

	<p style="text-align: center;"> School of Arts & Science PHYSICS DEPARTMENT PHYS 115 Fundamentals of Physics 2 2011 Spring (May-June) </p>
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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. Instructor Information

(a)	Instructor:	Christopher Avis		
(b)	Office Hours:	Monday, Wednesday 1:30-3:00 (or by appointment)		
(c)	Location:	Fisher 314A		
(d)	Phone:	(250) 370-3445	Alternative Phone:	
(e)	Email:	AvisC@camosun.bc.ca		
(f)	Website:	D2L (online.camosun.ca)		

2. Intended Learning Outcomes

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

1. Solve technical problems for objects undergoing uniform and non-uniform circular motion, and calculate centripetal forces and acceleration.
2. Solve technical problems using calculus involving work by constant and non-constant forces, the work-energy theorem, gravitational and elastic potential energy, in two and three dimensions.
3. Solve technical problems utilizing the concept of conservation of momentum of isolated systems, including elastic and inelastic collisions, the coefficient of restitution, and momentum conservation of systems of particles involving mass changes.
4. Define the rotational kinematic quantities angular velocity and angular acceleration. Transform between linear and rotational quantities. Use the rotational form of Newton's 2nd Law to solve dynamics problems. Calculate work, energy and power for rotational systems.
5. Calculate the centre-of-mass and moment-of-inertia for uniform objects. Use the parallel-axis theorem for moment-of-inertia calculations. Perform calculations and answer conceptual questions using torques. Solve equilibrium problems for non-concurrent forces.
6. Solve technical problems involving the translational and rotational conditions of mechanical equilibrium of rigid systems.
7. Solve technical problems involving the electrostatic force, the electric field, and the electric potential of point charges.
8. Solve technical problems involving magnetic forces on moving charges, current-carrying wires, and practical applications of magnetism in science and technology.
9. Assemble experimental apparatus using written instructions.
10. Observe, record, organize and display data in tables, graphs or charts.
11. Analyze linear graphs (determine area, slope, intercept, etc.).
12. Observe and record sources of error and estimate the range of uncertainty in results.
13. Interpret meaning of experimental results in the context of the experimental objectives.
14. Write scientific reports in an acceptable, traditional format.

3. Required Materials

- (a) Physics for Scientists and Engineers, R. A. Serway and J. W. Jewett, jr., 7th edition, Thomson, 2008
- (b) PHYS 114/115 Lab Manual (Camosun College), graph paper (millimeter scale), scientific calculator

4. Course Content and Schedule

Lectures: Monday, Wednesday, Friday: 11:30-1:20; Tuesday, Thursday: 11:30-12:20
Labs: Tuesday, Thursday: 12:30-2:20

5. Basis of Student Assessment (Weighting)

- (a) Final Exam: 50%
- (b) Midterm Exams (Best 2 out of 3) 25%
- (c) Homework Assignments 12.5%
- (d) Laboratory Reports 12.5%

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
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 on page 39, “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 and handed in prior to the date of the final exam with an overall grade of 60% in order to obtain credit for the course. 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 10 and 20 hours per week (or more for students with a weak background) studying for this course outside of class time.

OUTLINE:

1. **Circular Motion (Sections 4.4, 4.5 and Sections 6.1, 6.2)**

- 1.1 Uniform circular motion
- 1.2 Tangential and radial acceleration
- 1.3 Newton’s second law and uniform circular motion
- 1.4 Non-uniform circular motion

2. **Energy and Energy Transfer (Chapter 7.1 – 7.8)**

- 2.1 Work done by a constant force
- 2.2 Scalar product (review from P114)
- 2.3 Work done by a varying force
- 2.4 Kinetic energy and the work-energy theorem
- 2.5 The non-isolated system – Conservation of energy
- 2.6 Situations involving kinetic friction
- 2.7 Power

3. **Potential Energy (Chapter 8.1 – 8.5)**

- 3.1 Potential energy of a system
- 3.2 The isolated system – Conservation of mechanical energy
- 3.3 Conservative and non-conservative forces
- 3.4 Changes in mechanical energy for non-conservative forces

4. **Linear momentum and Collisions (Chapter 9.1 – 9.6)**

- 4.1 Linear momentum and its conservation
- 4.2 Momentum and impulse
- 4.3 Collisions in one-dimension and two-dimensions
- 4.4 The center of mass

