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

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

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 accleration 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