



**School of Arts & Science**  
**PHYSICS DEPARTMENT**  
**PHYS 192**  
**Physics 2 Civil/Mechanical**  
**Quarter 2 Winter 2007**

### COURSE OUTLINE

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

#### 1. Instructor Information

(a)	Instructor:	Wilf Nienaber	
(b)	Office Hours:		
(c)	Location:		
(d)	Phone:	Alternative Phone:	
(e)	Email:		
(f)	Website:		

#### 2. Intended Learning Outcomes

Upon completion of this course the student will be able to solve technical problems associated with:

1. Impulse, the concept of conservation of momentum of isolated systems, including elastic and inelastic collisions, and angular momentum.
2. The Simple Harmonic Motion of a mass and spring system and the simple pendulum, including equations of motion, energy, and graphical representations.
3. Waves in various media (sound and light), including types of waves, wave functions, wave speed, and interference of waves.
4. Fundamental thermal physics, including thermometry conversions, specific heat, latent heat, and thermal expansion.
5. Static electricity (the Coulomb force, electric force field, electric potential and potential difference).
6. Current electricity (Ohm's Law, resistors in series, parallel and combination circuits).
7. The effect of magnetic fields on moving point charges and on current-carrying wires.

##### 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
  - 3.1.4 The wave function for transverse waves
  - 3.1.5 Wave speed and particle speed
- 3.2 Sound waves
  - 3.2.1 Properties
  - 3.2.2 Speed of sound in solids, liquids, and gases and temperature dependence
  - 3.2.3 The wave function for longitudinal waves
- 3.3 Principle of linear superposition
  - 3.3.1 Constructive and destructive interference
  - 3.3.2 Standing waves – transverse and longitudinal
  - 3.3.3 The standing wave function

## **4. Thermal Properties of Matter**

- 4.1 Temperature scales
- 4.2 Thermometers
- 4.3 Thermal expansion
  - 4.3.1 Linear expansion - Thermal stress
  - 4.3.2 Volume expansion
- 4.4 Thermal energy
  - 4.4.1 Specific heat
  - 4.4.2 Latent heat
  - 4.4.3 Calorimetry

## **5. Electricity**

- 5.1 Electrostatics
  - 5.1.1 Charges as constituents of matter
    - 5.1.1.1 Conductors and insulators and semiconductors
    - 5.1.1.2 Charging processes – charge by induction
  - 5.1.2 Coulomb's law
  - 5.1.3 Electric fields
  - 5.1.4 Electric potential energy, potential and potential difference

## **6. Current Electricity**

- 5.2 Electric current
- 5.3 Ohm's Law
- 5.4 Resistivity, resistances in series and parallel
- 5.5 Power
- 5.6 Simple D. C. circuits
- 5.7 Kirchhoff's Rules

## 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

## 3. **Required Materials**

Texts	“Physics”, 6 <sup>th</sup> or 7 <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)
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## 4. **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. Excursions, holidays or scheduled travel flights are not accepted.

## DEPARTMENT POLICIES REGARDING LABS:

1. Lab exercises will be done on a bi-weekly basis during the scheduled lab period. Attendance is mandatory and you will be required to “sign in” at the beginning of each one. If, at the end of the lab period, it becomes necessary to complete your report at home, your data must be reviewed and signed (initialed) by the instructor before leaving the lab.
2. All assigned laboratory exercises and reports must be completed with an overall grade of 60% in order to obtain credit for this course. Attendance is required for all lab exercises at the scheduled times. A lab may be made up at a later time only in the case of documented illness or other extenuating circumstances.

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.

## 5. **Basis of Student Assessment (Weighting)**

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%

## 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.

## 6. Grading System

### Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
95-100	A+		9
90-94	A		8
85-89	A-		7
80-84	B+		6
75-79	B		5
70-74	B-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

### Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at [camosun.ca](http://camosun.ca) or information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	<i>In progress:</i> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	<i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy E-1.5 at [camosun.ca](http://camosun.ca) for information on conversion to final grades, and for additional information on student record and transcript notations.

## 7. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

### 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, at Student Services or the College web site at [camosun.ca](http://camosun.ca).

### STUDENT CONDUCT POLICY

There is a Student 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, at Student Services and on the College web site in the Policy Section.

### 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 under "Getting Your Coursework Done" at:

<http://www.camosun.bc.ca>