



**School of Arts & Science
PHYSICS DEPARTMENT**

PHYS 154-01
Technical Physics 3
2007 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.

1. Instructor Information

(a)	Instructor:	Wilf Nienaber		
(b)	Office Hours:	See timetable on webpage		
(c)	Location:	T 218		
(d)	Phone:	250-370-4435	Alternative Phone:	
(e)	Email:	neinaber@camosun.bc.ca		
(f)	Website:	nienaber.disted.camosun.bc.ca		

2. Intended Learning Outcomes

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

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

1. Solve technical problems involving distance, displacement, speed, velocity and acceleration.
2. Solve problems involving the application of Newton's Laws to two or more bodies moving in two dimensions.
3. Calculate, from first principles, conditions for equilibrium of rigid bodies subject to various forces.
4. Solve technical problems involving torque and rotational motion.
5. Solve technical problems involving work, energy, and power.
6. Solve technical problems requiring the application of particle vibration and wave physics.
7. Solve technical problems involving light reflection, refraction, critical angle and total internal reflection applications.

3. Required Materials

(a)	Texts	Textbook: "Physics for Technology", 2 nd edition, Betts, J. Physics 154 lab manual
(b)	Other	Bound laboratory notebook Graph paper (millimeter/centimeter ruled graph paper is preferred) Calculator

4. Course Content and Schedule

(Can include: class hours, lab hours, out of class requirements and/or dates for quizzes, exams, lectures, labs, seminars, practicums, etc.)

CREDIT:	4
IN-CLASS WORKLOAD:	4 lecture, 2 lab (alt. weeks), 1 seminar
PRE-REQUISITES:	Physics 151 or Physics 11 and Math 172 or Math 11 or Applications of Math 12

COURSE OUTLINE

TUTORIAL TOPICS:

1. Measurement & Units – The International System

- 1.1 Systeme Internationale (SI)
 - 1.1.1 Base units
 - 1.1.2 Prefixes
 - 1.1.3 Derived units
- 1.2 British Engineering and US Customary systems and conversions
- 1.3 Dimensional algebra

2. Kinematics

- 2.1 Linear kinematics - Review

OUTLINE:

1. Vectors

- 1.1 Components of vectors
- 1.2 Vector addition and subtraction
- 1.3 Kinematic examples
 - 1.3.1 Displacement, velocity, acceleration
 - 1.3.2 Relative motion
- 1.4 Vector multiplication
 - 1.4.1 Scalar product and work
 - 1.4.2 Vector product and torque

2. Dynamics – Newton's Laws

- 2.1 Newton's second law
 - 2.1.1 Forces – tension, springs, friction, gravity
 - 2.1.2 Free-body diagrams
 - 2.1.3 Two-dimensional problems
 - 2.1.4 Problems with two connected objects

3. Equilibrium

- 3.1 Concurrent coplanar forces – algebraic 2-D problems
- 3.2 Non-concurrent forces

4. **Work and Energy**

- 4.1 Concept of work
- 4.2 Mechanical energy
 - 4.2.1 Kinetic energy
 - 4.2.2 Potential energy – gravitational and elastic
- 4.3 Conservation of energy
- 4.4 Power

5. **Uniform Circular Motion**

- 5.1 Centripetal acceleration
- 5.2 Centripetal force

6. **Rotary Motion**

- 6.1 Equations of uniform rotary motion
- 6.2 Torque
- 6.3 Moment of inertia
- 6.4 Rotational dynamics
- 6.5 Rotational energy
- 6.6 Rotational power

7. **Vibrations**

- 7.1 Periodic motion
 - 7.1.1 Period, frequency and amplitude
- 7.2 Simple harmonic motion
 - 7.2.1 Definition
 - 7.2.2 Circular motion and SHM
 - 7.2.3 Angular velocity and frequency
 - 7.2.4 Acceleration
- 7.3 Vibratory energy

8. **Waves**

- 8.1 Wave types
- 8.2 Wave characteristics
 - 8.2.1 Speed, wavelength, frequency, phase
- 8.3 Transmission between media
- 8.4 Wave equation
 - 8.4.1 Phase difference
- 8.5 Wave energy
 - 8.5.1 Intensity, intensity ratio, inverse square law
- 8.6 Interference
 - 8.6.1 Superposition theorem
 - 8.6.2 Beats
- 8.7 Standing waves and resonance
 - 8.7.1 Vibrating strings,
 - 8.7.2 Vibrating air columns
 - 8.7.3 Vibrating rods
- 8.8 Speed of sound
 - 8.8.1 Temperature effects
- 8.9 *Doppler effect – Optional material*

9. **Light**

- 9.1 Reflection
- 9.2 Refraction
- 9.3 Total internal reflection
- 9.4 Optical fibers
 - 9.4.1 Modes of propagation and dispersion
 - 9.4.2 FOTS – Optional material

5. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)

The standard mark distribution for this course is as follows:

Final Exam	50%
Midterms and other work	40%
<u>Lab Reports</u>	<u>10%</u>
	100%

6. Grading System

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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. <i>(For these courses a final grade will be assigned to either the 3rd course attempt or at the point of course completion.)</i>
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.

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. In exceptional circumstances such as medical issues or a documented illness, a make-up exam may be given or the test may be waived at the discretion of the instructor. The instructor should be notified prior to the exam.**
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.**

DEPARTMENT POLICIES REGARDING LABS:

1. **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.**

2. All assigned laboratory exercises and reports must be completed with an overall grade of 60% 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.
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.

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.