



COURSE OUTLINE

The course description is online @ <http://camosun.ca/learn/calendar/current/web/phys.html>

Ω Please note: the College electronically stores this outline for five (5) years only.
It is **strongly recommended** you keep a copy of this outline with your academic records.
You will need this outline for any future application/s for transfer credit/s to other colleges/universities.

1. Course Instructor Information

Instructor: Christopher Avis
Office Hours: M, T, Th, F: 11:30-12:20 PM, or by appt.
Location: Tech 219
Phone: 250-370-4406 / 250-370-3510
Email: avisc@camosun.bc.ca
Website: [D2L \(online.camosun.ca\)](http://D2L.online.camosun.ca)

Lab Instructor Information

Julie Alexander
Location: Tech 220
Phone: 250-370-4437
Email: 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 the 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

- (a) Physics 151 Course Materials Book (reprint taken from "Physics" 6th edition (Pearson), Douglas Giancoli)
- (b) Physics 151 Lab Manual
- (c) Scientific calculator, graph paper, ruler

4. Course Content and Schedule

Lectures: Monday:	9:30 – 10:20 AM, Tech 173
Tuesday, Thursday, Friday	10:30 – 11:20 AM, Tech 173
Tutorials: Monday	10:30 – 11:20 AM, Tech 173 (X01A)
Tuesday	9:30 – 10:20 AM, Tech 173 (X01B)
Labs: Wednesday	9:30 – 11:20 AM, Tech 222 (Alternating Weeks)

5. Basis of Student Assessment (Weighting)

- (a) Final Exam: 50%
- (b) Term Tests 35% (Best 3 of 4)
- (c) Weekly Quizzes 5%
- (d) Homework 5%
- (e) Tutorial Sheets 5%
- (f) Laboratory Successful completion

Please note the following class policies:

1. Homework will be assigned at the beginning of each week and will be due the Tuesday of the week after it was assigned. Tutorial sheets will be due one week after they are assigned. Late homework and tutorial sheets will be subject to a 10 % per day mark deductions
2. Quizzes will consist of a series of short multiple-choice questions drawn from the banks of questions posted on the class website (D2L). They will encompass material covered since the last quiz and up to the previous day's lecture.

Students must be successful (>60%) in both the theory and lab components to pass the course.

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
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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 the College web site in the Policy Section.

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, "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 assigned laboratory exercises and reports must be completed in order to obtain credit for the course. Attendance is required for all lab exercises at the scheduled times. 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. At the discretion of the instructor, a student who is repeating this Physics course may apply for lab exemption.

STUDY TIME

It is recommended that you spend between 5 and 10 hours per week (or more for students with a weak background) studying for this course outside of class time.

OUTLINE:

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
 - 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 Image 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 in One Dimension**

- 4.1 Review of one dimensional kinematics
 - 4.1 Review of one dimensional kinematics
- 4.2 Motion in two dimensions
 - 4.2.1 Scaled diagrams
 - 4.2.2 Vectors and Scalars
 - 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
- 4.5 Uniform circular motion

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 Centre of gravity
 - 6.2.4 Torques in equilibrium