

# Carleton University Physics Department

## PHYS 3308 - Electromagnetism (Fall 2024)

### Syllabus

**Instructor:** Prof. Daniel Stolarski (he/him)

**Email:** stolar@physics.carleton.ca

**Office:** HP3320

**Lecture Schedule:** Mondays & Wednesdays, 11:35 AM. - 12:55 PM in person.

**Course Calendar Description:** Electrostatics field and magnetostatics in the presence of matter. Solving Laplace's and Poisson's equations. Multipole expansions. Vector potential. Faraday's laws of induction; Maxwell's equations in matter. Waves in vacuum and dielectric media, guided waves.

**Prerequisites:** PHYS 2202 (Wave Motion and Optics), PHYS 2305 (Electricity and Magnetism), PHYS 2604 (Modern Physics I), MATH 2004/2008 (Multivariate/Intermediate Calculus), MATH 3705 (Mathematical Methods I), or permission of the Department.

**Course webpage:** See Brightspace

**Required Textbook:** David J. Griffiths, "Introduction to Electrodynamics," (Cambridge University Press). Any edition of this textbook is fine.

**Teaching Assistant:** Fazlul Yasin (he/him), FAZLULYASIN@cmail.carleton.ca.

**Student Hours:** By email appointment with either Falzul or Prof. Stolarski. You can ask either Falzul or Prof. Stolarski questions about the material or assignment problems, but for questions about assignment marking please contact Falzul.

#### **Inclusive teaching statement:**

Science is for everyone. I am committed to fostering an environment for learning that is inclusive for everyone regardless of gender identity, gender expression, sex, sexual orientation, race, ethnicity, ability, age, class, etc. All students in the class, the instructor, and any guests should be treated with respect during all interactions. It is my hope that our class will support diversity of experience, thought, and perspective. I will continually strive to create inclusive learning environments and would therefore appreciate your support and feedback. I welcome emails or in-person communications to let me know your preferred name or pronoun. Please see the Faculty of Science Equity, Diversity, and Inclusion (EDI) statement.

#### **Mental Health:**

Taking classes at university can be difficult and stressful. If you are struggling with your mental health, please do not hesitate to reach out. I can direct you to resources that might help. Remember that Carleton also offers an array of mental health and well-being resources, which can be found here.

# Evaluation

The mark for this course is split between assignments (40%) and exams (60%). The breakdown is as follows.

## **Assignments:** 40%

Assignments will be assigned weekly and posted on Brightspace. They will be due at 11:30 AM before the start of class. The precise schedule will be posted on Brightspace.

Working through problems is an essential part of developing a deep understanding of Electromagnetism. This material is heavily math based, and is meant to provide a foundation for the mathematical aspects of physics that will come in future classes. **Students are encouraged to work together to understand the problems; however, the work handed in must be original.** Solutions showing significant overlap may have the mark divided by the number of people who provide that solution.

**Late assignments will not be accepted** without a legitimate reason, such as illness. If you do need a short (5 days or less) accommodation due to illness or similar reasons, please contact me via email.

Students that are having significant difficulties with the material are encouraged to come see me during office hours. Please let me know as soon as possible, as I will not be able to accommodate last minute requests.

## **Midterm Exam:** 25%

There will be an 80-minute, in-class midterm on **October 17**. The midterms will be closed-book and closed-notes, and calculators cannot be used. Students will be allowed to prepare their own formula sheet on one 8.5" x 11" (letter size) piece of paper. Use of both sides is allowed. The formula sheet can contain only formulas, without words or worked out solutions. The formula sheet will be handed in with the exam to verify that it meets this criteria.

In the case of an exam deferral for legitimate reasons, please inform me **within 24 hours** of the regularly scheduled midterm. The deferred midterm will be on Oct 29 from 11:30 AM - 1 PM.

## **Final Exam:** 35%

The final exam will be held during the final exam period in December, and will be 3 hours long. Students will again be allowed to write their own formula sheet, with the same criteria as for the midterm exam. The final exam will focus on the material from the second half of the course.

In the event that a deferred exam is necessary, that exam will replace only the final exam component of the course mark, and will only be granted in if adequate term work has been completed. Inadequate term work constitutes earning less than 15 of the 65 possible term marks.

## **If you are repeating this course:**

I invite you to meet with me early in the term to discuss your study strategy and develop a plan for successful completion of the course.

