# PHY6346

## Electromagnetic Theory I

Fall 2021
MWF, period 8

3:00 p.m.-3:50 p.m.

NPB 1101

Instructor: Dmitri Maslov
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**Office hours:**

**Wednesday 4:00 p.m.-5:00 p.m.**

**Friday 1:00 p.m.-2:00 p.m.**

or by appointment

Grader: TBA

E-Mail:

Office:

Office hours:

All materials for this class will be posted at UF e-learning . Enter with your Gatorlink login and password.

## Overview

PHY 6346 is the first semester of the graduate core sequence in Electromagnetism. The objectives of the course are

1. to study electrodynamics at a theoretically sophisticated level;
2. to develop mathematical techniques useful for solving problems in E&M as well as in other areas of physics;
3. to develop general problem-solving skills;
4. to prepare the student (if necessary) for the preliminary exam.

Topics to be covered include

- Electrostatics: Coulomb's Law, the electric field, Gauss's Law, Poisson's equation, Green's functions
- Mathematical methods: images, separation of variables, Legendre polynomials, Bessel functions, spherical harmonics
- Multipoles, polarization, displacement, linear dielectrics
- Magnetostatics: Biot-Savart Law, the magnetic field, Ampère's Law, vector potential, magnetization, magnetic materials
- Time-dependent magnetic field: Faraday's Law, induction, Ohm's law, skin depth

## Coursework

Weekly homework (50% of the grade), due at 11:59 p.m. every Friday (**uploaded to Canvas site**)

Exam I (25%)

Exam II (25%) (in lieu of final exam)

Exam II is **not** cumulative

Both exams are open book. You can use any electronic/printed/handwritten materials but your Internet connection **must be turned off**.

**Units Rule**

Every algebraic solution of homework and exam problems must be accompanied by a unit check. Without such a check, no more that 75% of the credit will be given even for an otherwise perfectly correct solution. On the other hand, constructing an answer using dimensional analysis and other general arguments (symmetries, analysis of limiting cases, etc.) may earn you up to 50% of the credit, even if a complete solution is not provided.

## Materials

- **Main text:**

  J. D. Jackson, *Classical Electrodynamics*, 3rd ed.

- **Supplemental texts:**

  A. Zangwill, *Modern Electrodynamics*, Cambridge

  L. D. Landau and E. M. Lifshitz, *Electrodynamics of continuous media* (Landau Course of Theoretical Physics, v.8)

## Important dates

**No classes:**

**Sept 6 (Labor Day)**

**Oct 8 (Homecoming)**

**Nov 11 (Veteran's Day)**

**Nov 24 and 26 (Thanksgiving)**

**Exam I**

Tuesday, Oct 19, time & room TBA

**Exam II**

Friday, Dec 3, time & room TBA

### Diversity statement

Physics is practiced and advanced by a scientific community of individuals with diverse backgrounds and identities and is open and welcoming to everyone. The instructional team recognizes the value in diversity, equity and inclusion in all aspects of this course. This includes, but is not limited to differences in race, ethnicity, gender identity, gender expression, sexual orientation, age, socioeconomic status, religion and disability. Students may have opportunities to work together in this course. We expect respectful student collaborations such as attentive listening and responding to the contributions of all teammates.

Physics, like all human endeavors, is something that is learned. Our aim is to foster an atmosphere of learning that is based on inclusion, transparency and respect for all participants. We acknowledge the different needs and perspectives we bring to our common learning space and strive to provide everyone with equal access. All students meeting the course prerequisites belong here and are well positioned for success.

## University Policies

Students are expected to know and comply with the University's policies regarding academic honesty and use of copyrighted materials. Cheating, plagiarism, or other violations of the Academic Honesty Guidelines will not be tolerated and will be pursued through the University's adjudication procedures.

Students requesting classroom accommodations must first register with the Disabilities Resources Program, located in the Dean of Students Office, P202 Peabody Hall. The Disabilities Resources Program will provide documentation to the student, who must then deliver this documentation to the instructor when requesting accommodations.

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/