

# COURSE SYLLABUS



COURSE TITLE: PHYS-104: General College Physics 1

CLASS SECTION: 001

TERM: Fall 2022

COURSE CREDITS: 4

DELIVERY METHOD(S): Face-to-Face Lecture + Lab

Camosun College campuses are located on the traditional territories of the Lək̓ʷəŋən and W̓SÁNEĆ peoples. We acknowledge their welcome and graciousness to the students who seek knowledge here.

Learn more about Camosun's [Territorial Acknowledgement](#).

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For COVID-19 information please visit <https://legacy.camosun.ca/covid19/index.html>.

*Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable explanation in advance, you will be removed from the course and the space offered to the next waitlisted student.*

## INSTRUCTOR DETAILS

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NAME: Chris Avis

EMAIL: [avisc@camosun.ca](mailto:avisc@camosun.ca)

OFFICE: Fisher 346D

HOURS: M,W: 12:00-12:50 PM; Tu, Th: 10:30 – 11:20 AM; Fr: 11:30 AM – 12:20 PM, or by appointment.

*As your course instructor, I endeavour to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me. Camosun College is committed to identifying and removing institutional and social barriers that prevent access and impede success.*

## CALENDAR DESCRIPTION

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This is the first part of a survey of physics primarily for students in life sciences and non-science programs. It is suitable for students who require Physics 12 as a pre-requisite. Students explore kinematics, dynamics, work, energy and power, momentum, static equilibrium, thermal energy, fluids, circular motion and gravitation.

### PREREQUISITE(S):

One of:

- C in Physics 11
- C in Camosun Alternative

And one of:

- C in Pre-calculus 11; C in MATH 073; C in MATH 077; C in MATH 137; C in MATH 139; C in MATH 173

It is recommended that students who have been away from Physics for more than 5 years should first refresh with PHYS 070 or PHYS 101 or see the Physics chair to gauge skill level. It is also recommended that students

who have been away from math courses for more than 5 years should consult with the Mathematics department to ensure that their math skills are at a level appropriate for this course.

**CO-REQUISITE(S):**

Not Applicable

**EXCLUSION(S):**

Not Applicable

**COURSE LEARNING OUTCOMES / OBJECTIVES**

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

1. Perform addition, subtraction and scalar multiplication of vectors in two-dimensions using graphical and trigonometric techniques.
  
2. Solve technical problems involving kinematics and dynamics of particles in one- and two-dimensions.
  - a. Define and differentiate between kinematic variables (position, displacement, velocity, speed acceleration)
  - b. Solve technical kinematics problems involving constant acceleration in one-dimension (horizontal and inclined surfaces, and free fall) and two-dimensions (projectile motion).
  - c. Describe Newton's Laws and use Free-Body diagrams to represent forces acting on an object.
  - d. Apply Newton's Laws to solve dynamics problems involving gravitational forces, friction and interacting pairs of objects.
  
3. Apply conservation principles to solve technical problems involving energy and momentum
  - a. Solve problems involving the work done by constant forces in one-and two-dimensions using the work-kinetic energy theorem.
  - b. Use the conservation of energy principle to solve problems involving gravitational potential energy and dissipative forces.
  - c. Calculate power output and efficiency for simple mechanical systems
  - d. Apply the concepts of momentum and impulse to solve problems involving in collisions in one- and two-dimensions.
  
4. Apply kinematics and dynamics concepts to the study of circular, rotational and orbital motion
  - a. Use the concept of centripetal acceleration to solve dynamics problems involving objects in uniform circular motion.
  - b. Describe Newton's Law of Universal Gravitation and use this principle to solve problems involving orbital motion.
  - c. Evaluate the torque produced by a force and use the first and second condition for equilibrium to solve problems involving rigid objects in static equilibrium.
  
5. Solve technical problems involving elastic properties of solids and fluid statics and dynamics.
  - a. Define density, pressure (including gauge pressure), stress, strain and elastic modulus.
  - b. Characterize and evaluate the variation in pressure with depth in a fluid in hydrostatic equilibrium including applications of Pascal's Principle.
  - c. Apply Archimedes' principle to evaluate the buoyant force on objects partially or completely immersed in fluids.

