



**CAMOSUN COLLEGE**  
**Arts and Science**  
**Physics Department**

**PHYS 151 Physics 151 – Technical Physics 2**  
**Quarter 2, 2007- Corrected Room Numbers, Jan. 4**

**COURSE OUTLINE**

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The Approved Course Description is available on [http://intranet/ed\\_prov/CentralizedCurriculum.php](http://intranet/ed_prov/CentralizedCurriculum.php)  
the web @

Ω Please note: This outline will not be kept indefinitely. It is recommended students keep this outline for their records.

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**1. Course Instructor Information**

<b>Instructor</b>	Nancy Luick
<b>Office hours</b>	Monday - Friday: 11:30 – 12:30 pm or by appointment
<b>Location</b>	Tech 219
<b>Phone</b>	370-4471
<b>E-mail</b>	luick@camosun.bc.ca
<b>Website</b>	luick.disted.camosun.bc.ca

**2. Intended Learning Outcomes**

At the end of the 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 principle 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.

### 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

<b>Class Times:</b>	Monday, Wed.	10:30 - 11:20 am	Tech 174
	Tuesday	10:30 - 11:20 am	CC123
	Friday	10:30 - 11:20 am	Tech 222

<b>Seminar Time:</b>	Group B on Thursday	10:30 - 11:20 am	Tech 177
	Group A on Friday	12:30 - 1:20 pm	Tech 222

<b>Lab Time:</b>	Thursday	12:30 - 2:20 pm	Tech 222
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### 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%
Seminar and 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 seminar/lab mark (10%).

LATE POLICY: Late labs/assignments will be given a penalty of 25% per week.

#### 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 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 five 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 this 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 to make arrangements to complete the lab prior to the end of classes for Q2.
2. At the discretion of the instructor, a student who is repeating this Physics course may apply for lab exemption.

## 6. Grading System

<b>X</b>	Standard Grading System (GPA)
	Competency Based Grading System

## 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, Student Services or the College web site at <http://www.camosun.bc.ca>

### STUDENT CONDUCT POLICY

There is a Student Conduct Policy. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section.

<http://www.camosun.bc.ca/policies/policies.html>

GRADING SYSTEMS <http://www.camosun.bc.ca/policies/policies.php>

The following two grading systems are used at Camosun College:

### 1. Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
95-100	A+		9
90-94	A		8
85-89	A-		7
80-84	B+		6
75-79	B		5
70-74	B-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

### 2. Competency Based Grading System (Non GPA)

This grading system is based on satisfactory acquisition of defined skills or successful completion of the course learning outcomes

Grade	Description
COM	The student has met the goals, criteria, or competencies established for this course, practicum or field placement.
DST	The student has met and exceeded, above and beyond expectation, the goals, criteria, or competencies established for this course, practicum or field placement.
NC	The student has not met the goals, criteria or competencies established for this course, practicum or field placement.

## B. 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 at <http://www.camosun.bc.ca/policies/E-1.5.pdf> 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 are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
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.

## **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. **Kinematics**

- 3.1 Review of one dimensional kinematics
- 3.2 Motion in two dimensions
  - 3.2.1 Vectors and scalars
  - 3.2.2 Scaled diagrams
  - 3.2.3 Vector components
  - 3.2.4 Displacement and velocity
  - 3.2.5 Acceleration
- 3.3 Relative velocity
- 3.4 Projectile motion in two-dimensions
- 3.5 Uniform circular motion

#### 4. Dynamics

- 4.1 Concept of force and inertia
- 4.2 Newton's laws of motion
- 4.3 Applications of Newton's second law
  - 4.3.1 Component method
  - 4.3.2 Connected objects
  - 4.3.3 Uniform circular motion

#### 5. Equilibrium

- 5.1 First condition
  - 5.1.1 Forces in equilibrium
- 5.2 Second condition
  - 5.2.1 Non-concurrent forces
  - 5.2.2 Torque
  - 5.2.3 Center of gravity
  - 5.2.4 Torques in equilibrium

#### 6. Light

- 6.1 Properties of light
  - 6.1.1 Wave/particle nature
  - 6.1.2 Electromagnetic spectrum
  - 6.1.3 Wave speed
- 6.2 Reflection
  - 6.2.1 Law of reflection
  - 6.2.2 Images formed in flat mirrors
  - 6.2.3 Images formed in spherical mirrors
  - 6.2.4 Ray tracing
  - 6.2.5 Mirror equation
  - 6.2.6 Magnification
- 6.3 Refraction
  - 6.3.1 Index of refraction
  - 6.3.2 Snell's law
  - 6.3.3 Total internal reflection
  - 6.3.4 Images formed by refraction
  - 6.3.5 Ray tracing
  - 6.3.6 Lens equation
  - 6.3.7 Magnification