CAMOSUN COLLEGE	**School of Arts & Science** **PHYSICS DEPARTMENT** **PHYS 114** **Fundamentals of Physics 1** **Quarter or Semester/Year**

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:	Ed Nelson		
(b)	Office Hours:			
(c)	Location:	TECH 219/F 346C		
(d)	Phone:	250-370-4711	Alternative Phone:	
(e)	Email:	nelson@camosun.bc.ca		
(f)	Website:			

2. Intended Learning Outcomes

(No changes are to be made to these Intended Learning Outcomes as approved by the Education Council of Camosun College.)

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

1. Demonstrate proficiency in solving vector algebra problems, including coordinate system conversions, use of unit vectors, vector addition, dot product, and cross product.
2. Solve technical problems for objects undergoing uniform and non-uniform circular motion, and calculate centripetal forces and acceleration.
3. Solve technical problems involving particle kinematics and dynamics with non-constant force using calculus in two and three dimensions.
4. 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.
5. 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.
6. 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.
7. 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.
8. Solve technical problems involving the translational and rotational conditions of mechanical equilibrium of rigid systems.
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 a correct format.

3. Required Materials

(a) "Physics for Scientists and Engineers" 7th ed. or 8th ed., Thomson 2008, Serway and Jewett

(b) PHYS 114/115 Lab Manual; Lab note book; calculator; graph paper; drawing instruments

4. Course Content and Schedule

Lecture W, Th 2:30 – 4:20 pm F322
Laboratory M 2:30 – 4:20 pm F322

5. Basis of Student Assessment (Weighting)

(a) Final Exam 50%

(b) Quizzes 5%

(c) Homework 5%

(d) Midterms 25% (4 scheduled; top 3 of 4 will be counted)

(e) Lab Reports 15%

6. Grading System

(No changes are to be made to this section unless the Approved Course Description has been forwarded through the Education Council of Camosun College for approval.)

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	*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, 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. *(For these courses a final grade will be assigned to either the 3rd course attempt or at the point of course completion.)*
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.

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.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED

OUTLINE:

1. **Introduction – REVIEW (Chpt 1)**
   - 1.1 Standards of Length, Mass, and Time
   - 1.2 SI Units, Derived Units, Unit Conversion

2. **Vectors and Vector Mathematics (Ref. Chpt. 3, 7 and 11)**
   - 2.1 Co-ordinate Systems
   - 2.2 Vectors and Scalars
   - 2.3 Properties of Vectors
   - 2.4 Unit Vectors and Vector Components
   - 2.5 Scalar Product
   - 2.6 Vector Product

3. **Motion in One Dimension (Ref. Chpt. 2)**
   - 3.1 Position, Velocity and Speed
   - 3.2 Instantaneous Velocity and Acceleration
   - 3.3 Motion Diagrams
   - 3.4 One Dimensional Motion with Constant Acceleration
   - 3.5 Kinematics Equations Derived from Calculus

4. **Motion in Two and Three Dimensions (Ref. Chpt. 4)**
   - 4.1 Position, Velocity and Acceleration Vectors
   - 4.2 Two Dimensional Motion with Constant Acceleration
   - 4.3 Projectile Motion

5. **Circular Motion (Ref. Chpt. 4)**
   - 5.1 Uniform Circular Motion
   - 5.2 Tangential and Radial Acceleration

6. **Dynamics (Ref. Chpt. 5 and 6)**
   - 6.1 Concept of Force
   - 6.2 Newton's First and Second Laws of Motion
   - 6.3 Gravitational Force and Weight
   - 6.4 Newton's Third Law of Motion
   - 6.5 Friction
   - 6.6 Newton's Second Law and UCM
   - 6.7 Non-Uniform Circular Motion
   - 6.8 Accelerated Reference Frames

7. **Work and Energy (Ref. Chpt. 7)**
   - 7.1 Work Done by a Constant Force
   - 7.2 Scalar Product
   - 7.3 Work done by Non-Constant Force

7.4 Kinetic Energy and the Work-Energy Theorem
7.5 Conservation of Energy (non-isolated system)
7.6 Work Done by Kinetic Friction
7.7 Mechanical Power

8. **Potential Energy (Ref. Chpt. 8)**
   8.1 Potential Energy of a System
   8.2 Conservation of Energy (isolated system)
   8.3 Conservative and Non-conservative forces
   8.4 Changes in Mechanical Energy for Non-Conservative Forces
   8.5 Conservative Forces and Potential Energy
   8.6 Elastic Potential Energy

9. **Linear Momentum and Collisions (Ref. Chpt. 9)**
   9.1 Linear Momentum and Conservation
   9.2 Momentum and Impulse
   9.3 Collisions in One Dimension and Two Dimensions
   9.4 The Centre of Mass

10. **Rotational Kinematics and Dynamics (Ref. Chpt. 10)**
   10.1 Angular position, velocity and acceleration
   10.2 Rotational kinematics
   10.3 Angular and linear quantities
   10.4 Rotational Kinetic Energy
   10.5 Moments of Inertia of homogeneous rigid objects
   10.6 Torque and angular acceleration
   10.7 Work, energy and power in rotational motion
   10.8 Rolling motion of a rigid object