

Carleton University Physics Department

PHYS 2305 - Electricity and Magnetism

Winter 2024 Course Outline

Instructor: Prof. Daniel Stolarski (he/him)

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Office: HP3320

Lecture Schedule: Tuesday & Thursday, 11:35 p.m. - 12:55 p.m.

Course delivery: The course will consist of synchronous meetings that will follow an in person model where we will gather in our classroom. I will lead a discussion of the course material in a lecture style following the chalk-and-talk. Students are encouraged to ask questions and engage with the material during the lecture. These sessions are intended to be the primary method of course delivery and it is highly recommended that you attend these sessions except in the case of an emergency.

Course Calendar Description: Electrostatic field and potential, Gauss' law. Properties of conductors. Magnetic effects from currents. Motion of charges in electric and magnetic fields. Energy in electric and magnetic fields. Electromagnetic induction. Maxwell's equations in vacuum using vector differential and integral calculus.

Prerequisites: You must have successfully completed:

1. PHYS 1001, **or** PHYS 1003, **or** PHYS 1007 with an overall grade of B- or higher.
2. PHYS 1002, **or** PHYS 1004, **or** PHYS 1008 with an overall grade of B- or higher.
3. MATH 2004.

Course webpage: See Brightspace

Required Textbook: David J. Griffiths, "Introduction to Electrodynamics," 4th Edition (Cambridge University Press., 2017). This course will be compatible with the 3rd Edition, students may use either. PHYS 3308 will use the same textbook.

Teaching Assistant: Cyrus Robertson Orkish (he/they), CyrusRobertsonOrkish@email.carleton.ca.

Student Hours: Student hours will be determined during the first week of the semester.

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.

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 and should be submitted electronically on Brightspace. They will be due on class days and should be submitted before the beginning of class. Students can hand write their solutions and scan or photograph them to upload to the website. **Please upload a single pdf file.**

Working through problems is an essential part of developing a deep understanding of electricity and magnetism. 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 except for legitimate reasons such as illness. It is your responsibility to notify me if you will be unable to hand in the assignment by the deadline.

Viewing or searching for solutions in any form before your assignment is submitted is forbidden and will be considered an academic offence. This includes solution manuals, worked problems on the internet, AI generated solutions, solutions written by other students, and solutions provided by course instructors in previous years.

Students that are having significant difficulties with the material are encouraged to come see me during student hours. If the provided student hours do not work, accommodation can be made. Let me know as soon as possible, though, as I will not be able to accommodate last minute requests.

Midterm Exam: 25%

There will be an 80-minute, in-class midterm on February 15. A formula sheet will be provided (to be posted on Brightspace in advance). In the case of an exam deferral for legitimate reasons, please inform me within 24 hours of the regularly scheduled midterm to arrange a time to write the deferred exam.

Final Exam: 35%

The final exam will be held during on during the finals period in April and will be 3 hours long. A formula sheet will be provided. 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.

Course Outline

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

Class	Textbook Sections	Topic Description
Jan 9	1.1 & 2.1	Course intro, vector algebra, Coulomb's law
Jan 11	2.1	Electric field, Continuous charge distribution
Jan 16	1.2 – 1.3	Differential and integral calculus
Jan 18	1.4	Curvilinear coordinates, Assignment 1 due
Jan 23	2.2	Gauss' Law
Jan 25	1.6 & 2.3	Electric potential, Assignment 2 due
Jan 30	2.3	Poisson's equation
Feb 1	2.4	Work and energy, Assignment 3 due
Feb 6	2.5	Conductors
Feb 8	5.1	Lorentz force law, Assignment 4 due
Feb 13	5.2	Biot–Savart law
Feb 15		Midterm
Feb 20 & 22	Winter Break	No classes.
Feb 27	5.3	Ampere's law
Feb 29	5.3	Ampere's law, Assignment 5 due
Mar 5	7.1	Electromotive force
Mar 7	7.2	Electromagnetic induction, Assignment 6 due
Mar 12	7.2	Electromagnetic induction
Mar 14	7.3	Maxwell's laws, Assignment 7 due
Mar 19	7.3	Maxwell's laws
Mar 21	8.1, 8.2	Conservation of charge, energy, and momentum, Assignment 8 due
Mar 26	9.2	Electromagnetic waves
Mar 28	9.1	The Wave Equation, Assignment 9 due
Apr 2 & 4		Catch up
Apr 9	Final class	Review, Assignment 10 due

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.

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	

Academic Accommodations, Regulations, Plagiarism, Etc.

Carleton University is committed to providing access to the educational experience in order to promote academic accessibility for all individuals. Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University. More information can be found [here](#).

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 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.

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

Carleton recognizes that these are unprecedented times during the COVID-19 pandemic, and that students may be experiencing greater stress and other life factors that are not in their control. As a result, Carleton has put into place a protocol for students to apply for accommodations using a self-declaration form in the event of missed work. The form can be found at: <https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf>.

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

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/>