

# CAMOSUN COLLEGE

## PHYSICS DEPARTMENT

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### **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

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### **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 versus 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

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## 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.***