

PHYS 5302 Classical Electrodynamics

Winter 2021, updated Feb 3, 2021

Instructor: Mark Boulay mark.boulay@carleton.ca

Textbook: Classical Electrodynamics, JD Jackson, 3rd Edition 1998 ISBN 978-0471309321

Times (zoom calls): Wednesday/Friday 1:05pm-2:25pm, starting Jan 13th

Outline

We will cover advanced topics in electrodynamics. Covered topics will include:

- Recap of electrostatics, greens theorem and Greens function (1.1-1.5, 1.7-1.10) w2, 3
- Solutions to the Poisson equation in spherical and cylindrical coordinates (2.1 - 2.8 and 3.1 - 3.8) w4-5
- (Break week)
- Multipole expansion (4.1) w6
- Covariant formulation of electromagnetism (11.7, 11.9, 11.10, 12.1, 12.7, 12.10, 12.11) w7,w8
- Maxwell equations and EM waves (6.2, 6.3, 6.4, 7.1) w9
- Dispersion relations (7.5), w10
- Multipole fields and radiation (9.1-9.10)
- Collisions, energy loss and Cherenkov radiation (13.1-13.4)
- Radiation by moving charges (14.1-14.6, 14.8)

Grading

Assignments (60%) Approximately 4 assignments throughout the term. You are free to work with others, but the work handed in for marking must be your own.

Final take-home exam (40%) distributed during the exam period. You must work on the exam on your own.

Academic Policies:

Academic Regulations

University rules can be found here:

<https://calendar.carleton.ca/grad/gradregulations/>

Academic Accommodations for Students with Disabilities

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at

613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send your ***Letter of Accommodation*** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*).

For Religious Obligations:

Students requesting academic accommodations on the basis of religious obligation should make a formal, written request to their instructors for alternate dates and/or means of satisfying academic requirements. Such requests should be made during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist, but no later than two weeks before the compulsory event. Accommodation is to be worked out directly and on an individual basis between the student and the instructor(s) involved. Instructors will make accommodations in a way that avoids academic disadvantage to the student. Students or instructors who have questions or want to confirm accommodation eligibility of a religious event or practice may refer to the Equity Services website for a list of holy days and Carleton's Academic Accommodation policies or may contact an Equity Services Advisor in the Equity Services Department for assistance.

For Pregnancy:

Pregnant students requiring academic accommodations are encouraged to contact an Equity Advisor in Equity Services to complete a letter of accommodation. The student must then make an appointment to discuss her needs with the instructor at least two weeks prior to the first academic event in which it is anticipated the accommodation will be required.

carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Plagiarism and cheating at the graduate level are serious and the sanctions imposed are accordingly severe. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy (See <https://carleton.ca/registrar/academic-integrity/>). The Policy is strictly enforced and is binding on all students. Plagiarism and cheating – presenting another's ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another student – weaken the quality of the graduate degree. Academic dishonesty in any form will not be tolerated. Students who infringe the Policy may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; a refusal of permission to continue or to register in a specific degree program; academic probation; or a failing grade in the course.