CAMOSUN COLLEGE
School of Arts & Science
Department of Physics & Astronomy

PHYS-140-D01
Physics for Science/ENGR 1
Winter 2021

COURSE OUTLINE

The course description is available on the web @ http://camosun.ca/learn/calendar/current/web/phys.html

Ω *Please note: This outline will not be kept indefinitely. It is recommended students keep this outline for their records, especially to assist in transfer credit to post-secondary institutions.*

1. Instructor Information

(a) Instructor	Christopher Avis		
(b) Office hours	Tu: 8:30-9:20, W: 8:30-10:20, Th: 8:30-9:20 or by appointment		
(c) Location	Online via D2L (online.camosun.ca)		
(d) Phone	250-507-3361 (please email first)	**Alternative:**	
(e) E-mail	avisc@camosun.bc.ca		
(f) Website	D2L (online.camosun.ca)		

2. Intended Learning Outcomes

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

3. Required Materials

(a) Texts
Optional reference textbook: Physics for Scientists and Engineers: A Strategic Approach by Knight, 4th Edition

(b) Other
Scientific calculator, ruler, protractor.
Access to a computer with Microsoft Excel*.
Access to a cellphone, camera or scanner capable of generating pdf documents for submission of homework, labs and tests

*Excel is available as part of the Office 365 suite provided free to all Camosun students. See: http://camosun.ca/services/its/other-services.html for details.

4. Course Content and Schedule

This course is designed to be largely delivered **asynchronously** (meaning that students can access and engage with course content at a time of their choosing) with optional **synchronous** (set time) office hours and tutorials delivered as per the schedule below. Asynchronous lecture content will consist of pre-recorded videos, supplemented with typed lecture notes. Students are encouraged to work through the videos, taking notes as if they were participating in a lecture and pausing videos to work on problems themselves. The time commitment to work through the asynchronous lectures is estimated to take approximately 4 hours a week, just as it would in a regular face-to-face term.

The optional tutorials are designed to allow students to engage with specific problems drawn from the homework. To fully benefit from the tutorials, students should ensure that they've watched the asynchronous lecture content for the portion of the week leading up to the tutorial and at least read through the homework problems. Tutorials will be recorded and made available on D2L for asynchronous viewing.

Labs are also set up to be **asynchronous**. They consist of an introductory video to guide students through the material accompanied by written instructions. Optional support for the labs will be available during the two-hour lab office hours noted below. It is estimated that it will take students between 2 to 4 hours to complete each lab.

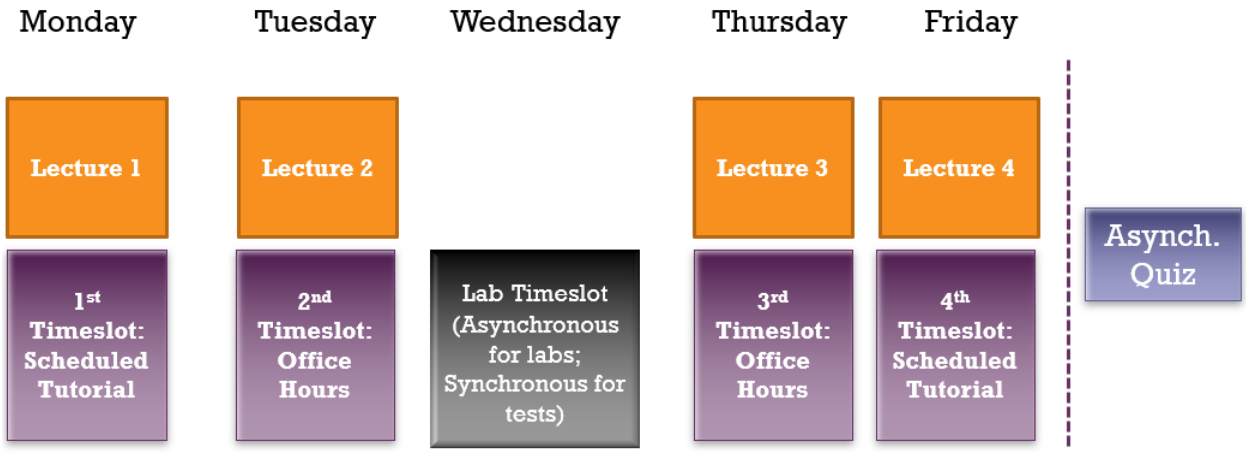
There will be **four synchronous** tests delivered in the lab period throughout the term and students **must be available** to write tests at those times at the dates noted below. There will be an asynchronous quiz delivered each week that must be completed by the start of the following week. All synchronous content will be delivered via D2L's Blackboard Collaborate feature.

