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| CAMOSUN COLLEGE | ***School of Arts & Science***<br>***PHYSICS DEPARTMENT***<br>**PHYS 114-002**<br>**Fundamentals of Physics 1**<br>**Semester/Year, eg, 2007F or 2007Q1** |

# COURSE OUTLINE

**The Approved Course Description is available on the web @ _____**

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

## 1. Instructor Information

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| (a) | Instructor: | John Pratt | | |
| (b) | Office Hours: | 10: 30 – 11 : 20 , M., T., Th. and F. ; 13 : 30 – 14 : 20 , M. | | |
| (c) | Location: | F 346 B | | |
| (d) | Phone: | 370 - 3516 | Alternative Phone: | 370 - 3511 |
| (e) | Email: | prattj@camosun.bc.ca | | |
| (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 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.

## 3. Required Materials

(a) Texts — Physics for Scientists & Engineers with Modern Physics, *6th edition*, Serway, R.A., and Jewett, J.W.Jr.

(b) Other — Physics 114/115 Laboratory Manual
Graph paper (must be either 10 lines/inch or millimeter graph paper)

## 4. Course Content and Schedule

*(Can include: class hours, lab hours, out of class requirements and/or dates for quizzes, exams, lectures, labs, seminars, practicums, etc.)*

## 5. Basis of Student Assessment (Weighting)

*(Should be linked directly to learning outcomes.)*

The student must be successful (≥ 60%) in both the theory and laboratory assignments to pass the course. The approximate percentages used for the final grading are:

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| Quizzes | 35% |
| Lab Work | 15% |
| Final Exam (3 hours) | 50% |

Midterm tests may be discounted from the grading distribution (see above) if all term work, including term tests, labs, and assignments, has been completed and is 60% or higher. In this case, the final grade for the course may be based on a combination of the final exam (90%) and the lab mark (10%).

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.

## 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** 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 on 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 – Section11.1

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