

CAMOSUN COLLEGE
PHYSICS DEPARTMENT

PHYS 191M PHYSICS 1 for CIVIL AND MECHANICAL ENGINEERING TECHNOLOGIES

A physics course enriched with applications relevant to civil and mechanical engineering technologies. Topics: measurement and units, vectors, kinematics, dynamics, work, energy and power; statics and rotational dynamics.

OFFERED:	Q1
CREDIT:	4.5
IN-CLASS WORKLOAD:	5 Lec, 2 Lab (alt. wks)
OUT-OF-CLASS WORKLOAD:	8
PREREQUISITES:	PHYS 151 or Physics 11 or departmental assessment. Restricted to students in Civil and Mechanical Engineering Technology Programs.

OUTLINE

1. Measurement

- 1.1 Concept and process
- 1.2 Significant figures
- 1.3 SI Units and Rules. British and Practical Units
- 1.4 Error Analysis

2. Vectors

- 2.1 Representation of vectors and specification of directions
- 2.2 Addition and subtraction
- 2.3 Scalar and vector multiplication
- 2.4 Component method
- 2.5 Application of sine and cosine formulas to vector problems
- 2.6 Concurrent forces in equilibrium

3. Kinematics

- 3.1 Kinematic quantities: displacement, velocity and acceleration; distance and speed
- 3.2 Uniformly accelerated motion
- 3.3 One dimensional kinematic problems
 - 3.3.1 Freefall
 - 3.3.2 Two-body problems
- 3.4 Two dimensional kinematic problems
 - 3.4.1 Projectiles and trajectories

4. Dynamics

- 4.1 Newton's Laws and conceptual problems
- 4.2 Free body diagrams and problem solving techniques
- 4.3 Normal forces
- 4.4 Static and kinetic friction
- 4.5 Tension forces
- 4.6 Inclined Planes
- 4.7 Dynamics of connected systems
- 4.8 Two dimensional dynamics problems
- 4.9 Equilibrium

5. Uniform Circular Motion

- 5.1 Centripetal acceleration
- 5.2 Centripetal force

6. Work, Energy and Power

- 6.1 Definition and concept
- 6.2 Types of energy; kinetic and potential energy
- 6.3 Work energy theorem - Conservation of energy
- 6.4 Problems involving work and energy
 - 6.4.1 Without dissipative forces
 - 6.4.2 With dissipative forces
- 6.5 Power as rate of doing work and change of energy

7. Physics of Rigid body

- 7.1 Center of mass and center of gravity. Calculations
- 7.2 Torque
- 7.3 Equilibrium of a rigid body
- 7.4 Rotational Inertia. Definition and calculations
- 7.5 Parallel axis theorem. Perpendicular axis theorem. Methods of symmetry
- 7.6 Rotational kinematics
 - 7.6.1 Definition of rotational kinematic quantities and units
 - 7.6.2 Formulas for uniformly accelerated rotation
 - 7.6.3 Relation between linear and angular quantities
- 7.7 Rotational dynamics
 - 7.7.1 Dynamic equation
 - 7.7.2 Work, rotational kinetic energy, power

8. Simple Machines

- 8.1 General Theory. Mechanical advantage and efficiency
- 8.2 Application: Different types of machines