5. **Rotational Kinematics and Dynamics (Chapter 10)**

- 5.1 Angular position, velocity and acceleration
- 5.2 Rotational kinematics
- 5.3 Angular and linear quantities
- 5.4 Rotational kinetic energy
- 5.5 Moments of Inertia of homogeneous rigid objects
- 5.6 Torque and angular acceleration
- 5.7 Work, power and energy in rotational motion
- 5.8 Rolling motion of a rigid object

6. **Torque and Equilibrium (Chapter 11.2 and Chapter 12.1 – 12.3)**

- 6.1 Vector product (review from P114) and torque – Section 11.1
- 6.2 Conditions for equilibrium
- 6.3 Center of gravity
- 6.4 Examples of objects in static equilibrium

7. **Electric Fields and Electric Potential (Chapter 23 and Sections 25.1 - 25.3)**

- 7.1 Properties of electric charges
- 7.2 Charging objects by induction
- 7.3 Coulomb's law
- 7.4 The electric field
- 7.5 Electric field lines
- 7.6 Motion of charged particles in a uniform E-field
- 7.7 Potential difference and electric potential – Section 25.1
- 7.8 Potential differences in a uniform E-field – Section 25.2
- 7.9 Electric Potential energy – Section 25.3

8. **Magnetic Fields (Chapter 29.1 – 29.5)**

- 8.1 Magnetic fields and forces
- 8.2 Magnetic force on a current-carrying conductor
- 8.3 Torque on a current loop in a uniform B-field
- 8.4 Motion of a charged particle in a uniform B-field
- 8.5 Applications involving charged particles moving in a B-field

9. **Oscillatory Motion (Chapter 15)**

- 9.1 Simple harmonic motion
- 9.2 Energy of the simple harmonic oscillator
- 9.3 SHM and circular motion

- 9.4 The pendulum
- 9.5 Damped and forced oscillations
- 9.6 Reflection and Transmission

Date	Lecture Topic	Lab Topic	Formal / Informal
Monday, May 9 th	Introduction / Energy & Energy Transfer		
Tuesday, May 10 th	Energy and Energy Transfer	Lab Expectations	
Wednesday, May 11 th	Energy and Energy Transfer		
Thursday, May 12 th	Potential Energy	Ballistic Pendulum	Informal
Friday, May 13 th	Potential Energy		
Monday, May 16 th	Potential Energy		
Tuesday, May 17 th	Linear Momentum / Collisions	Conservation of Momentum – Part 1	Formal
Wednesday, May 18 th	Linear Momentum / Collisions		
Thursday, May 19 th	Linear Momentum / Collisions	Conservation of Momentum – Part 2	Formal
Friday, May 20 th	Linear Momentum / Collisions		
Monday, May 23 rd	NO CLASS (VICTORIA DAY)		
Tuesday, May 24 th	Circular Motion	Tutorial # 1	
Wednesday, May 25 th	Circular Motion		
Thursday, May 26 th	Midterm # 1	Circular Motion	Informal
Friday, May 27 th	Rotational Motion		
Monday, May 30 th	Rotational Motion		
Tuesday, May 31 st	Rotational Motion	Rotational Inertia	Formal
Wednesday, June 1 st	Rotational Motion		
Thursday, June 2 nd	Torque and Equilibrium	Equilibrium 1	Informal
Friday, June 3 rd	Torque and Equilibrium		
Monday, June 6 th	Electric Fields and Potential		
Tuesday, June 7 th	Electric Fields and Potential	Tutorial # 2	
Wednesday, June 8 th	Catch up class		
Thursday, June 9 th	Midterm # 2	Electric Fields	
Friday, June 10 th	Electric Fields and Potential		
Monday, June 13 th	Electric Fields and Potential		
Tuesday, June 14 th	Magnetic Fields	Motion of Charges in a Magnetic Field	Formal
Wednesday, June 15 th	Magnetic Fields		
Thursday, June 16 th	Magnetic Fields	Magnetic Forces on a Current Carrying Wire	Informal
Friday, June 17 th	Magnetic Fields		
Monday, June 20 th	Oscillatory Motion		
Tuesday, June 21 st	Oscillatory Motion	Tutorial # 3	
Wednesday, June 22 nd	Oscillatory Motion		
Thursday, June 23 rd	Midterm # 3		

Friday, June 24 th	Free class: catch up /review		
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