C A M O S U N C O L L E G E

PHYSICS DEPARTMENT

PHYS 060 INTRODUCTORY PHYSICS

A first course to introduce students to the nature of physics. This is also recommended for students who took Physics 11 several years ago. Various topics including measurement, graphical analysis, 1-D kinematics, 1-D dynamics, energy, heat, electricity and nuclear energy are studied with the goal of introducing students to some concepts and the methodology of problem solving and data analysis.

OFFERED:	Fall, winter, spring,
CREDIT:	4
IN-CLASS WORKLOAD:	4 lecture, 2 lab (semester) 8 lecture, 2 lab (term)
PREREQUISITES:	Math 10 or MATH 050
COREQUISITES:	Math 11 or MATH 060

OUTLINE

1. **Measurement**

   1.1 Concept, process and results

   1.2 Numbers
   - 1.2.1 Accuracy and precision
   - 1.2.2 Uncertainty
   - 1.2.3 Significant digits
   - 1.2.4 Scientific notation
   - 1.2.5 Significant digits in calculations

   1.3 Units
   - 1.3.1 Purpose
   - 1.3.2 Historical

   1.4 Systeme Internationale (SI)
   - 1.4.1 Base units
   - 1.4.2 Prefixes
   - 1.4.3 Derived units
   - 1.4.4 Some rules
   - 1.4.5 Conversion of units

2. **Graphical Analysis**

   2.1 Graph construction
   - 2.1.1 Cartesian coordinate system
   - 2.1.2 Drawing and labeling axes
   - 2.1.3 Plotting data
   - 2.1.4 Fitting curves to data

2.2 Analyzing linear graphs
- 2.2.1 Determination of slope
- 2.2.2 Determination of intercept
- 2.2.3 Generic linear equation
- 2.2.4 Specific linear equation

2.3 Analyzing non-linear graphs
- 2.3.1 Recognition of power graphs
- 2.3.2 Changing variables to produce linear graphs
- 2.3.3 Writing equations

3. **Kinematics in One Dimension**

3.1 Description of kinematics
- 3.1.1 Position
- 3.1.2 Distance and displacement
- 3.1.3 Vector and scalar quantities
- 3.1.4 Average speed and velocity
- 3.1.5 Instantaneous speed and velocity

3.2 Kinematics graphs
- 3.2.1 Position veresus time
- 3.2.2 Displacement versus time
- 3.2.3 Velocity versus time

3.3 Equations of uniformly accelerated motion
- 3.3.1 Development of supplemental equations
- 3.3.2 Solving kinematics problems

3.4 Vertical motion near the earth
- 3.4.1 Concept of free fall
- 3.4.2 Acceleration due to gravity
- 3.4.3 Solution of problems

4. **Dynamics in one dimension**

4.1 Introduction to force

4.2 Newton's first law of motion
- 4.2.1 Historical perspective
- 4.2.2 Statement of the law
- 4.2.3 Concept of inertia

4.3 Newton's second law of motion
- 4.3.1 Dependence of acceleration on net force
- 4.3.2 Dependence of acceleration on mass
- 4.3.3 Concepts of net force and mass
- 4.3.4 Force of gravity and weight
- 4.3.5 Dynamics problems

4.4 Newton's third law of motion
- 4.4.1 Statement of the law
- 4.4.2 Interpretation of examples of the law

5. Work, Energy and Power

- 5.1 Work
  - 5.1.1 Definition
  - 5.1.2 Calculating work done by a force
  - 5.1.3 Positive and negative work
- 5.2 Energy
  - 5.2.1 Types of energy
- 5.3 Kinetic energy
  - 5.3.1 Definition
  - 5.3.2 Work energy theorem
  - 5.3.3 Problems involving work and kinetic energy
- 5.4 Gravitational potential energy
  - 5.4.1 Definition
  - 5.4.2 Dependence on reference level
- 5.5 Elastic Potential Energy
  - 5.5.1 Hooke's law
  - 5.5.2 Energy in a spring
- 5.6 Conservation of mechanical energy
  - 5.6.1 Statement of the law
  - 5.6.2 Problems
- 5.7 Power
  - 5.7.1 Definition
  - 5.7.2 Problems

6. Thermal energy

- 6.1 Temperature
  - 6.1.1 Concept of temperature
  - 6.1.2 Temperature scales
  - 6.1.3 Absolute temperature scale
- 6.2 Calorimetry
  - 6.2.1 Concept of heat
  - 6.2.2 Specific heat capacity
  - 6.2.3 States of matter
  - 6.2.4 Specific latent heat of fusion
  - 6.2.5 Specific latent heat of vaporization
- 6.3 Transfer of thermal energy
  - 6.3.1 Concept of conduction
  - 6.3.2 Concept of convection
  - 6.3.3 Concept of radiation

7. **Electrical Energy**

7.1 Charges
- 7.1.1 Atomic structure
- 7.1.2 Negative, positive, and neutral objects
- 7.1.3 Conductors and insulators

7.2 Electric circuits
- 7.2.1 Meaning of current, voltage, resistance
- 7.2.2 Parts of a circuit
- 7.2.3 Ohm's law
- 7.2.4 Electric power and energy
- 7.2.5 Characteristics of series circuit
- 7.2.6 Characteristics of parallel circuit

8. **Nuclear Energy**

8.1 Nucleus
- 8.1.1 Nuclear atom
- 8.1.2 Size and mass of nucleus

8.2 Mass-Energy
- 8.2.1 Equivalence of mass and energy
- 8.2.2 Mass defect in nucleus
- 8.2.3 Binding energy

8.3 Nuclear energy
- 8.3.1 Fission and fusion
- 8.3.2 Chain reactions
- 8.3.3 Safety concerns

The student must obtain a satisfactory mark for the lab portion in order to obtain credit for the course.

TEXTS AND REFERENCES

Course material developed in department
Lab manual
Scientific calculator
Graph paper

It is the policy of the physics department that instructors are not required to give make-up tests. At their discretion , instructors may give make-up tests in the case of documented excuses.