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

***PHYS-157-001***
***Physics for Electronics***
***Winter 2019***

# 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** | M 1:30 – 2:20;T 12:30 – 2:20; F 11:30 – 1:20 | | |
| **(c) Location** | Office TECH 218 | | |
| **(d) Phone** | 250 370 4435 | **Alternative:** | |
| **(e) E-mail** | nelson@camosun.bc.ca | | |
| **(f) Website** | online.camosun.bc.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 MTWTh 9:30 – 10:20
LAB F 2:30 – 4:20

## 5. Basis of Student Assessment (Weighting)

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

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.

## 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. |

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