- d. Solve technical problems involving surface tension and capillary action.
- e. Use the equation of continuity and Bernoulli's equation to qualitatively describe aspects and applications of fluids in motion.
6. Explore energy transfer by thermal mechanisms through investigations into heat exchange, thermal expansion and calorimetry.
- Identify common temperature scales and appropriate conversion factors between scales.
  - Solve technical problems involving the thermal expansion of solids and fluids.
  - Define and distinguish between the terms temperature, heat, thermal energy, specific heat capacity and latent heat.
  - Solve technical calorimetry problems including problems involving phase changes of matter.
  - Describe heat transfer by radiation, thermal conduction and convection.
7. Analyze, interpret, and report on experimental results in the context of experimental objectives.
- Observe, record, organize and display data in tables, and record sources of error and determine the uncertainty in results
  - Plot and analyze linear graphs (determine area, slope, intercept, including uncertainties)
  - Convey findings in scientific reports written in an acceptable, traditional discipline-specific format

#### REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

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##### Required materials:

- Physics 104 Lab Manual (Fall 2022 edition)
- Scientific calculator
- Ruler
- Access to a computer with Microsoft Excel. (Students can access Excel through the Microsoft Office Suite available free to students here: <https://legacy.camosun.ca/services/its/other-services.html>.)

##### Optional material:

Physics by Giancoli, 7<sup>th</sup> Edition (Copies available in Lansdowne Campus Library and the Bookstore)

#### COURSE SCHEDULE, TOPICS, AND ASSOCIATED PREPARATION / ACTIVITY / EVALUATION

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The following schedule and course components are subject to change with reasonable advance notice, as deemed appropriate by the instructor.

WEEK	ACTIVITY or TOPIC	DUE DATES
<b>WEEK #1</b>		
Mon. Sept. 5 <sup>th</sup>	<i>Labour Day – No Class</i>	
Tues. Sept. 6 <sup>th</sup>	Introductory Class / 1.1: Vector Operations (Graphical Approach)	
Weds. Sept. 7 <sup>th</sup>	1.1: Vector Operations (Graphical Approach)	
Thurs., Sept. 8 <sup>th</sup>	1.2: Vector Components	
Fri. Sept. 9 <sup>th</sup>	Lab 1: Significant Figures, Scientific Notation and Unit Conversions	

WEEK	ACTIVITY or TOPIC	DUE DATES
<b>WEEK #2</b>		
Mon. Sept. 12 <sup>th</sup>	1.2: Vector Components / 1.3: Vector Operations (Component Method)	Add/Drop Deadline
Tues. Sept. 13 <sup>th</sup>	1.3: Vector Operations (Component Method)	
Weds. Sept. 14 <sup>th</sup>	2.1: Position, Distance and Displacement in 1-D	HW Week #1 Due
Thurs., Sept. 15 <sup>th</sup>	2.2: Average and Instantaneous Velocity	
Fri. Sept. 16 <sup>th</sup>	Lab 2: Deflection of a Loaded Beam	Lab #1 Due
<b>WEEK #3</b>		
Mon. Sept. 19 <sup>th</sup>	2.3: Kinematics with Uniform Acceleration	
Tues. Sept. 20 <sup>th</sup>	2.4: Free-Fall	
Weds. Sept. 21 <sup>st</sup>	3.1: Kinematics in 2-D	HW Week #2 Due
Thurs., Sept. 22 <sup>nd</sup>	3.1: Kinematics in 2-D	
Fri. Sept. 23 <sup>rd</sup>	Lab 3: Mechanical Equilibrium in 2-D	Lab #2 Due
<b>WEEK #4</b>		
Mon. Sept. 26 <sup>th</sup>	3.2: Projectile Motion	
Tues. Sept. 27 <sup>th</sup>	3.2: Projectile Motion	
Weds. Sept. 28 <sup>th</sup>	4.1: Review of Forces	HW Week #3 Due
Thurs., Sept. 29 <sup>th</sup>	Test #1	
Fri. Sept. 30 <sup>th</sup>	<i>National Day for Truth and Reconciliation</i>	
<b>WEEK #5</b>		
Mon. Oct. 3 <sup>rd</sup>	4.2: Newton's First Law	Lab #3 Due
Tues. Oct. 4 <sup>th</sup>	4.3: Newton's Second Law	
Weds. Oct. 5 <sup>th</sup>	4.4: Inclined Planes	HW Week #4 Due
Thurs., Oct. 6 <sup>th</sup>	4.5: Problems involving Friction	
Fri. Oct. 7 <sup>th</sup>	Lab 4: Projectile Motion	
<b>WEEK #6</b>		
Mon. Oct. 10 <sup>th</sup>	<i>Thanksgiving Day</i>	
Tues. Oct. 11 <sup>th</sup>	4.6: Newton's Third Law and Connected Objects	
Weds. Oct. 12 <sup>th</sup>	5.1: Kinematics of UCM	HW Week #5 Due
Thurs., Oct. 13 <sup>th</sup>	5.2: Dynamics of UCM	
Fri. Oct. 14 <sup>th</sup>	Lab 5: Atwood's Machine	Lab #4 Due
<b>WEEK #7</b>		
Mon. Oct. 17 <sup>th</sup>	5.2: Dynamics of UCM	
Tues. Oct. 18 <sup>th</sup>	5.3: Newton's Law of Universal Gravitation	
Weds. Oct. 19 <sup>th</sup>	5.4: Gravity and Orbits	HW Week #6 Due
Thurs., Oct. 20 <sup>th</sup>	Test #2	
Fri. Oct. 21 <sup>st</sup>	Lab 6: Uncertainties	Lab #5 Due
<b>WEEK #8</b>		
Mon. Oct. 24 <sup>th</sup>	6.1: Work	
Tues. Oct. 25 <sup>th</sup>	6.2: The Work-Kinetic Energy Theorem	
Weds. Oct. 26 <sup>th</sup>	6.3: Potential Energy	HW Week #7 Due
Thurs., Oct. 27 <sup>th</sup>	6.4: Conservation of Energy	
Fri. Oct. 28 <sup>th</sup>	Lab 7: Conservation of Energy (w/ Uncertainties)	Lab #6 Due