Content Schedule:

Monday: 8:30 AM - 9:20 AM Optional tutorial
Tuesday: 8:30 AM - 9:20 AM Optional lecture office hour
Wednesday: 8:30 AM - 10:20 AM Optional lab office hour / mandatory test time (on test days)
Thursday: 8:30 AM - 9:20 AM Optional lecture office hour
Friday: 8:30 AM - 9:20 AM Optional tutorial

There are four evenly weighted term tests. The first three will occur during the regular term and the fourth will occur during the final exam period. Test days and times for the first three tests are as noted below:

Test #1: Wednesday, February 3rd: 8:30 AM – 10:20 PM
Test #2: Wednesday, March 10th: 8:30 AM – 10:20 PM
Test #3: Wednesday, March 31st: 8:30 AM – 10:20 PM
Test #4: In final exam period. Date and time TBA.



5. Basis of Student Assessment (Weighting)

(a) Homework: 15 %

(b) Quizzes: 15 %

(c) Labs: 30 %

(d) Tests: 40 %

Course Guidelines

Homework and Labs

A detailed calendar of due dates will be available on the course page on D2L as well as in the schedule at the end of the course outline. There will be some modifications to the schedule below based on reading break and holidays, but in general:

- I ask that you complete homework and test problems using the notation, formulas and techniques introduced in the lectures. A full formula sheet for the course is available on D2L**. Failure to do so will result in problems being awarded a grade of zero.**

- 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…)

- 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. (Lab #1 will be due the Friday of Week #2, etc.). Exceptions will apply when there are tests, in which case students will have two weeks to work on a lab if a due date corresponded to a test date. Students can access and work on the labs at any point during the week, with specific support for the labs available during the lab office hours.

- 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 for the first five days following the due date. After this, a completed lab or homework assignment earns a maximum mark of 50%.

- All late homework and lab assignments must be submitted by the last day of the term (11:59 PM on Saturday, April 17th); after this point, outstanding assignments will receive a mark of zero.

- 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.

Tests

- Tests must be completed during the specified synchronous time slot for the labs noted in the content schedule and must be submitted by the end of this timeslot; students experiencing any difficulty accessing or completing the test during the specified timeslot must **immediately** contact me for assistance by email (avisc@camosun.bc.ca) or phone (250-507-3361).

- Students who know in advance that the assigned test time will pose a problem for them (e.g. due to illness or family emergency) must contact me in advance of the test.

- **Late tests received without a suitable explanation will be assigned a mark of zero.**

Submission of Assignments and Tests

- Unless otherwise noted, Labs, Homework and Tests are to be submitted as a single .pdf file per submission using the Assignments drop box on D2L.

- In the event of any difficulty submitting assessments to D2L, students can email me their assignment (avisc@camosun.bc.ca). The same time deadlines will apply to emailed submissions.

Quizzes

- Short weekly asynchronous quizzes cover lecture material. The first week's quiz covers the details of the course outline and the School of Arts & Science Academic Honesty Guidelines. This quiz is available at the start of the first week and does not have a time limit.

- Subsequent quizzes will focus on lecture content. These quizzes will go live on Thursday of a given week and will be available until 11:59 PM on the Monday of the following week. Quizzes can be attempted at any point during this window, but once the quiz has been started, there is a 30 minute time limit.

- These subsequent quizzes will consist of 5 multiple choice questions based on the lecture material for a given week.

