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

PHYSICS DEPARTMENT

PHYS 151 TECHNICAL PHYSICS 2

This course is designed as a bridge between Physics 11, PHYS 150 or PHYS 060 and the first year of the Engineering Technology Programs. Students will investigate the concepts of kinematics, dynamics, equilibrium, geometric optics, mechanical waves and sound with applications to various areas of technology. Emphasis will be on the development of skills in problem solving, laboratory procedure and data analysis.

OFFERED:	Q2, Q3
CREDIT:	4
IN-CLASS WORKLOAD:	4 lecture, 1 seminar, 2 lab
PREREQUISITES:	PHYS 150 or PHYS 060 or Physics 11
	MATH 060 or Math 11

OUTLINE

1. **Kinematics**

    1.1   Review of one dimension
            1.1.1 Definitions of terms
            1.1.2 Review equations
            1.1.3 Problem solving

    1.2   Motion in two dimensions
            1.2.1 Vectors and scalars
            1.2.2 Displacement and velocity
            1.2.3 Determination of acceleration
            1.2.4 Determination of relative velocity

    1.3   Trajectories
            1.3.1 Horizontal and vertical components
            1.3.2 Problems with initial horizontal motion

    1.4   Uniform circular motion
            1.4.1 Description
            1.4.2 Centripetal acceleration

2.   **Dynamics**

    2.1   Review
           2.1.1 Newton's three laws of motion
           2.1.2 Concept of net force

    2.2   Dynamics in two dimensions
           2.2.1 Vector nature of the second law
           2.2.2 Determining net force in two dimensions
           2.2.3 Problems with one object.
           2.2.4 Problems with two connected objects

3.   **Equilibrium**

    3.1   First condition
           3.1.1 Concurrent forces
           3.1.2 Scale drawings
           3.1.3 Problems with two unknown magnitudes
           3.1.4 Problems with two unknown directions
           3.1.5 Problems with unknown magnitude and direction

    3.2   Second condition
           3.2.1 Non-concurrent forces
           3.2.2 Torque with perpendicular forces
           3.2.3 Second condition
           3.2.4 Center of gravity
           3.2.5 Problems with forces perpendicular to lever

4.   **Light**

    4.1   Light
           4.1.1 Electromagnetic spectrum
           4.1.2 Wave nature
           4.1.3 Particle nature
           4.1.4 Wave speed

    4.2   Light at interface
           4.2.1 Incident ray
           4.2.2 Reflected ray
           4.2.3 Refracted ray

4.3   Reflection
     4.3.1 Laws of reflection
     4.3.2 Image location in plane mirror
     4.3.3 Image location in convex mirror
     4.3.4 Image location in concave mirror
     4.3.5 Mirror equation
     4.3.6 Sign convention for f, d_i and d_o.
     4.3.7 Magnification
     4.3.8 Spherical aberration
     4.3.9 Parabolic mirrors

4.4   Refraction
     4.4.1 Index of refraction
     4.4.2 Snell's law
     4.4.3 Total internal reflection
     4.4.4 Ray tracing in prism
     4.4.5 Image location in thin lenses
     4.4.6 Lens equation
     4.4.7 Magnification

5.   **Mechanical waves**

5.1   Wave terminology
     5.1.1 Period
     5.1.2 Frequency
     5.1.3 Wave speed
     5.1.4 Amplitude

5.2   Wave types
     5.2.1 Transverse
     5.2.2 Longitudinal

5.3   Interference
     5.3.1 Principal of superposition
     5.3.2 Constructive interference
     5.3.3 Destructive interference
     5.3.4 Beats

5.4   Standing waves
     5.4.1 Conditions
     5.4.2 Nodes
     5.4.3 Antinodes
     5.4.4 Vibrating strings
     5.4.5 Fundamental mode and harmonics

6.   **<u>Sound</u>**

  6.1   Nature
          6.1.1 Longitudinal wave
          6.1.2 Sources
          6.1.3 Harmonics
          6.1.4 Pitch and loudness
          6.1.5 Speed

  6.2   Vibrating air columns
          6.2.1 Open and closed pipes
          6.2.2 Harmonics
          6.2.3 Dependence on medium

<u>TEXT AND MATERIALS</u>

Text
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.