## Course Outline

Below is a rough outline of the course, but it may change to fit the pace needed.

Class	Text Sections	Topic Description
Sept 5 & 10	Chapter 1, 2	Review of electrostatics and vector calculus.
Sept 12	Sec 3.1	Laplace's Equation.
Sept 17	Sec 3.2	Method of Images.
Sept 19	Sec 3.3	Separation of Variables.
Sept 24	Sec 3.4	Multipole Expansion.
Sept 26	Sec 4.1, 4.2	Polarization and field of polarized object.
Oct 1 & 3	Sec 4.3, 4.4	Electric displacement and linear dielectrics.
Oct 8 & 10 & 15	Chapter 5	Review of magnetic fields in a vacuum.
Oct 17	<b>Midterm</b>	Midterm in class.
Oct 22 & 24	Fall Break	No classes.
Oct 29	Sec 6.1, 6.2	Magnetization, field of magnetized object.
Oct 31	Sec 6.3, 6.4	Auxiliary field H, Linear and Nonlinear Media.
Nov 5	Sec 7.3	Review of Maxwell's Equations, Maxwell's equations in Matter.
Nov 7	Sec 9.1, 9.2	Review of electromagnetic waves.
Nov 12	Sec 9.3	Electromagnetic waves in matter.
Nov 14 & 19	Sec 9.4, 9.5	Absorption and dispersion, Guided waves.
Nov 21	Sec 10.1	Potential formulation.
Nov 26	Sec 10.2, 10.3	Continuous distributions, point charges.
Nov 28 & Dec 3	Chapter 12	Electrodynamics and Relativity.
Dec 5	Final class	Review.

### Grade Definition:

In accordance with the Carleton University Undergraduate Calendar Regulations, the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100      A = 85-89      A- = 80-84

B+ = 77-79      B = 73-76      B- = 70-72

C+ = 67-69      C = 63-66      C- = 60-62

D+ = 57-59      D = 53-56      D- = 50-52

F < 50      WDN = Withdrawn from the course

ABS = Student absent from final exam      DEF = Deferred

### Academic Accommodations, Regulations, Plagiarism, Etc.

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances, are outlined on the Academic Accommodations website.

University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university's website, [here](#).

## **Academic Accommodations for Students with Disabilities**

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. For more details, visit the Paul Menton Centre website.

## **Addressing Human Rights Concerns**

The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at [equity@carleton.ca](mailto:equity@carleton.ca).

## **Religious Obligations**

Please contact me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the Student Guide to Academic Accommodation.

## **Survivors of Sexual Violence**

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: <https://carleton.ca/sexual-violence-support/>.

## **Accommodations for Missed Work**

If you need a short term (5 days or less) accommodation on assignments due to illness or similar reasons, please contact me via email. If you require accommodations that are longer than the 5 days period, please email me to discuss how/whether accommodation needs could be met.

## **For Pregnancy**

Please contact me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the Student Guide to Academic Accommodation.

## **Accommodation for Student Activities**

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the Senate Policy on Accommodation for Student Activities.

## **Academic Integrity**

Academic misconduct undermines the values of honesty, trust, respect, fairness, and responsibility that we expect in this class. Carleton University provides supports such as academic integrity workshops to ensure, as far as possible, that all students understand the norms and standards of academic integrity that we expect you to uphold. Your teaching team has a responsibility to ensure that their application of the Academic Integrity Policy upholds the university's collective commitments to fairness, equity, and integrity. (adapted from Carleton University's Academic Integrity Policy, 2021). Examples of actions that do not adhere to Carleton's Academic Integrity Policy include:

- Plagiarism
- Accessing unauthorized sites for assignments or tests
- Unauthorized collaboration on assignment and exams

The use of AI sources such as ChatGPT is **forbidden** and is an academic offence. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy. The Policy is strictly enforced and is binding on all students. For more information, please see Carleton's academic integrity page.

## **Course Copyright**

Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copyright protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s). Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s).

## **Assistance for Students**

Academic and Career Development Services  
Writing Services  
Peer Assisted Study Sessions (PASS)  
Science Student Success Centre

## **Important Dates:**

<https://calendar.carleton.ca/academicyear/>

<https://carleton.ca/registrar/registration/dates/academic-dates/>