CAMOSUN COLLEGE	***School of Arts & Science*** ***PHYSICS DEPARTMENT*** **PHYS 210-002** **Electricity and Magnetism** **2017F**

COURSE OUTLINE

Instructor Information

(a)	Instructor:	Dr. Julie Alexander		
(b)	Office Hours:	T:1:30, Th:11:30-1:30, F:11:30-1:30		
(c)	Location:	Tech 220		
(d)	Phone:	4437		
(e)	Email:	jalex@camosun.bc.ca		
(f)	Website:	http://web.uvic.ca/~jalexndr		

Intended Learning Outcomes

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

1. Provide and define the fundamental properties of the electric charge, solve technical problems associated with the electrostatic force (Coulomb force), the electric force field, Gauss's Law, the electric potential and potential difference, within a framework of distributed symmetric charge distributions, using calculus.
2. Define electric capacitance and solve technical problems associated with capacitors of various symmetries, capacitors in series and parallel combination, the microscopic effect of dielectric materials on capacitance and stored energy.
3. Define electric current, current density, and solve technical problems involving DC networks of resistors, batteries, and capacitors, Ohm's Law, Kirchhoff's Laws, and RC charging and decay circuits.
4. Define the magnetic field and magnetic flux, solve technical problems associated with the effect of static, non-uniform and uniform magnetic fields on moving charges and current-carrying wires, loops and the magnetic dipole.
5. Calculate the magnitude and direction of the magnetic field for symmetric current distributions using the Law of Biot-Savart and Ampere's Law, and state the limitations of Ampere's Law.
6. State Faraday's Law of Induction with Lenz's Law and use these equations to solve technical problems associated with induction.
7. Calculate inductance according to the fundamental definition, solve technical problems associated with LR circuits and coils, and calculate the stored energy in magnetic fields.
8. Solve technical problems involving electromagnetic oscillations and AC, including phasor diagrams, free, damped and forced oscillations, resonance, RMS current, voltage and power, LC oscillators, LRC circuits, and the transformer.
9. Quote the four Maxwell's equations, define all the terms, and demonstrate knowledge of the historical background leading to their development, with particular attention to the concept of the displacement current.

Required Materials

(a) University Physics with Modern Physics, By Young and Freedman, 14th edition
(b) Physics 210 lab manual, nonprogrammable calculator
(c) Mastering Physics license

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.

3. To pass this course, a student must have at least 50% on the final exam.

TERM TESTS

There will be two 1 hour term tests. Test dates have been entered into the Engineering Bridge Google calendar and are:

Test #1 Monday Oct. 2, 2017
Test #2 Monday Nov. 20, 2017

There will also be tutorial quizzes, see schedule for dates.

DEPARTMENT POLICIES REGARDING LABS:

1. All assigned laboratory exercises and reports must be completed with an overall grade of 60% in order to obtain credit for this course. A lab may be waived or made up at a later time only in the case of documented illness or other extenuating circumstances.

2. At the discretion of the instructor, a student who is repeating this Physics course may apply for lab exemption.

Physics 210 Labs

The lab schedule is on the class schedule. Labs are due on the next scheduled lab period.

Course Content and Schedule

See attached Excel sheets for a detailed class schedule

Basis of Student Assessment (Weighting)

The mark distribution for this course is as follows:

Final Exam	50%
2 Midterms	25%
Lab Reports	10%
Tutorial quizzes	10%
Mastering Physics	5%
	100%

Grading System

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.

Course Content:

Chapter 21 – Electric Charge and Electric Field, Chapter 22 – Gauss's Law,
Chapter 23 – Electric Potential, Chapter 24 – Capacitance and Dielectrics,
Chapter 25 – Current and Resistance, Chapter 26 – Direct Current Circuits,
Chapter 27 – Magnetic Field and Magnetic Forces, 28 – Sources of Magnetic Field
Chapter 29 – Electromagnetic Induction

OUTLINE:

1. **Electric charge**
   - 1.1 Electromagnetism as a fundamental force of nature
   - 1.2 Coulomb's law
   - 1.3 Conservation and quantization of charge

2. **The Electric Field**
   - 2.1 Electric field calculations for charge distributions of high symmetry
   - 2.2 Electric flux
   - 2.3 Gauss' law

3. **Electric Potential**
   - 3.1 Equipotential surfaces
   - 3.2 Calculation of potential due to charge distributions of high symmetry

4. **Capacitance**
   - 4.1 Combinations of capacitors
   - 4.2 Energy storage in capacitors
   - 4.3 Dielectrics

5. **Electrical circuits**
   - 5.1 Series and parallel circuits
   - 5.2 Kirchhoff's rules

6. **Magnetism**
   - 6.1 Force on a current-carrying conductor
   - 6.2 Torque on a current loop
   - 6.3 The magnetic dipole
   - 6.4 Magnetic flux

7. **Sources of Magnetic Fields**
   - 7.1 The Biot-Savart law
   - 7.2 Ampere's law
   - 7.3 Magnetic force on a current-carrying wire
   - 7.4 Solenoids and toroids

8. **Electromagnetic Induction**
   - 8.1 Faraday's law
   - 8.2 Lenz's law

9. **Maxwell's Equations**

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.