

# PHYSICS DEPARTMENT

## COURSE OUTLINE

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

A continuation of Physics 191. Topics include impulse and momentum, simple harmonic motion, mechanical waves, sound, light, thermal properties of matter, electricity and magnetism.

OFFERED:	Q2
CREDIT:	3
IN-CLASS WORKLOAD:	5 lecture, 2 lab (alt. weeks)
PRE-/CO-REQUISITES:	Physics 191

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#### REQUIRED MATERIALS:

Textbook: "Physics", 6<sup>th</sup> edition, Cutnell, J.D. and Johnson, K.W.

Physics 192 lab manual

Scientific calculator (any calculator is acceptable with the exception of personal computers)

Graph paper (must be either 10 lines/inch or millimeter graph paper)

#### DEPARTMENT POLICIES REGARDING TESTING:

1. Students must write quizzes, tests, midterm tests, etc., on the date and time assigned by the instructor. Missed exams normally receive a zero grade. In exceptional circumstances such as medical issues or a documented illness, a make-up exam may be given or the test may be waived at the discretion of the instructor. The instructor should be notified prior to the exam.
2. The final exam will cover the entire course and will be 3 hours long. As stated in the current college calendar (p. 39) "students are expected to write tests and final exams at the scheduled time and place." Exceptions will only be considered for emergency circumstances as outlined in the calendar. Holidays or scheduled travel flights are not accepted.

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### DEPARTMENT POLICIES REGARDING LABS:

1. All assigned laboratory exercises and reports must be completed with an overall grade of 60% in order to obtain credit for this course. A lab may be made up at a later time only in the case of documented illness or other extenuating circumstances.
2. At the discretion of the instructor, a student who is repeating this Physics course may not be required to complete the laboratory exercises a second time if an average lab grade of 70% or better was obtained.

### STUDY TIME

It is recommended that between 5 and 10 hours per week (or more for students with a weak background) be spent studying for this course outside of class time.

### LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College Calendar, Registrar's Office or the College web site at <http://www.camosun.bc.ca>

### ACADEMIC CONDUCT POLICY

There is an Academic Conduct Policy which includes plagiarism. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section.

[www.camosun.bc.ca/divisions/pres/policy/2-education/2-5.html](http://www.camosun.bc.ca/divisions/pres/policy/2-education/2-5.html)

### GRADING

The standard mark distribution for this course is as follows:

Final Exam	50%
Midterms and other work	40%
Lab Reports	10%
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	100%

## OUTLINE:

### 1. **Impulse and Momentum**

- 1.1 Impulse – momentum theorem
- 1.2 Conservation of linear momentum
- 1.3 Collisions
  - 1.3.1 One-dimensional collisions
  - 1.3.2 Two-dimensional collisions
- 1.4 Angular momentum

### 2. **Simple Harmonic Motion**

- 2.1 Physics of a spring
  - 2.1.1 Hooke's law
  - 2.1.2 Springs in series and parallel
  - 2.1.3 Potential energy
- 2.2 Simple harmonic motion
  - 2.2.1 Period, frequency, and amplitude
  - 2.2.2 Equations for displacement, velocity and acceleration in terms of time
  - 2.2.3 Graphs of displacement, velocity and acceleration as functions of time
  - 2.2.4 Maximum velocity and acceleration
- 2.3 Simple pendulum

### 3. **Waves**

- 3.1 Properties of waves
  - 3.1.1 Types of waves – transverse/longitudinal
  - 3.1.2 Speed, period, wavelength and amplitude of waves
  - 3.1.3 Speed of wave on a string
- 3.2 Sound waves
  - 3.2.1 Properties
  - 3.2.2 Speed of sound in solids, liquids, and gases and temperature dependence
- 3.3 Principle of linear superposition
  - 3.3.1 Constructive and destructive interference
  - 3.3.2 Standing waves – transverse and longitudinal
- 3.4 Electromagnetic waves
  - 3.4.1 Speed of light
  - 3.4.2 Frequency and wavelength of light

### 4. **Geometric Optics**

- 4.1 Reflection
  - 4.1.1 Definitions and laws - review
- 4.2 Refraction
  - 4.2.1 Index of refraction
  - 4.2.2 Snell's law

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#### 4.2.3 Total internal reflection

### 5. **Thermal Properties of Matter**

- 5.1 Temperature scales
- 5.2 Thermometers
- 5.3 Thermal expansion
  - 5.3.1 Linear expansion - Thermal stress
  - 5.3.2 Volume expansion

### 6. **Electricity**

- 6.1 Electrostatics
  - 6.1.1 Charges as constituents of matter
    - 6.1.1.1 Conductors and insulators and semiconductors
    - 6.1.1.2 Charging processes – charge by induction
  - 6.1.2 Coulomb's law
  - 6.1.3 Electric fields
  - 6.1.4 Electric potential energy, potential and potential difference
- 6.2 Applications for fields and potentials
  - 6.2.1 Potential energy and fields in circuits – Ohm's Law
  - 6.2.2 Potential energy and fields in P-N semiconductor junctions

### 7. **Electromagnetism**

- 7.1 Magnets and the magnetic field
- 7.2 Magnetic fields of currents – long straight wire, loop and coil
- 7.3 Force on a moving charge
- 7.4 Force on a current in a magnetic field
- 7.5 Electromagnetic induction and Faraday's Law

### **Additional Topics**

### 8. **Current Electricity**

- 8.1 Electric current and emf
- 8.2 Ohm's Law
- 8.3 Resistivity, resistances in series and parallel
- 8.4 Heating effect, power
- 8.5 Simple DC circuits