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

PHYS-140-001
Physics for Science/ENGR 1
Winter 2020

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	Stephanie Ingraham		
(b) Office hours	Mon, Tues, Thurs: 11:30 am -12:20 pm, Wed: 1:30- 2:20 pm, Fri: 12:30-1:20 pm (or by appointment)		
(c) Location	F346C		
(d) Phone	250-370-3513	**Alternative:**	
(e) E-mail	IngrahamS@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: Physics for Scientists and Engineers, *4th Edition*, Knight, R.D. (Optional)

(b) Other: Physics 140/141 Laboratory Manual, Scientific Calculator, Ruler

4. Course Content and Schedule

Mon.,Tue., Wed., Thu.:	Lecture:	4:30 – 5:20 PM	Fisher 322
Fri.:	Lab:	10:30 PM – 12:20 PM	Fisher 322

Tests are scheduled for the following dates and will be held in the lab period:

Test #1: Friday, January 31st
Test #2: Friday, February 28th
Test #3: Friday, March 27th

5. Basis of Student Assessment (Weighting)

(a) Homework: 10 %
(b) Quizzes: 5 %
(c) Labs: 25 %
(d) Term Tests: 30%
(e) Final: 30%

COURSE SPECIFIC POLICIES

- Homework problems for a particular week will be marked for completeness. They will be due at the **beginning of the lecture** on the Thursday of each week. Any time after this will be considered late. See below for late policies.

- Short, five minute multiple choice quizzes will be delivered at the start of each Monday's lecture class. These will be based on the previous week's material and the corresponding multiple choice questions found online through D2L.

- Labs for a particular week will be due by the beginning of the lab one week following the lab. Any changes in due dates or timelines will be posted on the D2L news feed.

- Each student is allowed one “dropped” or “missed” lab.

PHYSICS DEPARTMENT GUIDELINES REGARDING TESTING AND GRADING:

- 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.

- Students must write quizzes, tests, midterm tests, etc., on the date and time assigned by the instructor. Missed exams normally receive a zero grade. Instructors are not required to provide make-up tests. At their discretion, instructors may waive a test in exceptional circumstances such as medical issues or a documented illness.

- Any outstanding homework or labs must be submitted prior to the last day of classes, and will be graded according to the late policy outlined by the instructor.

- Refer to your instructor’s information page for any additional policies regarding testing and grade calculation.

PHYSICS DEPARTMENT GUIDELINES REGARDING LABS:

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

- Attendance is mandatory & you may be required to “sign in” at the beginning of each lab period. 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.

- Unless otherwise stated by your instructor late penalties are as follows: For overdue labs (or assignments), a late penalty of 1 mark per day (10%) will be assessed for the first five days following the due date. After this date a complete report is still required and earns a maximum mark of 50%.

- At the discretion of the instructor, a student who is repeating this Physics course with a laboratory grade of 70% or higher may apply for lab exemption.

- Students will complete a minimum of 9 laboratory experiments including 3 formal reports (with full uncertainty calculations) and at least at least one lab using technology to perform data analysis.

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 and Misconduct, Student Ancillary Fees, Student Appeals, Student Conduct, 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

Note that the lecture topics may vary by one or two days. Any changes to scheduled labs will be posted on D2L.

