PHYS 685: Classical Electrodynamics I

SPRING 2021

The course will be taught ONLINE in the synchronous mode
Wednesday: 4:30 - 7:10 pm

Instructor: Dr. Yuri Mishin (you can call me Yuri)
Email: ymishin@gmu.edu
Website: http://physics.gmu.edu/~ymishin/

Office Hours (virtual): 3 - 5 pm Tuesdays (or by appointment) via Blackboard. You can also post your questions in the ASK INSTRUCTOR forum in the Discussion Board on the Blackboard.

Course Description:
Static and dynamic properties of electromagnetic fields as described by Maxwell's equations. Covers electrostatics, magnetostatics, boundary value problems, multipoles, time dependent fields, propagating wave solutions, and resonant structures.

Course Website: All announcements, homework assignments, solutions and all other information related to the course will be posted on the Blackboard. Go to

https://mymasonportal.gmu.edu/webapps/portal/execute/tabs/tabAction?tab_tab_group_id=_66_1

login with your Mason ID and password, click on the tab “Courses” in the side bar, and find this course. In addition to computer access, consider downloading the mobile application from

https://its.gmu.edu/service/blackboard-mobile-learn/

Please be sure to learn how to use the Blackboard. Learning resources for students are available.

Textbook:

Required 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

Recommended supplementary text:
“Div, grad, curl, and all that; an informal text on vector calculus” (4th edition) by H. M. Schey, W.W. Norton and Company, 2004.

Class format:
Lectures will be delivered synchronously online via the Blackboard learning system during the regular time slots: 4:30-7:10 pm Wednesday. Students are required to have regular, reliable access to a computer with an updated operating system (recommended: Windows 10 or Mac

OSX 10.13 or higher) and a stable broadband Internet connection (cable modem, DSL, satellite broadband, etc., with a consistent 1.5 Mbps download speed or higher).

The lectures will not be recorded, but lecture notes will be posted on the course website before each class. Attendance might be taken for instructor's records only and will not affect your grade. However, attending the lectures is strongly encouraged as it will help you better understand the subject and be more successful in the homework and exams. If you miss a class, please try to catch up by reviewing the lecture notes and reading the textbook. Contact the instructor if you have questions.

The lectures will not exactly follow the textbook. Instead, they may include some additional material not covered in the textbook, while some textbook material will be left for reading at home. You will be expected to know both the lecture material and the relevant chapters of the textbook. The lecture notes will be divided into chapter that will not correspond to the chapters in the textbook.

Grading:
Homework = 40%, Midterm Exam = 30%, Final Exam = 30%.
The letter grades for the course will be assigned according to the GMU grading scale but could be curved, depending on the class performance.

Homework Assignments:
Weekly homework problem sets will be posted on the Blackboard and will be due the following Wednesday before class, i.e., by 4:30 pm (except for the first homework that will be due in two weeks). Please scan your homework, making sure the scan is perfectly legible and all pages are numbered. Include all pages in a single file. Upload the file through the Blackboard in one of the approved formats. The upload should be complete by the due date/time (keep in mind that Blackboard puts a time stamp on your submission).

Each homework problem will be worth 5 points unless otherwise indicated. Some of the homework problems will be given for extra credit. Solutions will be posted on Blackboard after the due date. Please study the solutions, they are an important part of the course.

Homework posted after 4:30 pm on Wednesday will be considered late and will not be graded. However, when calculating the semester grade, the lowest homework score will be dropped.

Exams:
The Midterm and Final Exams will be administered in the take-home format. The Final Exam will be comprehensive, with greater emphasis on the material covered in the second half on the course.

Important advice:
In the homework assignments and exams, please present all steps of your solution in every detail. Even if your final answer is incorrect, you may still get some partial credit if the problem setup and the general line of solution are correct. No credit will be given for a mere list of answers even if they are correct. Please write legibly: I cannot grade what I cannot read. Typesetting the solutions of the homework problem sets in Latex, MS Word or Apple Pages will be greatly appreciated but is not a requirement.

Students with disabilities:
If you are a student with a disability and need academic accommodations, please contact the Office of Disability Services at 703.993.2474. All academic accommodations must be arranged through that office. Students must inform the instructor at the beginning of the semester and the specific accommodation will be arranged through the ODS.

GMU Diversity Statement:
http://ctfe.gmu.edu/professional-development/mason-diversity-statement/

Academic Integrity:
GMU is an Honor Code university; please see the University Catalog for a full description of the honor code and the honor committee process.
GMU Honor code:
https://catalog.gmu.edu/policies/honor-code-system/#text
is supported by the Academic Integrity.

Tentative Schedule of the course:

Mathematical foundations of electrodynamics
January 27; February 3

Preview of electrodynamics
February 10, 17

Electrostatics. Electric field. Electric potential.
February 24; March 3

Boundary value problems of electrostatics
March 10, 17; (Midterm exam during the week of March 17)

Multipole expansion. Dielectrics.
March 24, 31

Magnetostatics. Vector potential. Calculation of magnetic fields.
April 7,14

Magnetic properties of matter. Electrodynamics in media
April 21, 28

Final exam: May 5