

PHYS 5302 for Winter 2025

CLASSICAL ELECTRODYNAMICS

We, the people of the Faculty of Science at Carleton University, acknowledge that our campus is located on the traditional, unceded territories of the Algonquin Anishinabeg people. Miigwetch for your hospitality and stewardship of this territory and the teachings that come from it. We are grateful for this land, the air that we breathe, and the water that sustains us all as well as for the animals, plants and other living beings: these enable us to research, teach, mentor, support, study, and learn. We recognize our responsibility to our natural environment and to reconciliation with Indigenous peoples.

Course Instructor: Razvan Gornea

How to address me: Razvan

Gender Pronouns: he/him/his

Email: razvan.gornea@carleton.ca

Note: If you have any question or would like to talk with me, you can send an email, visit me during student hours (see below) or approach me after lecture.

Best Ways to be in Touch: in class, via email, or during student hours

Student Hours: Wednesday and Friday, after class from 10h to 12h, at my office HP 2462

Office Location: Room 2462, Herzberg

Class Location: Please check Carleton Central for the room location.

Class Times: Wednesdays and Fridays, from 8h35 to 9h55

Prerequisites: PHYS 3308, PHYS 3802 and PHYS 3807, or equivalent courses, or permission of the Physics department

Preclusions: N/A

Department/Unit: Physics

Course TAs:
Not available

Topics Covered and Learning Outcomes

I am committed to fostering an inclusive learning environment well suited to all regardless of race, gender identity, expression, sexual orientation, age and ability. All students, the instructor and visitors should be treated with respect during all interactions. It is my intent that our classes will support a diversity of experience, thought and perspective. I am constantly striving to create an inclusive learning environment, and I always appreciate your feedback and support. I welcome electronic or in-person communication to let me know your preferred name and pronouns.

Topics to be Covered

Week	Topic/Content	Readings/Prep for Class
1, 2	Green's theorem and Green's functions	Textbook: 1.1-5; 1.7-10
3, 4	Solutions to Poisson equation in spherical and cylindrical coordinates	Textbook: 2.1-8; 3.1-8
5	Multipole expansion	Textbook: 4.1
6, 8	Covariant formulation of electromagnetism	Textbook: 11.7,9-10; 12.1,7,10-11
9	Maxwell equations and EM waves	Textbook: 6.2-4; 7.1
10	Dispersion and Kramers-Kronig relations	Textbook: 7.5,10
11	Multipole fields and radiation	Textbook: 9.1-10
12	Collisions, energy loss and Cherenkov radiation	Textbook: 13.1-4
13	Radiation by moving charges	Textbook: 14.1-6,8

Important dates and deadlines can be found here:

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

Course level learning outcomes:

1. Learn advanced topics in classical electrodynamics
2. Develop skills for solving complex physics problems

Assessments

Grade Breakdown

COMPONENT	GRADE VALUE	DATE
ASSIGNMENT 1	15 %	TBD
ASSIGNMENT 2	15 %	TBD
ASSIGNMENT 3	15 %	TBD
ASSIGNMENT 3	15 %	TBD
FINAL EXAM	40 %	TBD

Learning Material(s) and Other Course/Lab-Related Resources

Ancillary fees associated with this course, e.g., textbooks, course packs, lab manuals, field work, online resources or links required for the course along with their associated cost (if applicable). Estimated costs can be acquired based on current bookstore offerings, Amazon, etc.

Learning Material	Options for Purchasing	Approximate Cost
J. D. Jackson, "Classical Electrodynamics", 3 rd edition	Available at the Carleton bookstore, as well as new & used online	125 CAD

Academic Accommodations and Regulations

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 are outlined on the Academic Accommodations website (<https://students.carleton.ca/course-outline/>).

Statement on Chat GPT/Generative AI usage

As our understanding of the uses of AI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of AI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course.

Statement on Academic Integrity

Students are expected to uphold the values of academic integrity, which include fairness, honesty, trust, and responsibility. Examples of actions that compromise these values include but are not limited to plagiarism, accessing unauthorized sites for assignments or tests, unauthorized collaboration on assignments or exams, and using artificial intelligence tools such as ChatGPT when your assessment instructions say it is not permitted.

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in [Carleton University's Academic Integrity Policy](#). A list of standard sanctions in the Faculty of Science can be found [here](#).

Additional details about this process can be found on [the Faculty of Science Academic Integrity website](#).

Students are expected to familiarize themselves with and abide by [Carleton University's Academic Integrity Policy](#).

Student Rights & Responsibilities

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the [7 Rights and Responsibilities Policy](#) for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Student Concerns

If a concern arises regarding this course, **your first point of contact is me**: Email or drop in during student hours and I will do my best to address your concern. If I am unable to address your concern, the next points of contact are (in this order):

Note: You can also bring your concerns to [Ombuds services](#).