Date	Lecture Topic: P140-001
WEEK #1	
Monday, Jan. 6th	Introduction/1.1: Unit Conversions
Tuesday, Jan. 7th	1.2: Vector Addition / Subtraction
Wednesday, Jan. 8th	1.3: Vector Components
Thursday, Jan. 9th	1.4: Unit Vectors/1.5: Products of Vectors
Friday, Jan. 10th	Lab: Measurement Uncertainties
WEEK #2	
Monday, Jan. 13th	1.5: Products of Vectors
Tuesday, Jan. 14th	2.1: Displacement, Time, Avg. Velocity
Wednesday, Jan. 15th	2.2: Instantaneous Velocity
Thursday, Jan. 16th	2.3: Avg. and Instantaneous Acceleration
Friday, Jan. 17th	Lab: Components of a Vector
WEEK #3	
Monday, Jan. 20th	2.4: Kinematics with Constant Accel./2.5: Free-Fall
Tuesday, Jan. 21st	2.6: Velocity and Position by Integration
Wednesday, Jan. 22nd	2.6: Velocity and Position by Integration
Thursday, Jan. 23rd	3.1: Kinematics in 2-D and 3-D
Friday, Jan. 24th	Lab: 1D Kinematics
WEEK #4	
Monday, Jan. 27th	3.2: Projectile Motion
Tuesday, Jan. 28th	3.3: Circular Motion/4.1: Review of Forces
Wednesday, Jan. 29th	4.2: Newton's 1st Law, 4.3: Newton's 2nd Law
Thursday, Jan. 30th	4.4: Dynamics Problems with Inclined Planes
Friday, Jan. 31st	**Test 1**
WEEK #5	
Monday, Feb. 3rd	4.5: Problems Involving Friction
Tuesday, Feb. 4th	4.6: Newton's 3rd Law / Connected Objects
Wednesday, Feb. 5th	4.6: Newton's 3rd Law / Connected Objects/4.7: Dynamics of Circular Motion
Thursday, Feb. 6th	5.1: The Work / 5.2 The Work-KE Theorem
Friday, Feb. 7th	Lab: 2D Kinematics
WEEK #6	
Monday, Feb. 10th	5.3: Work and Energy with Variable Forces
Tuesday, Feb. 11th	5.4: Power/5.5: Gravitational Potential Energy
Wednesday, Feb. 12th	5.6 Conservation of Energy/5.7 Elastic Potential Energy
Thursday, Feb. 13th	5.8: Conservative and Non-Conservative Forces/5.10 Energy Diagrams
Friday, Feb. 14th	Lab: Newton's 2nd Law
WEEK #7	
Monday, Feb. 17th	No Class- Family Day
Tuesday, Feb. 18th	Reading Break
Wednesday, Feb. 19th	Reading Break
Thursday, Feb. 20th	Reading Break
Friday, Feb. 21st	Reading Break
WEEK #8	
Monday, Feb. 24th	6.1: Coulomb's Law
Tuesday, Feb. 25th	6.2: Electric Fields
Wednesday, Feb. 26th	6.2: Electric Fields / 6.3: Electric Potential Energy
Thursday, Feb. 27th	6.3: Electric Potential Energy
Friday, Feb. 28th	**Test 2**

WEEK #9	
Monday, Mar. 2nd	6.4: Electric Potential
Tuesday, Mar. 3rd	6.4: Electric Potential
Wednesday, Mar. 4th	7.1: Current, Resistance and EMF
Thursday, Mar. 5th	7.1: Current Resistance and EMF/ 7.2: Power
Friday, Mar. 6th	Lab: Electric Fields
WEEK #10	
Monday, Mar. 9th	7.3: Kirchoff's Rules
Tuesday, Mar. 10th	7.3: Kirchoff's Rules
Wednesday, Mar. 11th	8.1: Introduction to Magnetism
Thursday, Mar. 12th	8.2: Forces on Charges in B-Fields
Friday, Mar. 13th	Lab: Resistivity of Nichrome
WEEK #11	
Monday, Mar. 16th	8.3: Motion of a Charge in a Uniform B-Field
Tuesday, Mar. 17th	8.4: Force on a Current-Carrying Conductor
Wednesday, Mar. 18th	9.1: Impulse and Momentum
Thursday, Mar. 19th	9.2: Conservation of Momentum
Friday, Mar. 20th	Lab: Kirchoff's Laws
WEEK #12	
Monday, Mar. 23rd	9.3: Collisions in 2-D / 9.4: Centre of Mass
Tuesday, Mar. 24th	9.4: Centre of Mass
Wednesday, Mar. 25th	10.1: Angular Acceleration
Thursday, Mar. 26th	10.2: Angular Kinematics
Friday, Mar. 27th	**Test 3**
WEEK #13	
Monday, Mar. 30th	10.3: Relating Angular and Linear Quantities
Tuesday, Mar. 31st	10.4: Energy in Rotational Motion
Wednesday, April 1st	10.5: Moment of Inertia Calculations/10.6: The Parallel Axis Theorem
Thursday, April 2nd	10.7: Torque
Friday, April 3rd	Lab: Conservation of Momentum
WEEK #14	
Monday, April 6th	10.8: Torque and Angular Acceleration
Tuesday, April 7th	10.9: Work and Power in Rotational Motion
Wednesday, April 8th	10.10: Static Equilibrium
Thursday, April 9th	10.11: Angular Momentum
Friday, April 10th	No Class