- Once quizzes have been graded, students can email me to regain half of the marks lost for wrong answers if they provide an explanation as to why the correct answer to a question is right.

Academic Integrity

- Students in this course are subject to the Camosun College Academic Integrity Policy available at the link below and mirrored on the D2L website. http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf

- You should read the above document thoroughly by the end of the first week of classes and be familiar with what constitutes academic misconduct. Failure to read this document or this course outline is not considered a valid excuse if you are found to have committed academic misconduct!

- You may also wish to consult the supporting documents on the Process for Documenting and Addressing Academic Misconduct (http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.1.pdf) as well as the Guide to Academic Misconduct and How to Address It. (http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.5.pdf)

- As there are unique forms of academic misconduct that can occur when a course is delivered entirely online, please be advised that I consider the following to be specific examples of academic misconduct, though this list is not exhaustive:

    - Communicating with classmates or other individuals during tests and quizzes
    - Posting homework, quiz, lab or test material to homework helper sites such as Chegg, Slader, CourseHero, etc…
    - Direct copying from any resources without approval of the instructor (including, but not limited to your classmates' work, online non-D2L resources, lab manual instructions, and an instructor's own posted solutions)
    - Having an individual (classmate, friend, professional tutor) complete work on your behalf
    - Sharing detailed information about tests, quizzes or assignments with students who have not yet taken the test or completed the assignment (In this case, all participating students will be penalized)
    - Copying data taken by another student in an individual lab exercise, or sharing your own data with other students.
    - Submission of any work that is not your own.

All students found to have committed any form of academic misconduct will be assigned an appropriate consequence as outlined in the Academic Integrity Policy.

- Please note that student academic misconduct is documented and kept on record in the Office of the Registrar. Repeated breaches of academic integrity within this course or across courses can lead to more significant consequences per the policy and its supporting documents.

- Students are encouraged to engage with the instructor to discuss any concerns around academic integrity or violations thereof. Should a student and the instructor disagree as to the outcome of a misconduct allegation, then the student may reach out to the department Chair for support.

Centre for Accessible Learning

- Certain students are eligible for special academic accommodations through the college's Centre for Accessible Learning (CAL). (http://camosun.ca/services/accessible-learning/). If you suspect that you are eligible for accommodations, please contact the Centre as soon as possible.

- If you have been provided with CAL accommodations, please contact me as early as possible with your letter of accommodations.

6. Grading System

[X] Standard Grading System (GPA)

[ ] Competency Based Grading System

7. Recommended Materials to Assist Students to Succeed Throughout the Course

8. College Supports, Services and Policies

Immediate, Urgent, or Emergency Support
If you or someone you know requires immediate, urgent, or emergency support (e.g. illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts @ http://camosun.ca/about/mental-health/emergency.html or http://camosun.ca/services/sexual-violence/get-support.html#urgent

College Services
Camosun offers a variety of health and academic support services, including counselling, dental, disability resource centre, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on each of these services, visit the **STUDENT SERVICES** link on the College website at http://camosun.ca/

College Policies
Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies. Policies are available on the College website at http://camosun.ca/about/policies/. Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Standards for Awarding Credentials, Involuntary Health and Safety Leave of Absence, Prior Learning Assessment, Medical/Compassionate Withdrawal, Sexual Violence, Student Ancillary Fees, Academic Integrity, Grade Review & Appeals, Student Misconduct and Academic Accommodations for Students with Disabilities and Student Penalties and Fines.

A. GRADING SYSTEMS http://camosun.ca/about/policies/index.html

The following two grading systems are used at Camosun College:

1. 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		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://camosun.ca/about/policies/index.html 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 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	*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.

