CAMOSUN COLLEGE	***School of Arts & Science*** ***PHYSICS DEPARTMENT*** **PHYS 191- X02** **Physics 1 Civil/Mechanical Engineering Technology** **Quarter 1, 2009**

COURSE OUTLINE

The Approved Course Description is available on the web @ http://intranet/ed_prov/CentralizedCurriculum.php

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.*

1. Instructor Information

Instructor:	Nancy Luick
Office Hours:	Mon. - Fri 12:20 – 11:20 pm (Or by appointment)
Location:	Tech 219
Phone:	250-370-4471
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Website:	luick.disted.camosun.bc.ca

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

Textbook: "College Physics", 3rd edition, Giambattista, Richardson & Richardson

Other: Physics for Engineering Technology 154/191/192 Laboratory Manual
Graph paper (must be either 10 lines/inch or millimeter graph paper)

4. Course Content and Schedule

Class Times:	Mon., Wed., Fri.	1:30 – 2:20 pm	Tech177
	Thursday	1:30 – 3:20 pm	Tech177
Lab Time:	Tuesday	1:30 – 3:20 pm	Tech 222

5. Basis of Student Assessment (Weighting)

The student must be successful in both the theory and laboratory assignments to pass the course. The approximate percentages used for the final grading are:

Tests and homework	40%
Lab Reports	10%
Final Exam (3 hours)	50%

Midterms may be discounted from the grading distribution (see above) if all term work, including term tests, labs and assignments, has been completed and is 60% or higher. In this case, the final grade for the course may be based on a combination of the final exam (90%) and the lab mark (10%).

PHYSICS 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. Instructors are not required to provide make-up tests. At their discretion, instructors may waive a test in exceptional circumstances such as medical issues or a documented illness.

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.

PHYSICS DEPARTMENT POLICIES REGARDING LABS AND HOMEWORK:

1. All assigned laboratory exercises and reports must be completed with a passing grade 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.

2. 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.

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.

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. **Concept of Force (Review)**

- 3.1 Newton's Laws of Motion
- 3.2 Concept of Force
  - 3.2.1 Tension Forces
  - 3.2.2 Weight and Mass
  - 3.2.3 Normal Forces
  - 3.2.4 Static and Kinetic Friction
- 3.3 Free-Body Diagrams

4. **Newton's First Law and Equilibrium of a Rigid Body**

- 4.1 Concurrent Forces in Equilibrium
- 4.2 Center of Mass and Center of Gravity
- 4.3 Non-concurrent Forces in Equilibrium
- 4.4 Torque
- 4.5 Equilibrium of a Rigid Body

5. **Kinematics (Review)**

- 5.1 Kinematic quantities
  - 5.1.1 Position, distance and displacement
  - 5.1.2 Speed and velocity
  - 5.1.3 Acceleration
- 5.2 Uniformly accelerated motion
- 5.3 One-dimensional kinematic problems
  - 5.3.1 Free-fall
  - 5.3.2 Two-body problems
- 5.4 Two-dimensional kinematic problems
  - 5.4.1 Projectiles and trajectories

6. **Newton's Second and Third Laws**

- 6.1 Newton's second law of motion
  - 6.1.1 Friction revisited
  - 6.1.2 Problem-solving techniques
  - 6.1.3 Inclined planes
  - 6.1.4 Connected systems
  - 6.1.5 Multi-dimensional problems
- 6.2 Uniform Circular Motion
  - 6.2.1 Radial acceleration
  - 6.2.2 Applications with Newton's Laws

7. **Physics of a Rigid Body**

- 7.1 Rotational inertia
  - 7.1.1 Parallel axis theorem
  - 7.1.2 Perpendicular axis theorem
  - 7.1.3 Methods of symmetry

7.2 Rotational kinematics
    7.2.1 Definition of rotational kinematic quantities and units
    7.2.2 Formulas for uniformly accelerated rotation
    7.2.3 Relation between linear and angular quantities
7.3 Rotational dynamics

8. **Work, Energy and Power**

8.1 Definition and concept
8.2 Types of mechanical energy
    8.2.1 Kinetic energy
    8.2.2 Potential energy
8.3 Work-energy theorem – conservation of energy
8.4 Problems involving work and energy
    8.4.1 Without dissipative forces
    8.4.2 With dissipative forces
    8.4.3 Power as rate of doing work and change of energy
    8.4.4 Work, rotational kinetic energy, power

9. **Simple Machines**

9.1 General theory
    9.1.1 Mechanical advantage
    9.1.2 Efficiency
9.2 Application: Different types of machines