

PHY611 – E&M I Syllabus
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This is the first part of the core graduate electrodynamics sequence. I hope to cover electrostatics and magnetostatics in great detail, and to end with Maxwell's equations and their propagating wave solutions. We will mostly be using J. D. Jackson's *Classical Electrodynamics*, though I will occasionally borrow material from Landau and Lifshitz's *The Classical Theory of Fields* and Schwinger, DeRaad, Milton, and Tsai's *Classical Electrodynamics*. There will be homework due (roughly) every two weeks, which will be worth 40% of the final grade. Your grader is Olex Zelyak (this may change). One midterm on October 23th will be worth 25%, and the final on December 14th at 8:00 am will be worth the remaining 35%.

Please be aware that while you are encouraged to talk to each other and work together in understanding the homework problems and methods of solution, **you are expected to solve the problems, write and run any computer programs necessary for the solutions, and write out the solutions yourself**. A breach of this policy will be considered cheating and will be prosecuted as such.

Here is the rough outline of the course, with the chapters of Jackson listed as a reference.

0. Review of 200-level electrodynamics. [1/2 week]
1. Introduction to electrostatics. (Chapter 1) [2 weeks]
2. Boundary value problems in electrostatics, with many different methods of solving such problems. (Chapters 2 and 3) [4 weeks]
3. Multipoles and macroscopic media. (Chapter 4) [2 weeks]
4. Magnetostatics, and boundary value problems in magnetostatics. (Chapter 5) [2 weeks]
5. Faraday's law and Maxwell's equations. Conservation laws for energy and momentum, the stress-energy tensor. (Chapter 6) [2 weeks]
6. Travelling wave solutions of Maxwell's equations. (Chapter 7) [1 week]