



**School of Arts & Science
PHYSICS DEPARTMENT**

**PHYS 191- X02
Physics 1 Civil/Mechanical Engineering Technology
Quarter 1, 2007**

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. Course Instructor Information

Instructor Ed Nelson
Office hours Mon., Tues., Thurs: 9:30–11:20 am
(Or by appointment)
Location Tech 221/F314D
Phone 370-3515 OR 370-4470
E-mail nelson@camosun.bc.ca

Lab Instructor Information

Instructor Wilf Nienaber
Location Tech 218
Phone 370-4435
E-mail nienaber@camosun.bc.ca

2. Intended Learning Outcomes

At the end of the 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.

3. Required Materials

Textbook: "Physics", 7th edition, Cutnell, J. D. and Johnson, K. W.
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:	Monday	1:30 - 2:20 pm	PA 103
	Wednesday	1:30 - 2:20 pm	Tech 173
	Thursday	1:30 - 2:20 pm	Tech 177
	Friday	1:30 - 2:20 pm	Tech 181
Lab Time:	Tuesday	1:30 - 3:20 pm	Tech 222

5. Basis of Student Assessment (Weighting)

The student must be successful ($\geq 60\%$) in both the theory and laboratory assignments to pass the course. The approximate percentages used for the final grading are:

Best 3 out of 4 one-hour tests	40%
Lab Work	10%
Final Exam (3 hours)	50%

Midterm tests 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. 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, excursions or scheduled flights are not considered to be emergencies.
2. 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.

PHYSICS DEPARTMENT POLICIES REGARDING LABS:

1. All assigned laboratory exercises and reports must be completed and handed in prior to the date of the final exam with an overall grade of 60% in order to obtain credit for the course. A lab may be waived or made up at a later time only in the case of documented illness or other extenuating circumstances. If you will be absent from a lab period due to illness it is your responsibility to notify your instructor.
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.
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 apply for lab exemption.*

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	<i>Incomplete:</i> 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	<i>In progress:</i> 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 3 rd course attempt or at the point of course completion.)
CW	<i>Compulsory Withdrawal:</i> 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 Graphical 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**

- 3.1 Newton's Laws of Motion
- 3.2 Free-body diagrams
- 3.3 Concept of Force
 - 3.3.1 Weight and Mass
 - 3.3.2 Normal Forces
 - 3.3.3 Static and Kinetic Friction
 - 3.3.4 Tension Forces

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 - Calculations
- 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 Two-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
 - 7.3.1 Dynamic equation

8. 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
 - 6.4.3 Power as rate of doing work and change of energy
 - 6.4.4 Work, rotational kinetic energy, power

9. Simple Machines

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