PHYS 441B LEC 0.50
Electromagnetic Theory
Maxwell’s Equations. Electromagnetic fields and the Lorentz Transformation. Plane waves in insulators, conductors and plasmas. Reflection and refraction at plane boundaries. Guided waves. Dipole radiation. [Offered: W. The last offering of this course will be winter 2015.]
Prereq: PHYS 441A

2011W Session
Instructor
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office hours: TBA

Teaching Assistants
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Course Web Site
This course will use the uwace.uwaterloo.ca web site for course coordination.

Learning Objectives
This course is about Maxwell’s equations and their solutions in various media.

Students who successfully complete this course will be comfortable working with Maxwell’s equations and able to find their solutions for various boundary conditions.

Disclaimer
The course content and dates given below will be followed as closely as possible, but it is possible that changes may occur. Any changes will be discussed and announced in class and posted on the course webpage. The assessment will remain unchanged.

Textbook

Lectures & Tutorials
Three 50 minute lectures in PHY 313, Mondays, Wednesdays and Fridays, 10:30-11:20.

Course Content
Chapters 1-6 of the textbook were covered in the pre-requisite course, PHY 441A. We will work through chapters 7-12 of the textbook over the course of the term.

Assignments
There will be weekly assignments. These problems are to be submitted to the box across the hall from PHY 204. Only a selection of the submitted problems may be marked.

In general, assignments will be posted on Thursday, briefly discussed during the Friday class, help will be available in the scheduled office hours, and due on Friday at 14:00.

It is expected that the students will prepare for each week’s lectures by reading the corresponding textbook material. Part of each week’s assignment will consist of this reading assignment.

I expect the assignments to take from five to ten hours per week to complete. If you find that you are taking either much less or much more time to complete the assignments please come and talk with me.

Term Tests
There will be two in-class 50 minute term tests which are tentatively scheduled for Feb 7, Mar 7 (ie, weeks 6 and 10).

Exam
There will be a 150 minute exam to be scheduled by the registrar.

Essay
There will be an essay of 2000-4000 words on a related topic worth 10%.

An abstract and outline of the essay is due on January 24th and a revised and expanded abstract and outline are due on February 14th.

The essay will be due on March 14th.

Please double space your essay and leave 1 inch margins. Print your essay single-sided and use a single staple. Do not use any sort of cover or binding. \LaTeX is the preferred software to prepare your essay but you may use something else if you must.

Assessment
Assignments 20%
Term Tests 2 \times 15%
Essay 10%
Exam 40%

In order to pass the course a mark of 50% or better must be achieved on the final exam, otherwise the final exam mark will be the final mark.

Important Dates
Jan 4 Lectures Begin
Jan 24 Drop, Penalty 1 Begins
Jan 24 Essay abstract and outline due
Feb 7 test 1
Feb 14 Revised and expanded essay abstract and outline due
Feb 21-25 Reading Week
Mar 7 test 2
Mar 14 Essay due
Mar 14 Drop, Penalty 2 Begins
Mar 14 Einstein’s Birthday
Mar 14 Pi Day
Apr 4 Lectures End
Apr 8 Exam Period starts
Apr 21 Exam Period ends
Rules & Regulations

Illness
If you are ill and are unable to complete one or more course elements you must obtain a “Verification of Illness” form from Health Services and bring it to the Science Undergraduate Office (Earth Sciences and Chemistry Building Room 253).

Accommodation for Missed Course Elements
If an assignment is missed for legitimate academic reasons the remaining assignments will be re-weighted accordingly.
If a term test is missed for legitimate academic reasons the other tests and the exam will be re-weighted accordingly.
If the exam is missed for legitimate academic reasons you will be required to write the exam during the following term. It is your responsibility to arrange a mutually convenient time to write the exam.

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. [Check http://www.uwaterloo.ca/academicintegrity/ for more information.]”

Student Grievances
“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. http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm 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, http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm For typical penalties check Guidelines for the Assessment of Penalties, http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm

Appeals
“A decision made under Policy #70 (Student Petitions and Grievances) (other than petitions) or Policy #71 (Student Discipline) a student may appeal the finding, the penalty, or both. A student who believes he/she has a ground for an appeal should refer to Policy #72 (Student Appeals) http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm

Students with Disabilities
“Note 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.”

Travel and the Final Examination Period
“Student travel plans are not considered acceptable grounds for granting an alternative examination time. (see http://www.registrar.uwaterloo.ca/exams/finalexams.html)

Assignment 1.1. Summary #1
Read Ch. 8 of the textbook. (a) Write a 200-500 word summary of Ch. 8 of the textbook (p. 345-363) (b) List the three concepts in this chapter which you found most difficult.

Assignment 1.2. Maxwell’s Equations
(a) Write down Maxwells equations and explain their origins. (b) Define the quantities: $\vec{D}$, $\vec{M}$, $\vec{H}$, as used in electromagnetism (in rationalized MKSA units).

Assignment 1.3. Sea Water
(a) Do Problem 7.37. (b) Do Problem 7.42.