

# CAMOSUN COLLEGE

## PHYSICS DEPARTMENT

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### **PHYS 192M PHYSICS 2 for CIVIL AND MECHANICAL ENGINEERING TECHNOLOGIES**

A continuation of PHYS 191M. Topics: Simple harmonic motion and waves; sound and light; thermal properties of matter; electricity and electromagnetism.

OFFERED:	Q2
CREDIT:	4.5
IN-CLASS WORKLOAD:	5 Lec, 2 Lab (alt. wks)
OUT-OF-CLASS WORKLOAD:	8
PREREQUISITES:	PHYS 191m

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### **OUTLINE**

#### **1. Simple Harmonic Motion**

- 1.1 Physics of a spring
  - 1.1.1 Hooke's Law
  - 1.1.2 Springs in series and parallel
  - 1.1.3 Potential Energy
- 1.2 Simple harmonic motion
  - 1.2.1 Period, frequency, and amplitude
  - 1.2.2 Equations for displacement, velocity, and acceleration in terms of time
  - 1.2.3 Graphs of displacement, velocity, and acceleration as functions of time
  - 1.2.4 Maximum velocity and acceleration
- 1.3 Simple pendulum

#### **2. Waves**

- 2.1 Properties of waves
  - 2.1.1 Types of waves – transverse/longitudinal
  - 2.1.2 Speed, period, wavelength, and amplitude of waves
  - 2.1.3 Speed of wave on a string
- 2.2 Sound waves
  - 2.2.1 Properties
  - 2.2.2 Speed of sound in solids, liquids, and gases
- 2.3 Principle of linear superposition
  - 2.3.1 Constructive and destructive interference
  - 2.3.2 Standing waves – transverse and longitudinal
- 2.4 Electromagnetic waves
  - 2.4.1 Speed of light
  - 2.4.2 Frequency and wavelength of light

### 3. **Geometric Optics**

- 3.1 Reflection
  - 3.1.1 Plane mirrors
  - 3.1.2 Spherical mirrors – concave and convex
  - 3.1.3 Types of images
  - 3.1.4 Ray tracing
  - 3.1.5 Mirror equation and magnification equation
- 3.2 Refraction
  - 3.2.1 Index of refraction
  - 3.2.2 Snell's Law
  - 3.2.3 Total internal reflection
  - 3.2.4 Lenses and ray-tracing
  - 3.2.5 Lens equation and magnification equation

### 4. **Thermal Properties of Matter**

- 3.1 Temperature scales
- 3.2 Thermometers
- 3.3 Thermal expansion
- 3.4 Thermal energy
  - 3.4.1 Specific heat
  - 3.4.2 Latent heat

### 5. **Electricity**

- 5.1 Static electricity
  - 5.1.1 Charges as constituents of matter
    - 5.1.1.1 Conductors and insulators
    - 5.1.1.2 Induction
  - 5.1.2 Coulomb's Law
  - 5.1.3 Electric field (concept only)
  - 5.1.4 Electric potential energy, potential, and potential difference
- 5.2 Current electricity
  - 5.2.1 Electric current and emf
  - 5.2.2 Ohm's law
  - 5.2.3 Resistivity, resistances in series and parallel
  - 5.2.3 Heating effect, power
  - 5.2.6 Simple DC circuits
  - 5.2.7 Practical electricity. Electric safety

### 6. **Electromagnetism**

- 6.1 Magnets and magnetic field
- 6.2 Force on a moving charge
- 6.3 Motion of a charged particle in a magnetic field
- 6.4 Force on current in magnetic field