PC 0110
COURSE OUTLINE AND OBJECTIVES

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TEXT BOOK: COLLEGE PHYSICS BY WILSON AND BUFFA (FOURTH EDITION)

COURSE GOALS: To provide knowledge and skills in selected topics in physics, and to generate an appreciation of the importance of physics in everyday life.

PREREQUISITE: SC 0100 **COREQUISITE:** MA 0110

ATTENDANCE AND LATENESS: Regular attendance is expected of all students which is crucial to passing the course. Students missing classes will soon find themselves falling behind and thus failing. Students with more than 20% absences may be barred from writing the final exam. Lateness is **highly dscouraged.**

ASSIGNMENTS, TESTS AND EXAMS: All tests and exams **MUST** be written on scheduled times. A missed test or exam will result in a score of zero unless **PRIOR** arrangements have been made with the Instructor for valid reasons to write the test/exam at some other time. All assignments **MUST** be handed by the deadline. Late assignments will result in severe penalties. Assignments will **NOT** be marked if handed in late by more than two days without the **PRIOR** approval of the Instructor.

LABS: There will only be a few labs in the course, and attendance in them is compulsory. A missed lab will result in a mark of zero. Makeup labs **CANNOT** be guaranteed, and may be permitted only under special circumstances. All labs reports **MUST** be handed in before the deadline. Late reports will result in severe penalties. Labs reports will **NOT** be marked if handed in late by more than two days unless preapproval of the Instructor has been secured.

EVALUATION: The course has been divided into four main units - Kinematics; Force; Work, energy, and power; and Heat (Thermal Energy). There will be an assignment on each Unit, a Midterm exam, and the Final exam. The final grade will be based on different components as follows:

4 ASSIGNMENTS	= 40%
MIDTERM EXAM	= 22%
FINAL EXAM	= 30%
LAB	= 8%
TOTAL	= 100%

COURSE OBJECTIVES

The following objectives are excepted to be achieved in the course. More objectives may be added (or some may be deleted) later depending upon the rate of progress.

UNIT 1: KINEMATICS (Chapter 2)

On completing this Unit, you should be able to:

a. Define and distinguish between distance and displacement giving examples
b. Define and identify scalar and vector quantities. Give examples of each
c. Define and explain speed and velocity - average and instantaneous. State their units
d. Define and explain acceleration, and state its units. Explain why time appears twice in the units
e. Draw distance-time, and velocity-time graphs. Determine velocity and acceleration from the respective graph using their slopes.
f. Derive the following formulas from basic principles:
   $x = vt$ $\quad v = (v_0 + v)/2$ $\quad v = v_0 + at$
   $x = v_0t + \frac{1}{2} at^2$ $\quad 2ax = v^2 - v_0^2$
g. Use the international sign conventions for positive and negative directions
h. Apply the above formulas to solve related problems.

Do the following problems (pages 57 - 60)

8, 12, 14, 15, 20, 25, 33, 36, 37, 38, 39, 45, 46, 48, 49, 50, 53, 54, 56, 57,

ASSIGNMENT 1

i. Define acceleration due to gravity, 'g' and state its value. Be able to explain the dependency of the value of 'g' on different locations on the earth.
j. Solve problems involving 'g'.

Do the following problems (pages 61 - 63)

69, 72, 73, 74, 78, 79, 80, 91, 92, 96, 97, 98, 99, 102, 104, 106

UNIT 2: FORCE (Chapter 4)

On completing this Unit, you should be able to

a. Define and explain force, and state its units
b. State and explain Newton's First law of motion giving examples. Explain Inertia. How is it related to the First law?
c. Distinguish between mass and weight, and give units of each
d. State and explain Newton's Second law of motion. Derive the following relation $F = ma$ from the Second law

e. Apply the Second law to solve related problems
f. Explain the force of friction and incorporate it in problems involving force.
g. State and explain Newton's Third law, and apply it to relevant situations
h. Explain the working of Atwood's machine, and how the value of 'g' can be determined using Atwood's machine.

Do the following problems (pages 130 - 136)
Note: You do not need to answer the parts of questions which require the use of Imperial units.
5, 18, 19, 20, 21, 23, 28, 30, 31, 35, 36, 44, 46, 94,

ASSIGNMENT 2

WRITE MIDTERM EXAM

UNIT 3: WORK, ENERGY AND POWER (Chapter 5)

On completing this Unit, you should be able to
a. Define and explain work done by a force, and state units of work
b. Identify situations in which no work is done by a force. Calculate work done under different situations
c. Define and explain the concept of energy, and state its units.
d. Name different forms of energy, and explain the principle of conservation of energy. Also explain the principle of conservation of work and energy.
e. Explain kinetic and potential energies, and using the principle of conservation of energy, convert one form into the other. Solve related problems.
f. Define and explain power, and state its units. Solve related problems.
g. Solve problems related to the above three machines.

Do the following problems (Pages 165 - 171)
6, 8, 13, 35, 38, 39, 40, 41, 47, 61, 64, 66, 77, 78, 80, 94, 98 and 99

ASSIGNMENT 3

UNIT 4: HEAT OR THERMAL ENERGY (Chapter 11)

On completing this unit, you should be able to

a. Describe heat as thermal energy and state its units.
b. Describe temperature, and distinguish between heat and temperature.
c. Explain the Celsius and the Kelvin (Absolute) scales of temperature, and convert one into the other.
d. Define and explain (specific) heat capacity, and state its units.
e. Discuss the implication of the large heat capacity of water and how it modifies the climate of coastal areas.
f. State the relation between the mass of a substance, its heat capacity, change in temperature, and the amount of heat. Solve related problems.
g. Define change of state; and explain heat of fusion and heat of vaporization. State their units.
h. Use the above definitions to calculate the amount of heat absorbed or given off when a substance undergoes a change in phase.
i. State and explain the principle of heat transfer (calorimetry), and use the principle to solve related problems.
j. Describe the three modes of heat transfer giving examples of each.

Do the following problems (pages 383 - 387)
15, 16, 17, 19, 23, 24, 25, 26, 27, 34, 35, 36, 38, 40, 41, 43, 44, 45, 77, 79, 80, 84, 85

CONGRATULATIONS. YOU HAVE COMPLETED (Not passed yet) THE COURSE

ASSIGNMENT 4

FINAL EXAM