Tentative Class Schedule

Below is a tentative class schedule including a recommended pacing schedule for working through the asynchronous lecture videos and labs. Updates to this schedule will be posted on D2L

Date	Suggested Lecture Schedule / Weekly Lab	Synchronous Delivery	Due Dates
WEEK #1			
Mon. Jan. 11th	1.1: Unit Conversions	Drop in support on Blackboard Collaborate	
Tues. Jan. 12th	1.2: Vectors and Vector Addition	Office Hours	
Weds. Jan. 13th	Lab #1: Measurement Uncertainties	Lab Office Hours	
Thurs. Jan. 14th	1.3: Vector Components	Office Hours	
Fri. Jan. 15th	1.4: Unit vectors	Tutorial	
WEEK #2			
Mon. Jan. 18th	1.5: Products of vectors Part 1 (Dot product)	Tutorial	Quiz #1 by 11:59 PM
Tues. Jan. 19th	1.5: Products of vectors Part 2 (Cross product)	Office Hours	
Weds. Jan. 20th	Lab #2: Components of a Vector	Lab Office Hours	HW Week #1 by 11:59 PM
Thurs. Jan. 21st	2.1: Displacement, time and average velocity and 2.2: Instantaneous velocity and acceleration.	Office Hours	
Fri. Jan. 22nd	2.3: Average and Instantaneous acceleration	Tutorial	Lab #1 by 11:59 PM
WEEK #3			
Mon. Jan. 25th	2.4: Motion w/ constant acceleration.	Tutorial	Quiz #2 by 11:59 PM
Tues. Jan. 26th	2.5: Free-fall	Office Hours	
Weds. Jan. 27th	Lab #3: 1-D Kinematics with Tracker	Lab Office Hours	HW Week #2 by 11:59 PM
Thurs. Jan. 28th	2.6: Velocity and Position by Integration Part 1	Office Hours	
Fri. Jan. 29th	2.6: Velocity and Position by Integration Part 2	Tutorial	Lab #2 by 11:59 PM
WEEK #4			
Mon. Feb. 1st	3.1: Kinematics in 2-D and 3-D	Tutorial	Quiz #3 by 11:59 PM
Tues. Feb. 2nd	3.2: Projectile Motion	Office Hours	
Weds. Feb. 3rd	Test #1		Test #1 by 10:30 AM HW Week #3 by 11:59 PM
Thurs. Feb. 4th	4.1: Review of Forces 4.2: Newton's First Law	Office Hours	
Fri. Feb. 5th	4.3: Newton's Second Law	Tutorial	
WEEK #5			
Mon. Feb. 8th	4.4: Dynamics w/ Inclines;	Tutorial	Quiz #4 by 11:59 PM
Tues. Feb. 9th	4.5: Problems Involving Friction	Office Hours	
Weds. Feb. 10th	Lab #4: Graphing and Lab Reports	Lab Office Hours	HW Week #4 by 11:59 PM
Thurs. Feb. 11th	4.6: Newton's 3rd Law and Connected Objects	Office Hours	
Fri. Feb. 12th	4.7: Dynamics of Circular Motion	Tutorial	Lab #3 by 11:59 PM

