

Camosun College Physics Department

Physics 191M – Physics 1 for Civil and Mechanical Engineers Q1, 2002/2003

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

Pre or Corequisite: Phys 151 (recommended), Physics 11 or departmental assessment.

Instructor: Patricia Wrean (Pat)
Office: CBA 153
Office Phone: 370-4542
Email: wrean@camosun.bc.ca
Web Page: <http://www.camosun.bc.ca/~wrean/>
Office Hours: posted on office door

Grade Calculation:

The final grade will be calculated according to the following breakdown:

Quizzes (3)	30%
Assignments	5%
Lab work	15%
Final exam	50%

Note: If you miss a quiz, then your quizzes will be worth 20% and your final exam 60%. If you miss two quizzes, then your quiz will be worth 10% and your final exam 70%. If you miss all quizzes, then your final exam will be worth 80%. (Please note that the Physics department does not recommend this approach. ☹)

Note: If your final exam grade is higher than your term work grade and your term work is judged satisfactory, then your final exam grade will count as 85% of your final grade with the other 15% being your lab mark.

Labs:

Lab Instructor: Jim Nemec
Office: Tech 219
Office Phone: 370-4711

There will be five labs given in this course. All labs must be completed to pass this course. If you miss a lab for any reason, contact your lab instructor and arrange for a time to make up the lab.

To pass this course, you must pass the lab portion with a minimum average of 60%. In addition, all labs must be handed in to the lab instructor before the final exam, or the student will not be allowed to write the final.

Materials required:

Text: Cutnell & Johnson, Physics, 5th edition.
Phys 191M/192M Laboratory Manual
Scientific Calculator (any calculator is acceptable, with the exception of personal computers)
Ruler and Protractor
Graph Paper (must be either 10 lines/inch or millimetre graph paper)

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.

Grade Scale:

Final letter grades are normally assigned as follows (subject to the conditions above):

Percentage	Letter Grade
95 to 100	A+
90 to 94	A
85 to 89	A-
80 to 84	B+
75 to 79	B
70 to 74	B-
65 to 69	C+
60 to 64	C
50 to 59	D
below 50	F

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 SI Units and Rules. British and Practical Units
- 1.3 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
- 3.4 Kinematic graphs
- 3.5 Motion under gravity
- 3.6 Two dimensional kinematic problems
 - 3.6.1 Projectiles
 - 3.6.2 Circular motion
- 3.7 Relative velocities

4. **Dynamics**

- 4.1 Newton's Law
- 4.2 Free body diagrams and problem solving techniques
- 4.3 Static and kinetic friction
- 4.4 Dynamics of connected systems

5. **Work, Energy and Power**

- 5.1 Definition and concept
- 5.2 Types of energy; kinetic and potential energy
- 5.3 Work energy theorem - Conservation of energy
- 5.4 Problems involving work and energy
 - 5.4.1 Without dissipative forces
 - 5.4.2 With dissipative forces
- 5.5 Power as rate of doing work and change of energy

6. **Physics of Rigid body**

- 6.1 Center of mass and center of gravity. Calculations
- 6.2 Torque
- 6.3 Equilibrium of a rigid body
- 6.4 Rotational Inertia. Definition and calculations
- 6.5 Parallel axis theorem. Perpendicular axis theorem. Methods of symmetry
- 6.6 Rotational kinematics
 - 6.6.1 Definition of rotational kinematic quantities and units
 - 6.6.2 Formulas for uniformly accelerated rotation
 - 6.6.3 Relation between linear and angular quantities
- 6.7 Rotational dynamics
 - 6.7.1 Dynamic equation
 - 6.7.2 Work, rotational kinetic energy, power and angular momentum

7. **Simple Machines**

- 7.1 General Theory. Mechanical advantage and efficiency
- 7.2 Application: Different types of machines