Physics 191 – Physics 1 Civil/Mechanical
Q1, 2004/5

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.

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Office Hours: Posted on office door and on website

Grade Calculation:

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

Quizzes (4 or 5)	40%
Lab work	10%
Final exam	50%

Note: The lowest quiz grade will be dropped when calculating the average of your quizzes. This allows a student to be absent on any one quiz day for any reason, including illness, without penalty. There is no provision for "making up" a missed quiz.

Note: If your final exam grade is higher than your term work grade and your term work is **60% or higher**, then your final exam grade will count as 90% of your final grade with the other 10% being your lab mark.

Final Exam:

The final exam will cover the entire course and will be 3 hours long. As stated in the current college calendar on page 39, "students are expected to write tests and final examinations at the scheduled time and place." Exceptions will only be considered due to emergency circumstances as outlined in the calendar. Holidays or scheduled flights are **not** considered to be emergencies.

Labs:

Lab Instructor: Jim Nemec

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.

Note: A student who is repeating a Physics course does not have to complete the laboratory exercises a second time if an average lab grade of 70% or better was obtained.

Materials required:

Text: Cutnell & Johnson, Physics, 6th edition. (5th edition is also acceptable.)
Phys 191M/192M Laboratory Manual
Scientific Calculator (any calculator is acceptable, with the exception of personal computers)
Ruler and Protractor
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

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. 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

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

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