

Physics 421 Electricity and Magnetism I
General Information, Spring 2022
January 23, 2022

Subject matter: Electrostatics, magnetostatics, Maxwell's equations, dynamics of charged particles, multipole fields and potential formulation

Instructor: H. Daniel Ou-Yang, professor of physics
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General Plan: The class meets three times per week for 50 minutes each, 3:00 – 3:50 pm, Monday, Wednesday, and Friday in **Lewis Lab 311**

First date of lecture: Monday, January 24

Note: The first week lectures will be conducted by Zoom

Zoom Link:

<https://lehigh.zoom.us/j/92096603666?pwd=T3hneHRpQWJqWUdJY3hTa1M0VHZDQT09>

Textbook:

“*Classical Electrodynamics*,” John David Jackson, 3rd Ed. John Wiley & Sons, 1999.

“Introduction to Electrodynamics,” David Griffiths, 4th Ed., 2013

Goals for the course:

The students are expected to learn the physical concept and necessary mathematical tools to solve problems in the following topics:

- 1) Coulomb's law, Gauss's law, E field and electrostatic forces
- 2) Electric potential to determine E field and vice versa
- 3) Laplace equation, Green's theorem and boundary value problems
- 4) Electric field and polarization in polarizable materials
- 5) Biot-Savart law and vector potential of problems of magnetostatics
- 6) Ampere's law and Faraday's laws
- 7) Magnetic field and polarization in magnetic materials
- 8) Maxwell's equations, Lorentz force and conservation of charges
- 9) Potentials, and gauge transformation

Grading:

Homework, short exercises, and classroom participation 20%
Hour Exam I: 20%, Hour Exam II: 20%, Final Exam: 40%

Homework and assigned Exercises: The objective of the homework assignments, due before each lecture. These exercises will help you refresh what you have just learned in the class and also prepare you about what is to be discussed in the next lectures. These exercises will be assigned and submitted through CourseSite. The purpose of homework is that you get a feeling on how well you have understood what have just been taught and by grading them I get a feeling on how well the students are prepared for the lectures and how well they understood them.

The homework will be graded mostly on the effort rather than on the correctness of the answers. Students are encouraged to work with each other on homework assignments. You are also welcomed to email or come to see me if you need help. However, use of solution sets from previous years is considered an act of cheating, both for the current students and for the students who provided the solution sets.

Exams: All exams will be open-book and open notes, including free access to online Course-site materials.

Makeup Exams: No make-up exams for hour test or final exams are given under any circumstance. If an hour exam is missed for a legitimate reason, the corresponding portion of the final exam that covers the same course materials will be counted as the missed exam. It will be an incomplete if a final exam is missed – a make-up exam can be arranged if proof of illness by the University Health Center is provided.

Attendance Policy: Attendance to the lectures is required. Participation in discussions, pop quizzes and in-class exercises are important part of the class attendance.

Office Hours: The instructor will stay after the regular lectures to answer any questions the student might have. Additional office hours can be arranged for small group or individual meetings.

Statement on Academic Integrity/Code of Conduct: This is a graduate class that I assume all graduate students are honest and understand what is expected. However, a couple of specific comments might be necessary.

Homework: I consider homework assignments to be as important for learning as for receiving credits. Discussions with the instructor and/or other students in the class are encourage. However, copying solutions from other students or using of solution sets from previous years are considered an act of cheating.

Exams: Copying from papers of other students, collaborating on exams and using of notes or references that are not explicitly permitted, are obvious forms of cheating that will be dealt with by referral to the Discipline Committee. Phones of any kind are not permitted during the exams.

Accommodations for Students with Disabilities:

Lehigh University is committed to maintaining an equitable and inclusive community and welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact Disability Support Services (DSS), provide documentation, and participate in an interactive review process. If the documentation supports a request for reasonable accommodations, DSS will provide students with a Letter of Accommodations. Students who are approved for accommodations at Lehigh should share this letter and discuss their accommodations and learning needs with instructors as early in the semester as possible. For more information or to request services, please contact Disability Support Services in person in Williams Hall, Suite 301, via phone at 610-758-4152, via email at indss@lehigh.edu, or online at <https://studentaffairs.lehigh.edu/disabilities>.

The Principles of Our Equitable Community:

Lehigh University endorses The Principles of Our Equitable Community [http://www.lehigh.edu/~inprv/initiatives/PrinciplesEquity_Sheet_v2_032212.pdf]. We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

Academic integrity and Respect:

<https://mail.google.com/mail/u/0/#search/Academic+integrity/WhctKKXPcgpLfWSpgqvwjSrKrtTppxSWGgRGqhftzQBHtNtKCZsJrWmDBpwwWvJGTrplDkb>