Date	Suggested Lecture Schedule / Weekly Lab	Synchronous Delivery	Due Dates
WEEK #6	**READING BREAK**		
Mon. Feb. 15th	Family Day		Quiz #5 by 11:59 PM
Tues. Feb. 16th	Reading Break		
Weds. Feb. 17th	Reading Break		
Thurs. Feb. 18th	Reading Break		
Fri. Feb. 19th	Reading Break		
WEEK #7			
Mon. Feb. 22nd	5.1: The Work/ KE Theorem;	Tutorial	Lab #4 by 11:59 PM HW Week #5 by 11:59 PM
Tues. Feb. 23rd	5.2: Work and Energy w/ Variable Forces	Office Hours	
Weds. Feb. 24th	Lab #5: Projectile Motion	Lab Office Hours	
Thurs. Feb. 25th	5.3: Power and 5.4: Potential Energy	Office Hours	
Fri. Feb. 26th	5.4: Potential Energy	Tutorial	
WEEK #8			
Mon. Mar. 1st	5.5: Conservation of Energy with Non-Conservative Forces	Tutorial	Quiz #6 by 11:59 PM
Tues. Mar. 2nd	7.1: Coulomb's Law	Office Hours	
Weds. Mar. 3rd	Lab #6: Atwood's Machine	Lab Office Hours	HW Week #7 by 11:59 PM
Thurs. Mar. 4th	7.2: Electric Fields (Part 1)	Office Hours	
Fri. Mar. 5th	7.2: Electric Fields (Part 2)	Tutorial	Lab #5 by 11:59 PM
WEEK #9			
Mon. Mar. 8th	7.3: Electrical Potential Energy	Tutorial	Quiz #7 by 11:59 PM
Tues. Mar. 9th	7.3: Electrical Potential Energy and 7.4: Electric Potential	Office Hours	
Weds. Mar. 10th	Test #2		Test #2 by 10:30 AM HW Week#8 by 11:59 PM
Thurs. Mar. 11th	7.4: Electric Potential	Office Hours	
Fri. Mar. 12th	8.1: Current, Resistance and EMF	Tutorial	
WEEK #10			
Mon. Mar. 15th	8.2: Power and 8.3: Kirchoff's Rules	Tutorial	Quiz #8 by 11:59 PM
Tues. Mar. 16th	8.3: Kirchoff's Rules	Office Hours	
Weds. Mar. 17th	Lab #7: Kirchoff's Rules	Lab Office Hours	HW Week #9 by 11:59 PM
Thurs. Mar. 18th	9.1: Introduction to Magnetism	Office Hours	
Fri. Mar. 19th	9.2: Forces on Charges in Magnetic Fields;	Tutorial	Lab #6 by 11:59 PM
WEEK #11			
Mon. Mar. 22nd	9.3: Motion of a Charge in a Uniform B-Field	Tutorial	Quiz #9 by 11:59 PM
Tues. Mar. 23rd	6.1: Impulse and Momentum	Office Hours	
Weds. Mar. 24th	Lab #8: Conservation of Momentum	Lab Office Hours	HW Week #10 by 11:59 PM
Thurs. Mar. 25th	6.2: Conservation of Momentum in 1-D	Office Hours	
Fri. Mar. 26th	6.3: Centre of Mass	Tutorial	Lab #7 by 11:59 PM

Date	Suggested Lecture Schedule / Weekly Lab	Synchronous Delivery	Due Dates
WEEK #12			
Mon. Mar. 29th	10.1: Angular Acceleration	Tutorial	Quiz #10 by 11:59 PM
Tues. Mar. 30th	10.2: Rotation with Constant Angular Velocity	Office Hours	
Weds. Mar. 31st	Test #3	Lab Office Hours	Test #3 by 10:30 AM HW Week #11 by 11:59 PM
Thurs. Apr. 1st	10.3: Relating Angular and Linear Quantities	Office Hours	
Fri. Apr. 2nd	**Good Friday – No Class**	Tutorial	
WEEK #13			
Mon. Apr. 5th	**Easter Monday – No Class**	Tutorial	Quiz #11 by 11:59 PM
Tues. Apr. 6th	10.4: Moment of Inertia Calculations	Office Hours	
Weds. Apr. 7th	Lab #9: Rotational Inertia	Lab Office Hours	HW Week #12 by 11:59 PM
Thurs. Apr. 8th	10.5: Torque and Angular Acceleration	Office Hours	
Fri. Apr. 9th	10.5: Torque and Angular Acceleration	Tutorial	Lab #8 by 11:59 PM
WEEK #14			
Mon. Apr. 12th	10.6: Energy in Rotational Motion;	Tutorial	Quiz #12 by 11:59 PM
Tues. Apr. 13th	10.7: Static Equilibrium;	Office Hours	
Weds. Apr. 14th	Lab #9 Office Hours Part 2	Lab Office Hours	HW Week#13 by 11:59 PM
Thurs. Apr. 15th	10.7: Static Equilibrium;	Office Hours	
Fri. Apr. 16th	10.8: Angular Momentum	Tutorial	
Sat. Apr. 17th	**All outstanding labs and homework due by 11:59 PM**		Lab #9 by 11:59 PM