CAMOSUN COLLEGE	***School of Arts & Science*** ***PHYSICS DEPARTMENT*** **PHYS 295-section** **Physics (Engineering Bridge)** **Winter 2009**

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

(a)	Instructor:			
(b)	Office Hours:			
(c)	Location:			
(d)	Phone:		Alternative Phone:	
(e)	Email:			
(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. Describe the operation of several temperature sensors including the function and temperature calculations for a constant volume gas thermometer.
2. Solve problems involving thermal expansion in one and three dimensions. and derive from first principles the expressions required to solve these problems.
3. Solve problems involving the transfer of thermal energy with regard to specific heat capacity, latent heat and change of phase.
4. Solve problems involving the displacement wave function for transverse and longitudinal waves in elastic media with attention to wave number angular frequency, phase constant, and wave and particle velocities.
5. Derive the pressure wave function for sound waves and solve related problems.
6. Derive from first principles, the wave equation, the solution, and the expression for the wave velocity.
7. Derive the expressions for the interference of two or more waves including the phenomena of beats and standing waves.
8. Derive the expressions for, and solve problem involving, the Doppler Effect.
9. Derive the expressions for, and solve problems involving, physical optics phenomena, including: double and multiple slit interference, thin films, diffraction, and resolution of images.
10. Solve problems in geometrical optics including lenses, mirrors, prisms, and total internal reflection.
11. Use Coulomb's Law to solve problems in electrostatics for two or more charges.

12. Solve problems involving electric fields, electric potential, and potential difference for discrete charges and continuous charge distributions.
13. Analyze series and parallel electric circuits.
14. Solve problems involving magnetic flux density and magnetic forces on charges including forces on current carrying wires and torques on current loops.
15. Assemble experimental apparatus using written instructions.
16. Observe, record, organize and display data in tables, graphs or charts.
17. Analyze linear graphs (determine area, slope, intercept, etc.).
18. Observe and record sources of error and estimate the range of uncertainty in results.
19. Interpret meaning of experimental results in the context of the experimental objectives.
20. Write scientific reports in an acceptable, traditional format.

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 295 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:

Quizzes	30%
Lab Reports and Other Work	10%
Final Exam (3 hours)	60%

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. Thermal Energy

- 1.1. Review of Temperature
  - 1.1.1 Temperature Scales
  - 1.1.2 Thermal Equilibrium
- 1.2. Thermal Expansion
  - 1.2.1 Mechanical model of materials
  - 1.2.2 Linear expansion
  - 1.2.3 Volume expansion
  - 1.2.4 Capacity problems
- 1.3. Heat
  - 1.3.1 Heat and thermal energy
  - 1.3.2 Heat and mechanical work
  - 1.3.3 Heat and temperature change
  - 1.3.4 Specific heat capacity
  - 1.3.5 Change of Phase
  - 1.3.6 Latent heat of fusion and vaporization
  - 1.3.7 Calorimetry

2. Mechanical Waves

- 2.1. Periodic Waves
  - 2.1.1 Wave velocity, frequency, period, wavelength
  - 2.1.2 Transverse and longitudinal waves
  - 2.1.3 Traveling waves in space and time
- 2.2. The wave function

2.2.1 Wave number, angular frequency, phase constant, phase difference
2.3. Wave velocity in an elastic medium – Transverse waves in a string
2.4. Particle velocity and acceleration
2.5. The wave equation and solution
2.6. Energy in waves – Power and Intensity
2.7. Interference of waves
2.7.1 Constructive and destructive interference
2.7.2 Combined Wave function - Effect of frequency, amplitude and direction
2.7.3 Standing waves – Standing wave function
2.7.4 Standing waves in a string
2.7.5 Standing waves in air columns
2.7.6 Beats – Superposition of the two wave functions
2.8. Sound
2.8.1 Nature of pressure waves – Displacement wave function and pressure wave function

3. Physical Optics

3.1. Conditions for stable interference of light waves
3.1.1 Coherence
3.1.2 Monochromaticity
3.2. Young's double slit experiment
3.2.1 Conditions for interference
3.2.2 Interference pattern and the wave function
3.2.3 Intensity distribution – Intensity as a function of angle and distance

4. Electrostatics

4.1. Electric Charges
4.1.1 Types of charges
4.1.2 First law of electrostatics
4.1.3 Conductors and insulators
4.1.4 Coulomb's law
4.2. Electric field
4.2.1 Concept
4.2.2 Due to point charges
4.2.3 Due to distributed charge
4.2.4 Electric field lines
4.3. Electric potential
4.3.1 Electric potential energy
4.3.2 Potential difference
4.3.3 Potential near a point charge
4.3.4 Potential due to discrete charges and distributed charges
4.3.5 Equipotentials
4.3.6 Potential gradient and the electric field - Potential in a uniform field

5. Electric Circuits

5.1. Parts of a circuit
5.1.1 Types of sources
5.1.2 Types of loads
5.1.3 Electric Current
5.2. Resistance
5.2.1 Ohm's law
5.2.2 Factors affecting resistance

5.2.3 Temperature dependence
5.2.4 Internal resistance of sources
5.2.5 Superconductors
5.3. Series circuits
5.3.1 Description
5.3.2 Characteristics
5.4. Parallel circuits
5.4.1 Description
5.4.2 Characteristics
5.5. Series-parallel circuits
5.6. Kirchhoff's Rules
5.6.1 Junction (current) rule
5.6.2 Loop (voltage) rule

6. <u>Magnetic Fields</u>

6.1. Description
6.2. Force on a charge
6.2.1 Characteristics
6.2.2 Magnetic flux density
6.2.3 Generator principle
6.3. Magnetic force on a conductor
6.3.1 In a uniform field
6.3.2 Torque on a loop
6.3.3 Motor principle
6.4. Electromagnetic Induction and Faraday's Law

7. **<u>LC Circuits</u>**
7.1. Definition of capacitance
7.2. Definitions of mutual and self inductance
7.3. RL circuits, RC circuits, RLC circuits

8. **<u>Alternating Current</u>**
8.1. AC sources
8.2. Resistors in an AC circuit
8.3. Inductors in an AC circuit
8.4. Capacitors in an AC circuit