PHYS*2330: Electricity and Magnetism I
Fall 2017 (4-0) [0.50]

General information

Course description
This course continues building the foundation in electricity and magnetism begun in the first year and is intended for students proceeding to advanced studies in the physical sciences. Topics include vector calculus, electric fields, potential, electric work and energy, Gauss's Law, Poisson's and Laplace's equations, capacitors, D.C. circuits, transients and dielectric materials.

Class schedule and location
Tuesday and Thursday, 10:00am to 11:20am, Crop Science (CRSC) 116

Tutorials
Wednesdays (see schedule), 7:00pm to 8:50pm, MacKinnon (MCKN) 115

Midterm exam
Wednesday October 25, from 7:00pm to 9:00pm, room TBA

Final examination
Wednesday December 6, from 7:00pm to 9:00pm. The location of the final exam will be posted in due course.

Final exam weighting
45% (Scheme A) or 55% (Scheme B). See below.

Course website
On Courselink

Instructor information

Instructor
Eric Poisson (epoisson@uoguelph.ca)

Office location and phone number
MacNaughton 452, 519-824-4120 x53653

Office hours
There are no official office hours. I will be generally available in my office. Please schedule an appointment if you have trouble finding me.

I am very much an informal guy, and I prefer to be addressed simply as "Eric". I don't appreciate being subjected to such pompous titles as Doctor, Professor, or His Gracious. My field of research is general relativity, including black holes and gravitational waves. For additional details, please consult my research web page at http://www.physics.uoguelph.ca/poisson/research/

Graduate Teaching Assistant information

The TA for the course is Dylan Podkowka (dpodkowk@uoguelph.ca)

Course content

Specific learning outcomes

After taking this course, the student will be able to:

1. Demonstrate a mastery of Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges.
2. Demonstrate an understanding of the relation between electric field and potential, exploit the potential to solve a variety of problems, and relate it to the potential energy of a charge distribution.
3. Exploit alternative coordinate systems (cylindrical and spherical coordinates) to solve problems.
4. Apply Gauss's law of electrostatics to solve a variety of problems.
5. Apply the tools of vector calculus, and demonstrate a working understanding of the divergence and curl of vector fields, as well as the divergence and curl integral theorems.
6. Demonstrate an understanding of electric dipoles and the role of molecular dipoles in the electrostatic response of dielectrics.
7. Demonstrate an understanding of the behaviour of electric conductors.
8. Reformulate the laws of electrostatics in the form of Laplace's or Poisson's equations for the potential, and solve boundary-value problems.
9. Demonstrate a working understanding of capacitors.

Lecture, tutorial, and assignment schedule

The following table provides a *rough guide* of the material covered during each week of the semester, as well as key information regarding quizzes, tutorials, and assignments. *All dates are tentative*; c*heck Courselink regularly to get the most updated information.* Regular attendance at lectures and tutorials is the best way to ensure that you are up to date on the relevant course material.

Week	**Material covered**	**Activity**
0: Sept 7	Introduction	
1: Sept 12, 14	Electric field; line charge	Quiz: Electric field Quiz: Gradient

Week	Material covered	Activity
2: Sept 19, 21	Gradient; potential	Quiz: Potential Tutorial: Wed Sept 20
3: Sept 26, 28	Work and energy; polar, cylindrical, and spherical coordinates	Quiz: Work Quiz: Coordinates
4: Oct 3, 5	Coordinates (cont); potential and field calculations	Quiz: Field and potential **Assignment #1: due 10am, Tuesday Oct 3** Tutorial: Wed Oct 4
5: Oct 10, 12 (no class on Oct 10)	Potential and field calculations (cont)	
6: Oct 17, 19	Gauss's law	Quiz: Gauss's law **Assignment #2: due 10am, Tuesday Oct 17** Tutorial: Wed Oct 18.
7: Oct 24, 26	Gauss's law (cont); divergence and curl	**Midterm exam Wednesday Oct 25, 7pm**
8: Oct 31, Nov 2	Equations of electrostatics; dipoles	Quiz: Divergence and curl
9: Nov 7, 9	Dipoles (cont); dielectrics	Quiz: Dipole **Assignment #3: due 10am, Tuesday Nov 7** Tutorial: Wed Nov 8
10: Nov 14, 16	Conductors; boundary value problems	Quiz: Laplace and Poisson equations
11: Nov 21, 23	Method of images; capacitors	Quiz: Capacitance **Assignment #4: due 10 am, Tuesday Nov 21** Tutorial: Wed Nov 22
12: Nov 28, 30	Capacitors (cont)	

Laboratories

There are no labs for this course.

