CAMOSUN COLLEGE	***School of Arts & Science*** ***PHYSICS DEPARTMENT*** **PHYS 191-X03** **Physics 1 Civil/Mechanical** **2008 Q1**

COURSE OUTLINE

The Approved Course Description is available on the web @ _____

Ω *Please note: this outline will be electronically stored for five (5) years only.*
It is strongly recommended students keep this outline for your records.

A physics course enriched with applications relevant to civil and mechanical engineering technologies. 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 11 or departmental assessment *Physics 151 recommended*

REQUIRED MATERIALS:

Textbook: "Physics", 6th edition, Cutnell, J.D. and Johnson, K.W.
Physics 191/192 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. 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 exams 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.

2. Students must write quizzes, tests, midterm tests, etc., on the date and time assigned by the instructor. Instructors are not required to provide make-up tests. At their discretion, instructors may waive a test or provide a make-up test only in the event of documented illness or other extenuating circumstances.

3. Refer to your instructor's information page for any additional policies regarding testing and grade calculation.

DEPARTMENT POLICIES REGARDING LABS:

1. All assigned laboratory exercises and reports must be completed prior to the date of the final exam with an overall grade of 60% in order to obtain credit for this course. A lab may be waived or made up at a later time during the term 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 apply for lab exemption.

1. Instructor Information

(a)	Instructor:	Ed Nelson			
(b)	Office Hours:	10:30 – 11:30 MTThF			
(c)	Location:	TECH 263 / TECH 221 / FISHER 314D			
(d)	Phone:	370-3515	Alternative Phone:		
(e)	Email:	nelson@camosun.bc.ca			
(f)	Website:				

2. Intended Learning Outcomes

Upon completion of this course the student will be able to:

1. Define the scientific method and give examples of its application.
2. Perform unit conversions using SI, Imperial and U.S. Customary units. Round measurements to the correct number of significant figures. Calculate uncertainties.
3. Add and subtract vectors using scale diagrams, the component method, and the laws of sines and cosines. Solve problems of concurrent forces in equilibrium.
4. Define the following kinematic vector quantities: displacement, velocity and acceleration, distance and speed. Use the kinematic equations to solve one- and two-dimensional problems involving uniformly accelerated motion. One-dimensional problems will consist of freefall and two-body problems, while two-dimensional problems will feature projectiles and trajectories.
5. Using Newton's Laws, answer conceptual problems with free-body diagrams. Solve two-dimensional dynamics problems involving normal forces, static and kinetic friction, tension forces, inclined planes, and connected objects. Calculate forces for objects in equilibrium.
6. Construct free-body diagrams for objects undergoing uniform circular motion, and calculate centripetal forces and accelerations. Answer conceptual problems for systems undergoing circular motion.
7. Define the terms work, energy, and power. Use the work-energy theorem or the law of conservation of energy to solve problems with and without dissipative forces. Calculate the power and efficiency of mechanical processes.
8. Calculate the centre-of-mass and moment-of-inertia for uniform objects. Use the parallel-axis theorem for moment-of-inertia calculations. Perform calculations and answer conceptual questions using torques. Solve equilibrium problems for non-concurrent forces.
9. Define the rotational kinematic quantities angular velocity and angular acceleration. Transform between linear and rotational quantities. Use the rotational form of Newton's 2nd Law to solve dynamics problems. Calculate work, energy, and power for rotational systems.
10. Calculate the mechanical advantage and efficiency of simple machines.
11. Assemble experimental apparatus using written instructions.
12. Observe, record, organize and display data in tables, graphs or charts.
13. Analyze linear graphs (determine area, slope, intercept, etc.).
14. Observe and record sources of error and estimate the range of uncertainty in results.
15. Interpret meaning of experimental results in the context of the experimental objectives.
16. Write scientific reports in an acceptable, traditional format.

3. Required Materials

(a) Texts: "Physics" 7th Edition, Cutnell, J.D. and Johnson, K.W.

(b) Other: Physics 154/191/192 Lab Manual; Graph Paper (10 lines per inch or metric); scientific calculator (Graphing Calculator)

4. Course Content and Schedule

Lecture:	MTWThF	12:30 – 1:20	CBA 101
Lab:	F	08:30 – 10:20	TECH 222

5. Basis of Student Assessment (Weighting)

(a) Homework	5%	(weekly)
(b) Midterms	30%	(highest 3 out of 4)
(c) Quizzes	5%	(weekly)
(d) Lab Reports	10%	(MUST COMPLETE)
(e) Final Exam	50%	
	100%	

6. Grading System

(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)

Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D	Minimum level of achievement for which credit is granted; a course with a "D" grade cannot be used as a prerequisite.	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 E-1.5 at **camosun.ca** for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	*Incomplete*: 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	*In progress*: A temporary grade assigned for courses that, due to design may require a further enrollment in the same course. No more than two IP grades will be assigned for the same course. *(For these courses a final grade will be assigned to either the 3rd course attempt or at the point of course completion.)*
CW	*Compulsory Withdrawal:* 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.

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.

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.

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