WEEK	ACTIVITY or TOPIC	DUE DATES
<b>WEEK #9</b>		
Mon. Oct. 31 <sup>st</sup>	6.5: Conservation of Energy w/ Non-Conservative Forces	
Tues. Nov. 1 <sup>st</sup>	7.1: Impulse and Momentum	
Weds. Nov. 2 <sup>nd</sup>	7.1: Impulse and Momentum	HW Week #8 Due
Thurs., Nov. 3 <sup>rd</sup>	7.2: Conservation of Momentum in 1-D	
Fri. Nov. 4 <sup>th</sup>	Lab 8: Conservation of Momentum (2-D)	Lab #7 Due
<b>WEEK #10</b>		
Mon. Nov. 7 <sup>th</sup>	7.3: Conservation of Momentum in 2-D	
Tues. Nov. 8 <sup>th</sup>	7.4: Centre of Mass	
Weds. Nov. 9 <sup>th</sup>	8.1: Torque	HW Week #9 Due
Thurs., Nov. 10 <sup>th</sup>	Test #3	
Fri. Nov. 11 <sup>th</sup>	<i>Remembrance Day</i>	
<b>WEEK #11</b>		
Mon. Nov. 14 <sup>th</sup>	8.2: The Second Condition for Equilibrium	Lab #8 Due
Tues. Nov. 15 <sup>th</sup>	8.2: The Second Condition for Equilibrium	
Weds. Nov. 16 <sup>th</sup>	8.3: Stress and Strain	HW Week #10 Due
Thurs., Nov. 17 <sup>th</sup>	9.1: Thermal Expansion	
Fri. Nov. 18 <sup>th</sup>	Lab 9: The Second Condition for Equilibrium	
<b>WEEK #12</b>		
Mon. Nov. 21 <sup>st</sup>	9.2: Heat	
Tues. Nov. 22 <sup>nd</sup>	9.2: Calorimetry Problems w/ no Phase Changes	
Weds. Nov. 23 <sup>rd</sup>	9.3: Calorimetry Problems w/ Phase Changes	HW Week #11 Due
Thurs., Nov. 24 <sup>th</sup>	9.3: Calorimetry Problems w/ Phase Changes	
Fri. Nov. 25 <sup>th</sup>	Lab 10: Specific Heat of Tin	Lab #9 Due
<b>WEEK #13</b>		
Mon. Nov. 28 <sup>th</sup>	10.1: Hydrostatic Equilibrium	
Tues. Nov. 29 <sup>th</sup>	10.2: Pascal's Principle and Gauge Pressure	
Weds. Nov. 30 <sup>th</sup>	10.3: Buoyancy and Archimedes' Principle	HW Week #12 Due
Thurs., Dec. 1 <sup>st</sup>	Test #4	
Fri. Dec. 2 <sup>nd</sup>	Lab 11: Buoyancy and Archimedes' Principle	Lab #10 Due
<b>WEEK #14</b>		
Mon. Dec. 5 <sup>th</sup>	10.4: Surface Tension and Capillarity	
Tues. Dec. 6 <sup>th</sup>	10.5: The Equation of Continuity and Bernoulli's Principle	
Weds. Dec. 7 <sup>th</sup>	Review	HW Week #13 Due
Thurs., Dec. 8 <sup>th</sup>	Review	
Fri. Dec. 9 <sup>th</sup>	Review	Lab #11 Due

