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

PHYS-157-001
Physics for Electronics
Winter 2018

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	Ed Nelson			
(b) Office hours	MW 1:30 – 2:30; T 2:30 – 3:30; ThF 12:30 – 1:30			
(c) Location	TECH 218			
(d) Phone	250 370 4435	**Alternative:**		
(e) E-mail	nelson@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 involving distance, displacement, speed, velocity and acceleration in one and two dimensions.
2. Solve problems involving the application of Newton's Laws to two or more bodies moving in one and two dimensions.
3. Solve technical problems involving torque and rotational motion.
4. Solve technical problems involving work, energy, and power.
5. Define and describe the following properties of waves: period, frequency, wave speed, and amplitude. State the principal of superposition and understand the properties of waves undergoing constructive and destructive interference.
6. Define and describe Simple Harmonic Motion.
7. Solve technical problems involving light reflection, refraction, critical angle and total internal reflection applications.
8. Use fundamental thermal physics, including thermometry conversions, to perform calculations involving calorimetry and specific heat.
9. Use the principles of static electricity to solve problems involving the Coulomb force, electric fields, and electric fields in capacitors.
10. Describe and solve problems involving insulators, conductors and semiconductors.
11. Describe the effects of magnetic fields, and perform calculations involving Faradays Law and Induction.
12. Assemble simple experimental apparatus using written instructions.
13. Observe record, organize and display data in tables, graphs or charts.
14. Analyze linear graphs (determine area, slope, intercept, etc.).
15. Interpret meaning of experimental results in the context of the experimental objectives.

3. Required Materials

(a) "College Physics", Knight, Jones, and Field, 3rd edition, Pearson (Publisher)
(b) PHYS 157 Lab Manual

(c) Graph Paper Package
(d) Basic Scientific Calculator; Drawing Set

4. Course Content and Schedule

LEC T Th F 1:30 – 2:20 TECH 177
SEM W 12:30 – 1:20 TECH 222 (A); 11:30 -12:20 TECH 222 (B)
LAB F

OUTLINE:

1. **Kinematics in One and Two Dimensions**
   - 1.1 SI Units, Unit Conversions, and Significant Figures
   - 1.2 Kinematic Equations for One Dimensional Motion
   - 1.3 Vector Algebra in Two Dimensions
     - 1.3.1 Vector Algebra Diagrams
     - 1.3.2 Vector Algebra by Components
     - 1.3.3 Kinematics in Two Dimensions – Projectile Motion

2. **Dynamics in One and Two Dimensions**
   - 2.1 Newton's Laws of Motion
     - 2.1.1 Newton's 2nd Law of Motion
     - 2.1.2 Mass and Weight
     - 2.1.3 Equilibrium in One and Two Dimensions
     - 2.1.4 Newton's 3rd Law of Motion
   - 2.2 Interacting Objects
     - 2.2.1 Objects connected by ropes
     - 2.2.2 Contact forces between objects

3. **Torque and Rotational Motion**
   - 3.1 Uniform Circular Motion
     - 3.1.1 Centripetal Acceleration and Force
     - 3.1.2 Equations of Uniform Circular Motion
   - 3.2 Torque
     - 3.2.1 Definition
     - 3.2.2 Definition of Moment of Inertia
   - 3.3 Accelerated Rotational Motion
     - 3.3.1 Equations of Rotational Kinematics

4. **Work and Energy and Power**
   - 4.1 Concept of work
   - 4.2 Mechanical energy
     - 4.2.1 Kinetic energy
     - 4.2.2 Gravitational Potential energy
     - 4.2.3 Elastic Potential energy
   - 4.3 Conservation of energy
   - 4.4 Power

5. **Simple Harmonic Motion**
   - 5.1 Hooke's Law
   - 5.2 Oscillations
     - 5.2.1 Amplitude, Frequency, Period
     - 5.2.2 Energy in Simple Harmonic Motion
     - 5.2.3 Damped Oscillations (descriptive)

6. **Waves and Superposition of Wave**
   - 6.1 Travelling Waves
     - 6.1.1 Types of Travelling Waves
     - 6.1.2 Mathematical Description of Travelling Waves

6.2 Standing Waves
6.2.1 Standing Waves on Strings
6.2.2 Standing Waves in Air

7. **Geometric Optics**
7.1 Ray Model of Light
7.2 Law of Reflection
7.2.1 Plane Mirrors
7.2.2 Spherical Mirrors
7.3 Law of Refraction
7.3.1 Snell's Law
7.3.2 Lenses
7.3.3 Total Internal Reflection
7.4 Dispersion

8. **Thermal Physics**
8.1 Temperature Scales
8.1.1 Temperature Conversions
8.1.2 Thermometers
8.2 Thermal Energy
8.2.1 Specific Heat
8.2.2 Phases of Matter and Phase Changes
8.2.3 Latent Heats
8.3 Calorimetry
8.4 Thermistors
8.4.1 Properties
8.4.2 Methods of Use
8.5 Thermocouples
8.5.1 Properties
8.5.2 Methods of Use

9. **Electrostatics**
9.1 Electric Charge
9.1.1 Properties
9.1.2 Fundamental Unit of Charge
9.2 Coulomb's Law
9.3 Electric Field
9.4 Electric Field in Capacitors

10 Magnetism and Magnetic Induction
10.1 Sources of the Magnetic Field
10.1.1 Naturally Occurring Magnetism
10.1.2 Solenoids
10.2 The Right Hand Rule (sources)
10.3 Magnetic Forces on Current-Carrying Wires
10.3.1 DC Motor
10.4 Magnetic Induction (definition)
10.5 Motional Electromotive Force
10.5.1 The Generator
10.6 Magnetic Flux
10.7 Faraday's Law of Induction

5. Basis of Student Assessment (Weighting)

(a)	Weekly Assignments	5%
(b)	Weekly Quizzes	5%
(c)	Midterms	30% (Best 3 out of 4)
(d)	Labs (MANDATORY)	10%
(e)	Final Exam	50%

6. Grading System

[X] Standard Grading System (GPA)

[ ] Competency Based Grading System

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

N/A

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.