



School of Arts & Science  
PHYSICS DEPARTMENT

PHYS 150-X02 A/B  
Technical Physics 1  
2008 Q1

## COURSE OUTLINE

The Approved Course Description is available on the web @ \_\_\_\_\_

- Please note: this outline will be electronically stored for five (5) years only.  
It is strongly recommended students keep this outline for your records.

Physics 150 is a first course to introduce students to the nature of physics with applications from technology. This is also recommended for students who took Physics 11 several years ago. Various topics including measurements & units, graphical analysis, 1-D kinematics, 1-D dynamics, work & energy are studied with the goal of introducing students to some concepts and the methodology of problem solving and data analysis.

OFFERED:	Q1, Q2
CREDIT:	3
IN-CLASS WORKLOAD:	4 lecture, 2 lab (alt. weeks), 1 seminar
PRE-/CO-REQUISITES:	Math 063 or Math 172 or Math11 or assessment

### 1. Instructor Information

(a)	Instructor:	Ed Nelson		
(b)	Office Hours:	10:30 – 11:30 MTThF		
(c)	Location:	TECH 263 / TECH 221 / FISHER 314D		
(d)	Phone:	370-3515	Alternative Phone:	
(e)	Email:	<a href="mailto:nelson@camosun.bc.ca">nelson@camosun.bc.ca</a>		
(f)	Website:			

### 2. Intended Learning Outcomes

(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)

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

1. Define the scientific method and give examples of its application. Define and give examples of precision and accuracy.
2. Round measurements to the correct number of significant figures. Express numbers using scientific notation.
3. Use the SI system of units to express measurements. Identify and use SI base units, prefixes, and derived units. Perform unit conversions within the SI system. Use the Imperial and U.S. Customary system of units and perform conversions to and from the S.I. system.
4. Construct graphs using a Cartesian coordinate system. Plot data and label the graph correctly, including a title and axes labels. Analyze linear graphs, including

- drawing a best-fit line, calculating the slope and y-intercept, and writing the equation of the graph. Analyze non-linear graphs, change variables to produce a linear graph, and write the equation of that graph.
5. Define the following kinematic quantities: displacement, velocity and acceleration, distance and speed. Identify vector and scalar quantities. Define and calculate average and instantaneous velocities and speeds. Plot and read kinematic graphs. Use the kinematic equations to solve one-dimensional problems involving uniformly accelerated motion, including freefall.
  6. State Newton's Laws and answer related conceptual problems. Construct free-body diagrams. Describe the concepts of net force, mass and weight. Solve one-dimensional dynamics problems involving normal forces, friction, tension, and applied forces. Calculate forces for objects in equilibrium.
  7. Define the terms work, kinetic energy, potential energy and power. Use the work-energy theorem or the law of conservation of energy to solve problems. Calculate the power and efficiency of mechanical processes.
  8. Assemble simple experimental apparatus using written instructions.
  9. Observe, record, organize and display data in tables, graphs or charts.
  10. Analyze linear graphs (determine area, slope, intercept, etc.).
  11. Interpret meaning of experimental results in the context of the experimental objectives.

### 3. Required Materials

- (a) Texts: PHYS 150 Course Materials Book (Camosun College)
- (b) Other: PHYS 150 Lab Manual, Scientific Calculator, Graph Paper (10 lines per inch or metric)

### 4. Course Content and Schedule

**Lectures: M 1:30 – 3:20; Th 1:30 – 2:20; F 1:30 – 2:20**

**Lab: W 1:30 – 2:20**

**Seminar: Group A, W 9:30 – 10:20; Group B, W 10:30 – 11:20**

### 5. Basis of Student Assessment (Weighting)

(a) Midterms & Quizzes	50%
(b) Lab Reports	Completion Required
(c) Final Exam	50%
	100%

### 6. Grading System

*(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO 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](http://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. (For these courses a final grade will be assigned to either the 3 <sup>rd</sup> course attempt or at the point of course completion.)
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](http://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 on 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.

### OUTLINE:

#### 1. **Measurement & Units**

- 1.1 Concepts of physics
- 1.2 Accuracy and precision
- 1.3 Significant figures
- 1.4 Scientific notation
- 1.5 Systeme Internationale (SI)
  - 1.5.1 Base units
  - 1.5.2 Prefixes
  - 1.5.3 Derived units
- 1.6 Conversion of units – Metric and British units
- 1.7 Problem solving

#### 2. **Graphical Analysis**

- 2.1 Graph construction
  - 2.1.1 Plotting data
  - 2.1.2 Fitting curves to data
- 2.2 Analyzing linear graphs
  - 2.2.1 Determination of slope and intercept
  - 2.2.2 The linear equation
- 2.3 Analyzing non-linear graphs
  - 2.3.1 Recognition of power graphs
  - 2.3.2 Changing variables to produce linear graphs
  - 2.3.3 Writing equations for non-linear graphs

### **3. Kinematics in One Dimension**

- 3.1 Kinematic quantities
  - 3.1.1 Vector and scalar quantities
  - 3.1.2 Position, distance and displacement
  - 3.1.3 Average speed and velocity
  - 3.1.4 Acceleration
  - 3.1.5 Definition of instantaneous values
- 3.2 Kinematic graphs
  - 3.2.1 Position versus time
  - 3.2.2 Displacement versus time
  - 3.2.3 Velocity versus time
- 3.3 Uniformly accelerated motion
  - 3.3.1 Equations of uniform motion
  - 3.3.2 Solving kinematic problems
  - 3.3.3 Acceleration due to gravity
  - 3.3.4 Vertical motion near the Earth

### **4. Dynamics in One Dimension**

- 4.1 Concept of force
- 4.2 Newton's first law of motion
  - 4.2.1 Concept of inertia
- 4.3 Newton's second law of motion
  - 4.3.1 Dependence of acceleration on net force
  - 4.3.2 Dependence of acceleration on mass
  - 4.3.3 Dependence of net force on mass
  - 4.3.4 Dynamics examples – One-body problems
- 4.4 Newton's third law of motion
  - 4.4.1 Interpretation of examples of the law

### **5. Work, Energy and Power**

- 5.1 Work
  - 5.1.1 Definition
  - 5.1.2 Calculating work done by a force
  - 5.1.3 Positive and negative work
- 5.2 Types of Mechanical Energy
  - 5.2.1 Kinetic energy
  - 5.2.2 Gravitational potential energy
  - 5.2.3 Elastic potential energy
- 5.3 Work-Energy Theorem
- 5.4 Conservation of Mechanical Energy
- 5.5 Power and Efficiency