



School of Arts & Science
PHYSICS DEPARTMENT
PHYS 114
Fundamentals of Physics 1
2011 Winter

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:	MTWThF 9:30 – 10:30 am		
(c)	Location:	F346B		
(d)	Phone:	250-370-3515	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. 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.
2. State the conditions for standing waves and identify nodes and anti-nodes. Solve problems of vibrating strings and air columns, including fundamental nodes and harmonics.
3. Solve technical problems involving the behavior of light at an interface between media (laws of reflection, refraction, dispersion).
4. Solve technical problems involving geometric optics (lenses, mirrors, simple optic devices).
5. Solve technical problems associated with the effects of light interference, including Young's double-slit, diffraction gratings, spectral analysis and thin films.
6. Demonstrate proficiency in solving vector algebra problems, including coordinate system conversions, use of unit vectors, vector addition, dot product, and cross product.
7. Solve technical problems involving particle kinematics and dynamics with non-constant force using calculus in two and three dimensions.
8. Provide descriptions of early atomic models and/or the twentieth century experiments that lead to the modern quantum theory of the atom.
9. Solve technical problems involving photoelectric effect, atomic spectra, and energy levels in atoms.
10. Solve technical problems involving properties of the nucleus, radioactivity and nuclear energy.
11. Assemble experimental apparatus using written instructions.
12. Observe, record, organize and display data in tables, graphs or charts.
13. Analyze linear graphs (determine area, slope, intercept, etc.).
14. Observe and record sources of error and estimate the range of uncertainty in results.
15. Interpret meaning of experimental results in the context of the experimental objectives.
16. Write scientific reports in an acceptable, traditional format.

3. Required Materials

- (a) Physics for Scientists and Engineers, 8th ed., Serway and Jewett
- (b) PHYS 114/115 Lab Manual; Lab note book; calculator; graph paper; drawing instruments

4. Course Content and Schedule

LEC W Th 2:30 – 4:20 pm

LAB M 2:30 – 4:20 pm

5. Basis of Student Assessment (Weighting)

- (a) Final Exam 50%
- (b) Quizzes 5%
- (c) Homework 5%
- (d) Midterms 25%
- (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	<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.

OUTLINE:

1. **Nature of Light and Geometric Optics (Chapter 35.1 – 35.5, 35.7 & 35.8)**

- 1.1 Nature of light
- 1.2 Measurements of the speed of light
- 1.3 Ray approximation in geometric optics
- 1.4 Reflection
- 1.5 Refraction
- 1.6 Dispersion and Prisms
- 1.7 Total Internal Reflection and applications

2. **Image Formation (Chapter 36)**

- 2.1 Images formed by flat mirrors
- 2.2 Images formed by spherical mirrors
- 2.3 Images formed by refraction
- 2.4 Thin Lenses; combinations of thin lenses
- 2.5 Lens aberrations
- 2.6 Selected Optical systems

3. **Wave Motion (Chapter 16.1 – 16.4)**

- 3.1 Propagation of a Disturbance
- 3.2 Sinusoidal Waves (omit sinusoidal waves on a string)
- 3.3 Speed of waves on strings
- 3.4 Reflection and Transmission

4. **Superposition and Standing Waves (Chapter 18.1 – 18.3, 18.5 & 18.7)**

- 4.1 Superposition and Interference (omit sound waves)
- 4.2 Standing waves in a string
- 4.3 Standing waves in air columns
- 4.4 Beats: Interference in time

5. **Interference of Light Waves (Chapter 37.1, 37.2, 37.6)**

- 5.1 Conditions for interference
- 5.2 Young's double-slit experiment
- 5.3 Interference in thin films

6. **Introduction to Quantum Physics (Chapter 40.1, 40.2 and Chapter 42.1-42.3)**

- 6.1 Blackbody radiation and Plank's hypothesis

- 6.2 The photoelectric effect
- 6.3 Atomic Spectra of Gases
- 6.4 Early models of the atom
- 6.5 Bohr's model of the Hydrogen atom

7. Nuclear Structure (Chapter 44.1, 44.5 – 44.7 and Chapter 45.1 – 45.4)

- 7.1 Some properties of nuclei
- 7.2 Radioactivity
- 7.3 Qualitative discussion of decay processes
- 7.4 Nuclear Energy
 - 7.4.1 Nuclear fission
 - 7.4.2 Nuclear reactors
 - 7.4.3 Nuclear fusion
 - 7.4.4 Fusion technology

8. Vectors (Chapter 3) and Vector Mathematics (Sections 7.3, 11.1)

- 8.1 Co-ordinate systems
- 8.2 Vector and scalar quantities
- 8.3 Properties of vectors
- 8.4 Components of a vector and unit vectors
- 8.5 Scalar (dot) product – Section 7.3
- 8.6 Vector (cross) product – Section 11.1

9. Motion in One-Dimension (Chapter 2)

- 9.1 Position, velocity and speed
- 9.2 Instantaneous velocity and acceleration.
- 9.3 Motion diagrams
- 9.4 1-D motion with constant acceleration
- 9.5 Kinematic equations derived from calculus

10. Motion in Two and Three Dimensions (Chapter 4.1 – 4.3)

- 10.1 Position, velocity and acceleration vectors
- 10.2 Two-dimensional motion with constant acceleration
- 10.3 Projectile motion

11. The Laws of Motion (Chapter 5)

- 11.1 Concept of force and Newton's First law
- 11.2 Newton's second law of motion, applications with and with friction
- 11.3 Newton's third law of motion