

# COURSE SYLLABUS



COURSE TITLE: PHYS-140: Physics for Scientists and Engineers 1

CLASS SECTION: 001

TERM: Winter 2023

COURSE CREDITS: 4

DELIVERY METHOD(S): In-person lecture

Camosun College campuses are located on the traditional territories of the Ləkʷəŋən and W̱SÁNEĆ 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: Muyang (Mike) Zhong

EMAIL: [ZhongM@Camosun.ca](mailto:ZhongM@Camosun.ca)

OFFICE: F346B

Office HOURS: Tuesday 3:30 to 5:20pm; Thursday 3:30 to 4:20pm; Friday 2:30 to 3:20pm; 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 calculus-based course is intended for students in Science or Engineering. Students will study the mechanics of particles analyzing problems involving forces and equations of motion in multiple dimensions, conservation laws, rotational kinematics and dynamics. Students will further investigate electric fields and electric potential; DC circuits, and magnetic fields. Students will explore how these fundamental principles apply in laboratory settings.

### PREREQUISITE(S):

One of:

- C in Physics 12
- C in Camosun Alternative

### CO-REQUISITE(S):

All of:

- C in MATH 100

## EXCLUSION(S):

Not Applicable

## COURSE LEARNING OUTCOMES / OBJECTIVES

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

1. Apply techniques of vector algebra to solve problems where vectors sum to zero or calculate resultant vectors.

- a. Perform coordinate system conversions.
- b. Demonstrate operations of vector addition and subtraction using graphical, vector component and unit vector techniques.
- c. Calculate and interpret scalar product and vector products.

2. Solve problems involving particle kinematics and dynamics for translational motion with non-constant force.

- a. Apply kinematic equations to analyze motion of objects subject to constant acceleration.
- b. Use calculus to analyze motion of objects with non-constant acceleration.
- c. Use vector components to analyze motion in two and three dimensions.
- d. Solve problems for objects undergoing uniform and non-uniform circular motion.
- e. State and apply Newton's Laws to analyze systems subject to concurrent forces including friction, inclines and connected objects.

3. Analyze the rotational motion of rigid bodies.

- a. Calculate the center-of-mass and moment-of-inertia for uniform objects including the parallel-axis theorem.
- b. Perform calculations and answer conceptual questions using torques. Solve equilibrium problems for non-concurrent forces.
- c. Define the rotational kinematic quantities; transform between linear and rotational quantities.
- d. Use the rotational form of Newton's 2nd Law to solve dynamics problems.
- e. Apply translational and rotational conditions of mechanical equilibrium.

4. Use work-energy theorem and other conservation laws to solve applied problems.

- a. Solve problems involving work by constant and non-constant forces in two and three dimensions.
- b. Calculate work, energy and power for rotational systems.
- c. Perform calculations utilizing the conservation of momentum of isolated systems for elastic and inelastic collisions.
- d. Perform calculations utilizing the conservation of angular momentum for rotating systems.

5. Apply concepts of dynamics, work and energy to analyze charged particles in electric and magnetic fields.

- a. Calculate electric fields, forces, potential and potential energy for point charges and simple charge distributions.
- b. Perform calculations for charged particles moving in uniform electric and magnetic fields; describe their motion and practical applications.
- c. Solve problems for multi-branch direct current circuits using Ohm's Laws and Kirchhoff's Rules.

6. Examine the validity of key physical principles through the use of practical experimental techniques.

- Assemble experimental apparatus using written instructions.
- Observe and record data including sources of error and estimate the range of uncertainty in results.
- Interpret meaning of experimental results in the context of the experimental objectives.
- Write scientific reports in correct format.

#### REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

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Students will require a scientific calculator, ruler, protractor and access to a computer with Microsoft Excel. Microsoft Excel is available in certain campus computer labs. Students can also access Excel through the Microsoft Office Suite available free to students here: <https://legacy.camosun.ca/services/its/other-services.html>.

The following optional reference textbook is available through the Camosun Bookstore. Links between the course lectures and textbook sections can be found on the course website.

*Physics for Scientists and Engineers: A Strategic Approach by Knight, 4th Edition*

Students are not required to purchase the lab manuals. All the lab materials will be provided by the instructor.

#### 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 or DATE RANGE	ACTIVITY or TOPIC	OTHER NOTES
1	Chapter 1 Units and Vectors	
2	Chapter 1 Units and Vectors Chapter 2 Kinematics in 1D	
3	Chapter 2 Kinematics in 1D	
4	Chapter 2 Kinematics in 1D Chapter 3 2D and 3D Motion	
5	Chapter 3 2D and 3D Motion Chapter 4 Dynamics	Test 1
6	Chapter 4 Dynamics	
7	Chapter 5 Work and Energy	
8	Chapter 5 Work and Energy Chapter 6 Electric Forces and Potential Energy	
9	Chapter 6 Electric Forces and Potential Energy Chapter 7 Electric Circuits	Test 2
10	Chapter 7 Electric Circuits Chapter 8 Magnetism	
11	Chapter 8 Magnetism Chapter 9 Impulse and Momentum	
12	Chapter 9 Impulse and Momentum Chapter 10 Rotation of Rigid bodies	Test 3

WEEK or DATE RANGE	ACTIVITY or TOPIC	OTHER NOTES
13	Chapter 10 Rotation of Rigid bodies	
14	Chapter 10 Rotation of Rigid bodies / Review	
15	Final Exam	

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	5%
Labs	20%
3 Tests	45%
Quizzes	5%
Final Exam	25%
<b>TOTAL</b>	<b>100%</b>

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>

## 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 should be **submitted online** using the course's drop boxes. The full solutions to the homework assignments are provided, so your homework submissions will not be graded. They will be checked for completeness only. There is no late penalty for homework submissions.

### Tests

There are three (3) mid-term tests throughout the term. The tests will be announced at least two (2) weeks in advance. You must write the tests during the date and time specified. I do not do make up tests.

### Quizzes

Quizzes are almost weekly, designed to help you master the materials covered in each week. They will be marked.

## Labs

I allow for one drop lab, meaning that the lowest mark of the lab will be dropped.

Students who are repeating Physics 140 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 labs, a late penalty of 10 % per day will be assessed for the first five days following the due date. After this, a completed lab earns a maximum mark of 50%.

All late homework and lab assignments must be submitted by the last day of the term; after this point, outstanding assignments will receive a mark of zero.

## Study Habits

Physics 140 is a fast-paced, challenging course. You can anticipate spending around 10 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/>.

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Academic Advising

<http://camosun.ca/advising>

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Accessible Learning

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

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Counselling

<http://camosun.ca/counselling>

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Career Services

<http://camosun.ca/coop>

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Financial Aid and Awards

<http://camosun.ca/financialaid>

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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>
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>

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.