Students registered with the Centre for Accessible Learning (CAL) who complete quizzes, tests, and exams with academic accommodations have booking procedures and deadlines with CAL where advanced notice is required. Deadlines can be reviewed on the [CAL exams page](http://camosun.ca/services/accessible-learning/exams.html). <http://camosun.ca/services/accessible-learning/exams.html>

## EVALUATION OF LEARNING

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DESCRIPTION	WEIGHTING
Homework	15 %
Labs	25 %
Term Tests (Best 3 of 4)	30 %
Final Exam	30 %
	<b>TOTAL</b> 100 %

If you have a concern about a grade you have received for an evaluation, please come and see me as soon as possible. Refer to the [Grade Review and Appeals](http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf) policy for more information.  
<http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf>

Dates for the term tests are set as follows:

**Test #1: Thursday, September 29<sup>th</sup>, 9:30 AM – 10:20 AM**

**Test #2: Thursday, October 20<sup>th</sup>, 9:30 AM – 10:20 AM**

**Test #3: Thursday, November 10<sup>th</sup>, 9:30 AM – 10:20 AM**

**Test #4: Thursday, December 1<sup>st</sup>, 9:30 AM – 10:20 AM**

The final exam will occur during the final exam period; the date, time and location will be announced later in the term. Students should not make travel plans or other appointments during the Final Exam period before the exam schedule is released.

## COURSE GUIDELINES & EXPECTATIONS

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### Homework

Homework problems are designed to help you master problem solving skills and prepare you for the term tests. Homework either be submitted in person at the end of class or online using the course's dropboxes. Homework problems will be assigned at the beginning of a particular week and will be due by the end of the day (11:59 PM) on the Wednesday of the following week. (E.g. Week #1's HW will be due by the Wednesday of Week #2; Week #2's HW will be due by the Wednesday of Week #3, etc.).

### Labs

Labs assigned in a particular week will be due by the end of the day (11:59 PM) on the Friday of the following week. Exceptions will apply in week when there are statutory holidays in which case the due dates are as noted in the calendar. Students who are repeating Physics 104 and have a lab mark from the previous attempt at the course greater than 70% can apply for lab exemption and carry over their previous lab mark. Please contact me in the first week of the term with the name of your previous instructor if this applies to you.

Students must obtain an overall grade of 50% or higher in the laboratory component of the course order to obtain credit for the course.

## Late Policies

Students requiring an extension to labs or homework due to illness or other extenuating circumstances must contact me prior to the due dates. Otherwise, late penalties will apply as noted. For overdue assignments, a late penalty of 10 % per day will be assessed. In the case of labs, the maximum late mark deduction will be 50% to allow students to obtain a passing mark in the labs.

All late homework and lab assignments must be submitted by the last day of the term (11:59 PM on December 11<sup>th</sup>); after this point, outstanding assignments will receive a mark of zero. Students that miss a scheduled lab or test must contact me within 24 hours of their absence. Otherwise, a grade of zero will be applied to the missed item.

## Study Habits

Physics 104 is a fast-paced, challenging course. You can anticipate spending at least 5 hours a week outside of class to master the material. I strongly recommend that you attend the face-to-face lectures to stay on pace with the material and be able to clarify any questions you might have. Students who have been successful in the course have also recommended forming study groups, accessing the Science Help Centre and regular (and early) visits to office hours.

## STUDENT RESPONSIBILITY

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Enrolment at Camosun assumes that the student will become a responsible member of the College community. As such, each student will display a positive work ethic, assist in the preservation of College property, and assume responsibility for their education by researching academic requirements and policies; demonstrating courtesy and respect toward others; and respecting expectations concerning attendance, assignments, deadlines, and appointments.

## SUPPORTS AND SERVICES FOR STUDENTS

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Camosun College offers a number of services to help you succeed in and out of the classroom. For a detailed overview of the supports and services visit <http://camosun.ca/students/>.

