

FALL 2021

PHYS 785: Classical Electrodynamics II

Friday 1:30 – 4:10 pm; Planetary Hall, Room 126

Instructor: Yuri Mishin, ymishin@gmu.edu
<http://physics.gmu.edu/~ymishin/>

Office Hours: 2:00-3:00 pm Tuesday, or by appointment (online).

Course text: J. D. Jackson, "Classical Electrodynamics", Third Edition, Wiley, NY, 1998.
ISBN-13: 978-0471309321.

Amazon link: http://www.amazon.com/Classical-Electrodynamics-Third-David-Jackson/dp/047130932X/ref=sr_1_1?s=books&ie=UTF8&qid=1440611910&sr=1-1&keywords=jackson+classical+electrodynamics

The course will approximately cover Chapters 7-14 (not completely).

Highly recommended additional text: L. D. Landau and E. M. Lifshitz, "The Classical Theory of Fields", Volume 2 of the "Course of Theoretical Physics Series", Fourth Revised English Edition, Butterworth-Heinemann, 2000, Oxford. ISBN-13: 978-0750627689.

Amazon link: http://www.amazon.com/Classical-Theory-Fields-Fourth-Theoretical/dp/0750627689/ref=sr_1_1?s=books&ie=UTF8&qid=1440612509&sr=1-1&keywords=Landau+Lifshitz+classical+theory+of+fields

The course will approximately cover Chapters 1-9 (not completely).

● **Class format:**

- Lectures will combine slides with chalk-and-board derivations.
- Attendance of lectures is required. The course heavily relies on the lecture material.
- The lecture material may deviate from the textbooks very significantly. Taking lecture notes is recommended.
- Students must know the material covered in both the lectures and the appropriate chapters of the textbooks.

● **Homework** (40% of grade):

- Usually 2-4 problems a week. The due date and time will be indicated. Late homework will not be accepted.
- Typesetting your solutions (e.g., Latex or Word) is highly recommended but not required. If your solutions are handwritten, please write legibly. I cannot grade what I cannot read.
- Start working on homework problems shortly after they are posted. Give yourself plenty of time.
- Solutions of homework problem sets will be posted after the due date. Compare your solutions with mine. Analyzing the solutions is an important part of the course.
- Working in study groups is allowed. However, copying homework from other students constitutes cheating and will be treated as violation of the Academic Integrity rules.

● **Exams:**

- Midterm exam (30% of grade): 1:30-4:10 pm October 8, 2021.
- Final exam (30% of grade): 1:30-4:10 pm December 10, 2021.
- Students are allowed use lecture notes and textbooks during the tests. No laptops or wireless devices.
- Depending on the pace of lectures this semester, the exams could be administered in take-home format with regular lectures on the exam date/time.
- Each exam will contain 4-5 problems on the level of difficulty of the homework assignments.

COURSE CONTENT:

- Introduction
- Elements of vector and tensor algebra and calculus
- The Minkowski space
- Review of the special theory of relativity
- The motion of relativistic particles in electromagnetic field
- The electromagnetic field equations
- Conservation laws
- Electromagnetic waves
- Electromagnetic field of moving charges
- Radiation of electromagnetic waves
- Radiation by accelerated particles
- Interaction of radiation with matter
- Radiation reaction and limitations of classical electrodynamics