Physics 30: Electromagnetism

Fall 2018

Instructor: Prof. Matthew Headrick  
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Office: Abelson 313  
Office hours: Wednesday 4–5pm and by appointment. You are also welcome to knock on my door at any time, and I will meet with you if I can.

Time and place: Monday, Wednesday, Thursday from 10:00 to 10:50am in Abelson 126

Credits: Four-Credit Course (with three hours of class-time per week). Success in this 4 credit-hour course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, problem sets, recitations, preparation for exams, etc.).

Content: This course will cover the fundamentals and some applications of Maxwell’s theory of electromagnetism, along with associated mathematical methods. We will follow Griffiths' textbook *Introduction to Electrodynamics* (fourth edition), covering most of chapters 1–11.

Readings: A reading from the textbook will be assigned each week, to be done before Monday morning. This will include some problems, which are not to be handed in but which we may discuss in class. For each reading, you will also have to submit a TQ (thought or question) on Latte. This can be about something you didn’t understand, something you found particularly interesting, or a possible extension or application of the material. The question should be submitted by 10am on Monday (whether or not we have class that day).

Problem sets: Each week there will also be a problem set, usually. You are encouraged to work together in solving the problems (or at least to check your solutions), but you must write the problem set up by yourself (no copying). Problem sets will be graded based on both the correctness of the physics and the quality of the presentation. Late problem sets (or portions thereof) will be given 50% credit if handed in within one week of the original due date.

Exams: There will be two in-class midterms, tentatively scheduled for Oct. 4 and Nov. 1, and an in-class final exam.

Grade: Your grade for the course will be calculated as follows: 10% for attendance and participation; 10% for submission of TQs; 30% for problems sets; 10% for each midterm; and 30% for the final exam.

Other books: The material we will cover in this course is very standard and can be found in innumerable places besides Griffiths’ textbook, including on the web and in other textbooks. Therefore, if for any reason you are not satisfied by Griffiths’ discussion (or mine) of a particular topic, there are many places you can go for one that suits you better. Useful books include:

- *Electricity and Magnetism* by Purcell and Morin, the textbook for Physics 15b. This is at a lower level than Griffiths, and could be very useful for those who took Physics 11b.

- *Classical Electromagnetic Radiation* by Heald and Marion. This book is slightly more advanced than Griffiths.

- *Classical Electrodynamics* by Jackson. This is the standard graduate textbook for electromagnetism.

- *Mathematical Methods in the Physical Sciences* by Boas. This book very nicely covers all the math you will need in this course (or indeed in any undergrad physics course).

- *A History of the Theories of Aether and Electricity, Part I* by Whittaker. This weighty tome is the standard history of the development of electricity and magnetism through the end of the nineteenth century.