School of Arts & Science
PHYSICS DEPARTMENT

Course Outline

PHYS 191 Physics 1 for Civil/Mechanical Engr Technology

A Physics course enriched with applications relevant to civil and mechanical engineering technology. Topics include measurement and units, vectors, kinematics, dynamics, work, energy and power, statics and rotational dynamics.

OFFERED:	Q1
CREDIT:	3
IN-CLASS WORKLOAD:	5 lecture, 2 lab (alt. weeks
PRE-REQUISITES:	Physics 151 (recommended), Physics 11 or departmental assessment. Enrolled in Civil or Mechanical Engineering Technology

REQUIRED MATERIALS:

Textbook: "College Physics", 3rd edition, Giambattista, A., Ricahrdson, B.M. and Richardson, R,C.
Physics for Technology 154/191/192 Laboratory Manual
Bound laboratory notebook
Graph paper (millimeter/centimeter ruled graph paper is preferred)
Calculator

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.

3. Late Penalties: Reports for labs done on alternate weeks will normally be due at the end of the next lab period in the following week. For overdue labs, a late penalty of one mark per day (10%) will be assessed for the first five days following the due date. After this date a complete report is still required and earns a maximum mark of 5/10.

4. 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 or the College web site under "Getting Your Coursework Done" at:*www.camosun.bc.ca/services*

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 at: 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%
	100%

COURSE OUTLINE:

1. **Measurement**

   1.1 Concept and process
   1.2 Significant figures
   1.3 Systeme Internationale (SI)
   1.4 British and practical units
   1.5 Unit conversions - review
   1.6 Error analysis

2. **Vectors**

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

3. **Kinematics**

   3.1 Kinematic quantities
      3.1.1 Position, distance and displacement
      3.1.2 Speed and velocity
      3.1.3 Acceleration
   3.2 Uniformly accelerated motion
   3.3 One-dimensional kinematic problems
      3.3.1 Free-fall
      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 of motion and conceptual problems
   4.2 Concept of force
      4.2.1 Normal forces
      4.2.2 Static and kinetic friction
      4.2.3 Tension forces
   4.3 Newton's second law of motion
      4.3.1 Free-body diagrams
      4.3.2 Problem-solving techniques
      4.3.3 Inclined planes
      4.3.4 Connected systems
      4.3.5 Two-dimensional problems
   4.4 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 mechanical energy
      6.2.1 Kinetic energy
      6.2.2 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 a 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 intertia
  - 7.4.1 Parallel axis theorem
  - 7.4.2 Perpendicular axis theorem
  - 7.4.3 Methods of symmetry
- 7.5 Rotational kinematics
  - 7.5.1 Definition of rotational kinematic quantities and units
  - 7.5.2 Formulas for uniformly accelerated rotation
  - 7.5.3 Relation between linear and angular quantities
- 7.6 Rotational dynamics
  - 7.6.1 Dynamic equation
  - 7.6.2 Work, rotational kinetic energy, power

8. **Simple Machines**

- 8.1 General theory
  - 8.1.1 Mechanical advantage
  - 8.1.2 Efficiency
- 8.2 Application: Different types of machines

Instructor Information

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