2013S Session

Instructor
Dr. Hartwig Peemoeller
office: Physics, room 366
email: peemoell@uwaterloo.ca
office hours:
Tuesday 2:30-3:30;
Thursday 2:30-3:30
Please include the text “phys242” in the subject of any emails.

Textbook
Texts: “Elements of Electromagnetism” by Sadiku, 5th edition and
“Physics for Scientists and Engineers 7th edition” by Serway and Jewett, or
equivalent text
(e.g., “Essential University Physics” by Wolfson “Fundamentals of Physics” by
Halliday, Resnick and Walker
“University Physics 13th edition” by Young and Freedman)

Course web sites
i) UWACE  https://learn.uwaterloo.ca

Lectures
Lectures will be held in PHYS 150
Tuesdays and Thursdays from 1:00-2:20 pm.
Lectures are an integral part of this course and attendance is required.

Tutorial
Monday’s, 3:30-4:30 in RCH 306

Important Dates
See the University of Waterloo website for important dates connected with your program

Course Content
From “Elements of Electromagnetics”:

4 ELECTROSTATIC FIELDS
4.1 Introduction
4.2 Coulomb’s Law and Field Intensity
4.3 Electric Fields Due to Continuous Charge Distributions
4.4 Electric Flux Density
4.5 Gauss’s Law and applications
-Divergence of Electrostatic Fields
-Maxwell’s (1st) Equation
-Additional Comments re E fields inside conductors and cavities with q
4.6 Applications of Gauss’s Law
4.7 Electric Potential
-Curl of vector field and Stokes’s Theorem
4.8 Relationship between E & V
4.9 Electric Dipole and Flux Lines
4.10 Energy Density in Electrostatic Fields
5. ELECTRIC FIELDS IN MATERIAL SPACE
5.3 Convection and Conduction Currents
5.4 Conductors
-Ohm’s Law
5.5 Polarization in Dielectrics
-Field due to polarized dielectric
-physical interpretation of surface and volume bound charge densities
-Electric displacement and Gauss’s Law in presence of dielectrics

5.6 Dielectric Constant and Strength
-electric susceptibility
5.7 Linear, Isotropic, and Homogeneous Dielectrics
5.8 Continuity Equation and Relaxation Time
5.9 Boundary Conditions

CAPACITORS AND REVIEW OF DC CIRCUITS
1 Capacitors (with/without dielectrics)
2 Review of DC circuits (Kirchhoff’s Rules)

3 Charging/Discharging RC circuits

From “Physics for Scientists and Engineers, 7th edition”
Chapter 31 Faraday’s Law
31.1 Faraday’s Law of Induction
-Maxwell’s (3rd) egn
31.3 Lenz’s Law
31.4 Induced emf and Electric Fields
Chapter 32 Inductance
32.1 Self-Induction and Inductance
32.2 RL Circuits
32.3 Energy in a Magnetic Field
32.5 Oscillations in an LC Circuit
32.6 The RLC Circuit
Chapter 33 Alternating Current Circuits
33.2 Resistors in an AC Circuit
33.3 Inductors in an AC Circuit
33.4 Capacitors in an AC Circuit
-phasor
33.5 The RLC Series Circuit
33.6 Power in an AC Circuit
33.7 Resonance in a Series RLC Circuit

-AC circuit analysis using complex Z, V and I; phasors: high and low-pass filters
Midterm Tests
June 17, 6:30-8:00 pm in DWE 3522

Final Exam
There will be a 150 minute exam to be scheduled by the registrar. The exam schedule should be ready near the end of February.

Course mark
Assignments 20%
Midterm Test 20%
Final Exam 60%

Note re assignment returns:

The assignments will be marked and returned to you (normally in a week) by being placed inside cardboard boxes outside room 366 in physics (see the Note below).

NOTE: Marked assignments will be left in boxes outside of room physics 366 for no longer than two weeks. Students who prefer an alternative return method must so advise the instructor (HP) by email by May 20, 2013 and staple an appropriately sized stamped self-addressed envelope to each assignment submitted so that it may be returned by mail.

Unclaimed assignments: Unclaimed assignments will be retained until one month after term grades become official in quest. After that time, they will be destroyed in compliance with UW’s confidential shredding procedures.

Calendar course description:

PHYS 242 LEC,TUT 0.50 Course ID: 013643
Electricity and Magnetism 1
Coulomb's law, electric fields, Gauss' law, potential, capacitance, properties of dielectrics, DC circuits, AC circuits.
[Note: Students with PHYS 122 prior to Winter 2012 need to include PHYS 191 as a prerequisite. Offered: W,S]

Prereq: One of PHYS 112, 122 (taken Fall 2011 or later), PHYS 191; One of MATH 128, 138, 148; (MATH 227 or
Antireq: PHYS 222, 223, 241, 252

For students with disabilities:

The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require
academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.

Some Academic Regulations:

1) **Academic integrity:** Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility.

   *Note on avoidance of academic offences: All students registered in the courses of the Faculty of Science are expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for their actions. When the commission of an offence is established, disciplinary penalties will be imposed in accord with Policy #71 (Student Academic Discipline). For information on categories of offences and types of penalties, students are directed to consult Policy #71 (http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm). If you need help in learning what constitutes an academic offence; how to avoid offences such as plagiarism, cheating, and double submission; how to follow appropriate rules with respect to “group work” and collaboration; or if you need clarification of aspects of the discipline policy, ask your TA and/or your course instructor for guidance. Other resources regarding the discipline policy are your academic advisor and the Undergraduate Associate Dean."

   **Grievance:** A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy #70, Student Petitions and Grievances, Section 4. When in doubt please be certain to contact the department’s administrative assistant who will provide further assistance.

   **Discipline:** A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. For information on categories of offenses and types of penalties, students should refer to Policy #71, Student Discipline, For typical penalties check Guidelines for the Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

   **Appeals:** A decision or penalty imposed under Policy #70 (Student Petitions and Grievances) (other than petitions) or Policy #71 (Student Discipline) may appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy #72 (Student Appeals).

   Waterloo’s Office of Academic Integrity provides numerous resources on academic integrity for students, faculty and staff.

2) **Travel and final exam period:** “*Student travel plans are not considered acceptable grounds for granting an alternative examination time.*” (You may wish to start checking the registrar’s web site starting in the middle of June: http://www.registrar.uwaterloo.ca/exams/finalexams.html).
3) Make-up exams, tests: In general there will be no make-up exams, make-up tests or make-up assignments for PHYS 242. (Exceptions due to illness or death need to be considered on an individual basis.)

4) Verification of Illness form (VIF) or other compelling documentation.

If a student is unable to complete course requirements (usually final exam, midterm test), then the student must inform the instructor (ideally, beforehand but within 48 hours of the exam) and present the appropriate documentation (i.e. a completed VIF or other compelling documentation) within five business days.

NEW Please be aware that that starting with the Winter 2013 term, only VIFs issued from our campus Health Services (https://uwaterloo.ca/health-services/) will be acceptable documentation when the service is available (https://uwaterloo.ca/health-services/student-medical-clinic/hours). A student who is sick on a weekend, during off-hours, while out of town or receiving ongoing care from a family physician or specialist may have to provide valid and suitably informative VIF from other health service providers. Information should include
1) date of the physician assessment
2) dates of illness
3) level of incapacitation, and
4) whether the diagnosis was made by the physician or based on description by the student.

This policy will also apply to non-Science students taking Science courses.