Tutorials

Tutorials are held on alternating Wednesdays (see schedule above), from 7:00pm to 8:50pm, in MacKinnon 115.

Course evaluation

The final mark for the course will be the highest of the two marks calculated under the following two schemes. No other marking schemes will be considered.

Scheme	Quizzes	Assignments	Midterm exam	Final exam
A	5%	15%	35%	45%
B	5%	15%	25%	55%

Quizzes will be posted on Courselink, each quiz appearing a few days prior to a specific deadline. Completion of these quizzes by the assigned deadline is mandatory, and the quizzes will be marked to provide 5% of the final mark.

A set of four homework assignments will also be made available on Courselink, to be returned before the assigned due date. A penalty will be applied to any late assignment, and no assignment will be accepted after the tutorial on the following Wednesday. Special arrangements for late submission must be made well ahead of time. Assignments provide 15% of the course's final mark.

In **marking scheme A**, the midterm and final exams account for 35% and 45% of the final mark, respectively. In **marking scheme B**, the midterm and final exams account for 25% and 55% of the final mark, respectively.

Both midterm and final exams will be closed-book exams, meaning that you will not be allowed to consult your notes nor any other source of information. You will, however, be provided with a formula sheet. The formula sheet, as well as practice exams, will be made available on CourseLink. Calculators may be required; only non-programmable pocket calculators are permitted. Personal communication or entertainment devices (such as smart phones or MP3 players) are not permitted during the exams.

(Not) Working with other students

All work submitted for grading in this course must be each individual student's own work. While students are encouraged to share thoughts and ideas prior to writing up solutions to homework assignments, **it is not acceptable to share assignment solutions**. The assignments are not group projects, and it is important that you do not show your final written solutions to other students.

Completing assignments is an essential part of your preparation toward midterm and final exams. A serious attempt to do the work yourself, independently of others, will provide you with a very good preparation. Relying too much on others to provide pieces of solutions will give you a very poor preparation.

Getting help

One of the best sources of help is the course's TA and tutorial instructor. You can also consult with Eric in his office. Do not wait too long before getting the help you need; it may be too late by then.

Course resources

Required text

David J. Griffiths, *Introduction to Electrodynamics*, Fourth edition (Pearson, 2013)

Recommended text

H.D. Young and R.A. Freedman, *University Physics*, 13th edition (Pearson, 2012)

The book by Griffiths is the same book that is used in PHYS*2340 (Electricity and Magnetism II). My lectures will follow the relevant sections of the book, and reading assignments will be given each week to ensure that you keep up with the material. The quizzes will provide even more incentive to keep up with the reading. The book by Young and Freedman is appropriate at the first-year level; you may want to refer to it from time to time.

Course policies

Grading policies

Each homework assignment will be submitted by you before class begins on the day the assignment is due. A penalty will be applied to any late assignment, and no assignment will be accepted after the tutorial on the following Wednesday. No partial credit will be given to unaccepted assignments.

Both midterm and final exams will be closed-book exams, meaning that you will not be allowed to consult your notes nor any other source of information. You will, however, be provided with a formula sheet. Calculators may be required; only non-programmable pocket calculators will be permitted. Personal communication or entertainment devices (such as smart phones or MP3 players) are not permitted during the exams.

Course policy on group work

All work submitted for grading in this course must be each individual student's own work. While students are encouraged to share thoughts and ideas prior to writing up solutions of homework assignments, **it is not acceptable to share assignment solutions**. The assignments are not group projects, and it is important that you do not show your final written solutions to other students. Copying will not be tolerated, and evidence of copying will be considered under the Academic Misconduct section of this document (see below).

Course policy on electronic devices and recording of lectures

What you do with your laptop, smart phone, tablet, etc, during lectures is your own business, so long as it does not create a distraction for your classmates or the instructor. If such a distraction arises you will be asked to leave the classroom.

Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

University Policies

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the Undergraduate Calendar for information on regulations and procedures for academic consideration.

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact Student Accessibility Services (SAS) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208.

Course Evaluation

The Department of Physics requires student assessment of all courses taught by the Department. These assessments provide essential feedback to faculty on their teaching by identifying both strengths and areas of improvement. In addition, student assessments provide part of the information used by the Department Tenure and Promotion Committee in evaluating the faculty member's contributions in the area of teaching. You are therefore encouraged to take the evaluation procedures seriously, and to provide feedback about this course and its instructor.

Drop date

The last date to drop one-semester courses, without academic penalty, is 3 November 2017. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar.