for labs will be distributed in the class ahead of time.

PENALTIES will be awarded for late reports.

EVALUATION:

Tests and Quizzes	20%
Assignments	15%
Mid-term exams	15%
Lab reports	20%
Final exam	30%
Total	100%

GRADING:

9 - Point Grade	Percentage Equivalence	Designation
9	90-100	Excellent
8	80- 89	
7	72- 79	
6	65- 71	Good
5	57- 64	
4	50- 56	Pass
3	45- 49	Fail
2	26- 44	
1	0- 25	

Ordinarily, any student unable to finish the course by the end of semester will be given a "Failure" as a final grade. Any student wishing to withdraw from the course must do so officially before November 1 in order to avoid receiving a failing grade.

LEARNING OBJECTIVES: The following is a list of minimum objectives which must be achieved in the course. You are encouraged to learn as much as you can. A few more objectives may be added during the term if needed.

Unit 1 Vector Quantities (text reference: Chapter 2)

a) Differentiate between displacement and distance.
b) Differentiate between scalae and vector quantities and give examples of each.
c) Represent a vector quantity graphically. State triangle and polygon laws of vector addition.
d) Differentiate between speed and velocity.
e) Find the resultant of two or more vectors by both graphical and analytical methods.
f) Resolve a given vector into rectangular components.
g) Define force of gravitational attraction or weight; force
h) Solve related problems.

Unit 2 Translational Motion (Speed, Velocity, etc) (Text reference: Chapter 3)

a) Explain motion of pure translation, motion of pure rotation and give examples of each.
b) Define average velocity, instantaneous velocity, average acceleration and instataneous acceleration.
c) Explain uniformly accelerated motion, acceleration due to gravity and give its value.
d) Derive the formulas of motion relating velocity, acceleration, displacement and time and apply to problems
e) Freely falling bodies; effect of air on falling bodies.
f) Terminal velocity; objects projected upward.
g) Apply the above formulas to bodies undergoing two velocities (e.g. motion in a vertical plane)
h) Path of projectile fired horizontally.
i) Projectile fired at an angle with the horizontal.
j) Calculate the range, the maximum height reached and the time of flight of a projectile.
k) Solve other related problems.

Unit 3 Force and Motion (Text reference: Chapter 4, part of Chapter 5, part of Chapter 6)

a) State and explain Newton's laws of motion giving examples.
b) Define the terms clearly: force, momentum, impulse and inertia.
c) Differentiate between mass and weight.
d) Derive the relation between force and mass from Newton's second Law of Motion.
e) Apply the laws to solve problems involving mass, force, acceleration, velocity, tension in the string.
f) Solve problems of motion on an inclined plane.
g) Momentum and Newton's second Law of Motion.
h) Define force of friction and the factors on which it depends; How to reduce friction.
i) Define coefficient of friction and its relation to the force of friction.
j) Solve problems involving friction.

Unit 4 Equilibrium (Text reference: A part of Chapter 5, a part of Chapter 10)

a) Explain statics and dynamics equilibrium
b) Explain concurrent forces with examples.
c) State conditions for statics equilibrium.
d) Solve problems based on equilibrium.
e) Define the terms: torque and pivot.
f) Explain rotational equilibrium and give its condition.
g) Solve problems based on rotational equilibrium.

Unit 5 Uniform Circular Motion and Gravitation (Text reference: Chapter 8)

a) Circular motion at a constant speed.
b) Centripetal force.
c) Kepler's Law.
d) Newton's Law of Universal Gravitation.
e) Law of gravitation and weight.
f) Law of gravitation and acceleration due to gravity.
g) Gravitational Field.
h) Field strength of earth; escape velocity.
i) Artificial Satellites.

Unit 6 Work, Power and Energy (Text reference: Chapter 6)

a) Explain the term "work" with examples and able to calculate the work done by a given force including the force of friction.
b) Define "energy" and list its forms.
c) Give mathematical formulas of kinetic and potential energy.
d) Explain the principle of conservation of energy with examples. Solve problems based on this principle.
e) Define "power" and solve related problems.
f) Gravitational potential energy at a point.

Unit 7 Electrostatics (Text reference: Chapter 30)

a) Be able to relate brief history of static electricity.
b) Explain the effect of rubbing fur, silk, rubber, etc. with ebonite, glass and plastic etc.
c) State the effect of positive and negative charges on each other and on neutral substance.
d) The Electrical Structure of matter.
e) Exchange and conservation of charge.
f) State Coulomb's Law and apply it to problems.
g) Explain conduction of electricity and differentiate between conductors and insulators.
h) Explain charging by induction and by conduction.
i) Explain the working of electroscope.
j) Define electric field and electric lines of force giving their characteristics.

Unit 8 Potential (Text reference: Chapter 31, 32)

a) Explain potential energy in an electric field.
b) Derive the formula for a potential energy due to a point charged and potential difference between two points.
c) Explain distribution of electric field (charge) on bodies of different shapes and inside the bodies.
d) Explain uniform electric field.
e) To find the charge on the electron by using Millikan's experiment.

Unit 9 Capacitance and Dielectrics (Text reference: Chapter 32)

a) Explain the principles, working and construction of a capacitor.
b) Describe capacitance and the factors upon which it depends.
c) State mathematical relations between capacitance and other variables.
d) Define dielectric constant of a material and its effect on the capacitance of a capacitor.
e) Compute the resultant capacitance of a number of capacitor connected in series and in parallel.
f) Solve all the related problems.

Unit 10 Electric Current (Text reference: Chapter 33, 34)

a) Define electric current and resistance and state their units.
b) Define potential difference and EMF.
c) State ohm's law and give mathematical relation.
d) State factors on which the resistance of a material depends and give mathematical relations.
e) Describe the electric circuit and be able to make a diagram for the same.
f) Explain series and parallel circuits and be able to compute the resultant resistance for such circuits.
g) Calculate current and potential difference in various parts of a circuit.
h) State and apply Kirchoff's Rule to electric circuits.
i) State electric power and be able to solve related problems.

Unit 11 Electromagnetism

a) Explain magnetic lines of force (Magentic Flux) and magnetic field giving their units.
b) Explain the origin of magnetism.
c) State right hand rule for the direction of the magnetic field and moving charge.
d) State the relations between the magnetic field and the current in
   1) a straight wire 2) a flat circular coil 3) solenoid
e) Describe magnetic poles and forces they exert on each other.
f) Describe Dia, Para and Fellomagnetic substances.
g) Describe forces on a moving charge in a magnetic field and give mathematical relations relating the two.
h) State the mathematical selections for:
   1) Force on a current in a magnetic field.
   2) Force exerted on each other by two current carrying wires
   3) The torque on a current carrying loop in a magnetic field
i) Describe the construction, principle and working of:
   1) The Galvanometer
   2) Voltmeter
   3) Ammeter
   4) Electric motor
j) Solve related problems