

## CAMOSUN COLLEGE

## PHYSICS DEPARTMENT

**PHYS 154 TECHNICAL PHYSICS 3**

A Physics course with applications relevant to Electronics Technology. Topics: measurement, vectors, kinematics, dynamics, uniform circular motion, rotary motion, vibrations, waves, sound, light. (T)

OFFERED:	Q1
CREDIT:	4
IN-CLASS WORKLOAD:	5 lecture, 1 tutorial, 3 lab (alt. weeks)
OUT-OF-CLASS WORKLOAD:	5
PREREQUISITES:	PHYS 151 or Phys 11 and MATH 060 Restricted to students in the Electronics Engineering Technology program

**OUTLINE**

1. **Vectors**
  - 1.1 Components of Vectors
  - 1.2 Vector addition and subtraction
  - 1.3 Kinematic Examples
    - 1.3.1 Displacement, velocity, acceleration
    - 1.3.2 Relative motion
2. **Dynamics - Newton's Laws**
  - 2.1 Newton's Second Law
    - 2.1.1 Forces – Tension, springs, friction, gravity
    - 2.1.2 Free body diagrams
    - 2.1.3 2-D problems
3. **Equilibrium**
  - 3.1 Concurrent coplanar forces - algebraic 2-D problems
  - 3.2 Nonconcurrent forces
4. **Work and Energy**
  - 4.1 Work
  - 4.2 Energy
    - 4.2.1 Kinetic energy
    - 4.2.2 Potential energy - gravitational and elastic
    - 4.2.3 Conservation of energy
  - 4.3 Power
5. **Uniform Circular Motion**
  - 5.2 Centripetal acceleration and centripetal force
6. **Rotary Motion**
  - 6.1 Equations of uniform rotary motion
  - 6.2 Torque
  - 6.3 Moment of inertia
  - 6.4 Rotational Dynamics
  - 6.5 Rotational energy
  - 6.6 Rotational power

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7. **Vibrations**
    - 7.1 Periodic motion
      - 7.1.1 Period, frequency and amplitude
    - 7.2 Simple harmonic motion
      - 7.2.1 Definition,
      - 7.2.1 Circular motion and SHM,
      - 7.2.3 Angular velocity and frequency
      - 7.2.4 Acceleration
    - 7.3 Vibratory energy
  
  8. **Waves**
    - 8.1 Types
      - 8.1.1 Longitudinal
      - 8.1.2 Transverse
    - 8.2 Characteristics
      - 8.2.1 Speed, wavelength, and frequency
      - 8.2.2 Phase
    - 8.3 Transmission between media
    - 8.4 Wave equation
      - 8.4.1 Phase difference
    - 8.5 Wave energy
      - 8.5.1 Intensity, intensity ratio and inverse square law
    - 8.6 Interference
      - 8.6.1 Superposition theorem
      - 8.6.2 Beats,
    - 8.7 Standing waves and Resonance
      - 8.7.1 Vibrating strings
      - 8.7.2 Vibrating air columns
    - 8.8 Vibrating rods
    - 8.9 Speed of sound
      - 8.9.1 Temperature effects
    - 8.10 Doppler effect (optional)
  
  9. **Light**
    - 9.1 Reflection
    - 9.2 Refraction
    - 9.3 Total internal reflection
    - 9.4 Optical Fibres
      - 14.9.1 Modes of propagation and dispersion
      - 14.9.2 FOTS (Optional)

### TUTORIAL TOPICS

1. **Measurement and Units - the International System**
  - 1.1 SI Base units and Derived units
  - 1.2 British Engineering System and conversions
  - 1.3 Dimensional algebra
  
2. **Kinematics**
  - 2.1 Linear Kinematics - Review

Text: Physics – J. Cutnell & K. Johnson, 5<sup>th</sup> ed.