CAMOSUN COLLEGE	***School of Arts & Science*** ***PHYSICS DEPARTMENT*** **PHYS 151 – X01** **Technical Physics 2** **Quarter 2, 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. Course Instructor Information

Instructor	Nancy Luick
Office hours	Mon. – Fri.: 11:30–12:30 pm or by appointment
Location	Tech 219
Phone	370-4471
E-mail	luick@camosun.bc.ca
Website	luick.disted.camosun.bc.ca

Lab Instructor Information

Instructor Julie Alexander
Office hours – posted on Tech220

Location	Tech 220
Phone	370-4437
E-mail	jalex@camosun.bc.ca

2. Intended Learning Outcomes

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

1. Define vectors and scalars. Resolve a vector into components using either a scale diagram or trigonometry. Add and subtract vectors using either a scale diagram or the component method.
2. Use the kinematic equations to solve two-dimensional problems involving uniformly accelerated motion. Analyze accelerations and average velocities for two-dimensional problems. Calculate the trajectories for projectiles with initial horizontal motion. Solve problems involving relative velocities.
3. Making use of Newton's Laws, construct free-body diagrams, and solve two-dimensional dynamics problems involving normal forces, friction, tension, and applied forces.
4. Construct free-body diagrams for objects undergoing uniform circular motion, and calculate centripetal forces and accelerations. Answer conceptual problems for systems undergoing circular motion.
5. State the two conditions of equilibrium. Solve problems involving concurrent forces in equilibrium. Define torques (moment of a force) and answer related conceptual problems. Define and describe the centre-of-mass of an object. Solve equilibrium problems involving non-concurrent forces in which the forces are perpendicular to the lever arms.
6. Define and describe the following properties of waves: period, frequency, wave speed, and amplitude. Identify whether a particular wave is transverse or longitudinal. State the principal of superposition and sketch the properties of waves undergoing constructive and destructive interference. Calculate beat frequencies.
7. Define and describe the following properties of sound waves: pitch, loudness, speed, type of wave. Calculate the speed of sound in various media. State the conditions for standing waves and identify nodes and anti-nodes. Solve problems

of vibrating strings and air columns, including fundamental nodes and harmonics.

8. Describe the properties of light, including the electromagnetic spectrum, wave/particle nature, and speed. Define the incident, reflected, and refracted rays for light at an interface.
9. State the law of reflection. Complete ray-tracing diagrams to locate the image for plane, convex, and concave mirrors. Calculate quantities using the mirror and magnification equations, including the sign conventions for the focal length and image and object distances. Describe spherical aberration and the difference between spherical and parabolic mirrors.
10. State the law of refraction. Solve problems involving Snell's Law and total internal reflection. Complete ray-tracing diagrams to locate the image for converging and diverging lenses. Calculate quantities using the lens and magnification equations, including the sign conventions for the focal length and image and object distances.
11. Assemble simple 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. Interpret meaning of experimental results in the context of the experimental objectives.

3. Required Materials

Textbook: Physics 151 Course Materials Book
Other: Physics 151 Laboratory Manual
Graph paper (must be either 10 lines/inch or millimeter graph paper)

4. Course Content and Schedule

Class Times:	Mon., Tues, Thurs., Fri		10:30 – 11:20 am	CBA101
Seminars:	Group A	Wednesday	9:30 – 10:20 am	Tech174
(Mandatory)	Group B	Wednesday	10:30 – 11:20 am	Tech174
Lab Time:	Thursday	1:30 – 3:20 pm	Tech 222	
(Mandatory, A/B alt. weeks)				

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	50%
Lab Reports	Completion Required
Final Exam (3 hours)	50%

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 satisfactorily completed 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: For any assigned work, a late penalty of one mark per day (10%) will be assessed for the first five days following the due date. After this date the completed work 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

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.

COURSE CONTENT:

1. **Mechanical waves**
   - 1.1. Properties of waves
   - 1.2. Wave types
   - 1.3. Wave speed in a string/in air
   - 1.4. Interference
     - 1.4.1. Constructive and Destructive interference
     - 1.4.2. Superposition principle
     - 1.4.3. Beats
   - 1.5. Standing waves
     - 1.5.1. Conditions
     - 1.5.2. Vibrating strings
     - 1.5.3. Harmonics

2. **Sound**
   - 2.1. Nature of sound waves
     - 2.1.1. Speed
     - 2.1.2. Dependence on medium
     - 2.1.3. Harmonics
     - 2.1.4. Pitch and loudness
   - 2.2. Vibrating air columns
     - 2.2.1. Open and closed pipes
     - 2.2.2. Harmonics

3. **Light**
   - 3.1. Properties of light
     - 3.1.1. Wave/particle nature
     - 3.1.2. Electromagnetic spectrum
     - 3.1.3. Wave speed
   - 3.2. Reflection
     - 3.2.1. Law of reflection
     - 3.2.2. Images formed in flat mirrors

3.2.3. Images formed in spherical mirrors
3.2.4. Ray tracing
3.2.5. Mirror equation
3.2.6. Magnification
3.3. Refraction
3.3.1. Index of refraction
3.3.2. Snell's law
3.3.3. Total internal reflection
3.3.4. Images formed by refraction
3.3.5. Ray tracing
3.3.6. Lens equation
3.3.7. Magnification

4. Kinematics
4.1. Review of one dimensional kinematics
4.2. Motion in two dimensions
4.2.1. Vectors and scalars
4.2.2. Scaled diagrams
4.2.3. Vector components
4.2.4. Displacement and velocity
4.2.5. Acceleration
4.3. Relative velocity
4.4. Projectile motion in two-dimensions

5. Dynamics
5.1. Concept of force and inertia
5.2. Newton's laws of motion
5.3. Applications of Newton's second law
5.3.1. Component method
5.3.2. Connected objects
5.3.3. Uniform circular motion

6. Equilibrium
6.1. First condition
6.1.1. Forces in equilibrium
6.2. Second condition
6.2.1. Non-concurrent forces
6.2.2. Torque
6.2.3. Center of gravity
6.2.4. Torques in equilibrium