Academic Advising	<a href="http://camosun.ca/advising">http://camosun.ca/advising</a>
Accessible Learning	<a href="http://camosun.ca/accessible-learning">http://camosun.ca/accessible-learning</a>
Counselling	<a href="http://camosun.ca/counselling">http://camosun.ca/counselling</a>
Career Services	<a href="http://camosun.ca/coop">http://camosun.ca/coop</a>
Financial Aid and Awards	<a href="http://camosun.ca/financialaid">http://camosun.ca/financialaid</a>
Help Centres (Math/English/Science)	<a href="http://camosun.ca/help-centres">http://camosun.ca/help-centres</a>
Indigenous Student Support	<a href="http://camosun.ca/indigenous">http://camosun.ca/indigenous</a>
International Student Support	<a href="http://camosun.ca/international/">http://camosun.ca/international/</a>
Learning Skills	<a href="http://camosun.ca/learningskills">http://camosun.ca/learningskills</a>
Library	<a href="http://camosun.ca/services/library/">http://camosun.ca/services/library/</a>

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Office of Student Support	<a href="http://camosun.ca/oss">http://camosun.ca/oss</a>
Ombudsperson	<a href="http://camosun.ca/ombuds">http://camosun.ca/ombuds</a>
Registration	<a href="http://camosun.ca/registration">http://camosun.ca/registration</a>
Technology Support	<a href="http://camosun.ca/its">http://camosun.ca/its</a>
Writing Centre	<a href="http://camosun.ca/writing-centre">http://camosun.ca/writing-centre</a>

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If you have a mental health concern, please contact Counselling to arrange an appointment as soon as possible. Counselling sessions are available at both campuses during business hours. If you need urgent support after-hours, please contact the Vancouver Island Crisis Line at 1-888-494-3888 or call 911.

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## COLLEGE-WIDE POLICIES, PROCEDURES, REQUIREMENTS, AND STANDARDS

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### Academic Accommodations for Students with Disabilities

The College is committed to providing appropriate and reasonable academic accommodations to students with disabilities (i.e. physical, depression, learning, etc). If you have a disability, the [Centre for Accessible Learning](#) (CAL) can help you document your needs, and where disability-related barriers to access in your courses exist, create an accommodation plan. By making a plan through CAL, you can ensure you have the appropriate academic accommodations you need without disclosing your diagnosis or condition to course instructors. Please visit the CAL website for contacts and to learn how to get started:

<http://camosun.ca/services/accessible-learning/>

### Academic Integrity

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf> for policy regarding academic expectations and details for addressing and resolving matters of academic misconduct.

### Academic Progress

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.1.pdf> for further details on how Camosun College monitors students' academic progress and what steps can be taken if a student is at risk of not meeting the College's academic progress standards.

### Course Withdrawals Policy

Please visit <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.2.pdf> for further details about course withdrawals. For deadline for fees, course drop dates, and tuition refund, please visit <http://camosun.ca/learn/fees/#deadlines>.

### Grading Policy

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf> for further details about grading.



### Grade Review and Appeals

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf> for policy relating to requests for review and appeal of grades.

### Mandatory Attendance for First Class Meeting of Each Course

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable reason in advance, you will be removed from the course and the space offered to the next waitlisted student. For more information, please see the “Attendance” section under “Registration Policies and Procedures” (<http://camosun.ca/learn/calendar/current/procedures.html>) and the Grading Policy at <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf>.

### Medical / Compassionate Withdrawals

Students who are incapacitated and unable to complete or succeed in their studies by virtue of serious and demonstrated exceptional circumstances may be eligible for a medical/compassionate withdrawal. Please visit <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.8.pdf> to learn more about the process involved in a medical/compassionate withdrawal.

### Sexual Violence and Misconduct

Camosun is committed to creating a campus culture of safety, respect, and consent. Camosun’s Office of Student Support is responsible for offering support to students impacted by sexual violence. Regardless of when or where the sexual violence or misconduct occurred, students can access support at Camosun. The Office of Student Support will make sure students have a safe and private place to talk and will help them understand what supports are available and their options for next steps. The Office of Student Support respects a student’s right to choose what is right for them. For more information see Camosun’s Sexualized Violence and Misconduct Policy: <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.9.pdf> and [camosun.ca/sexual-violence](http://camosun.ca/sexual-violence). To contact the Office of Student Support: [oss@camosun.ca](mailto:oss@camosun.ca) or by phone: 250-370-3046 or 250-3703841

### Student Misconduct (Non-Academic)

Camosun College is committed to building the academic competency of all students, seeks to empower students to become agents of their own learning, and promotes academic belonging for everyone. Camosun also expects that all students to conduct themselves in a manner that contributes to a positive, supportive, and safe learning environment. Please review Camosun College’s Student Misconduct Policy at <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.pdf> to understand the College’s expectations of academic integrity and student behavioural conduct.

**Changes to this syllabus:** Every effort has been made to ensure that information in this syllabus is accurate at the time of publication. The College reserves the right to change courses if it becomes necessary so that course content remains relevant. In such cases, the instructor will give the students clear and timely notice of the changes.