

Syllabus for Electrodynamics II  
PHY6347 Spring 2020  
University of Central Florida  
Department of Physics

**Basics**

Instructor: Prof. Robert E. Peale

Office location: PS423

Office hours and Discussion: TBD

Email: [Robert.peale@ucf.edu](mailto:Robert.peale@ucf.edu)

Class website: <https://physics.ucf.edu/~rep/EDII/EDII.html>

Class time: TuTh 12-1:20 p.m.

Class location: BA1 0209

**Course information**

Credits: 3(3,0).

Prerequisites: PHY5346 Electrodynamics I

Course Description: This required core graduate course for the MS and PhD programs in physics will cover electrodynamics of conductors and dielectrics.

Goals and objectives: Learn theory of, and develop problem solving tools for, Electrostatics of Conductors, Electrostatics of Dielectrics, Steady Current, Static Magnetic Field, Superconductivity, Quasi-static Electromagnetic Field, Electromagnetic Wave Equations, and Propagation of Electromagnetic Waves. Specific subtopics are listed in the course schedule below.

Required text: Text: L.D. Landau, E.M. Lifshitz, and L. P. Pitaevskii, Electrodynamics of Continuous Media, 2<sup>nd</sup> Ed., (Elsevier Butterworth Heinemann, 1984).

**Course calendar**

**Date Section/Event**

Jan 7 Section 1 The electrostatic field of conductors

Section 2 The energy of the electrostatic field of conductors

Jan 9 Section 3 Methods of solving problems in electrostatics

Jan 14 Section 5 The forces on a conductor

Jan 16 Section 6 The electric field in dielectrics

Section 7 The permittivity

Jan 21 Section 10 Thermodynamic relations for dielectrics in an electric field

Jan 23 Section 11 The total free energy of a dielectric

**Jan 28 Exam 1**

Jan 30 Section 21 Current density and conductivity

Section 22 The Hall effect

Feb 4 Section 29 Static magnetic field

Section 30 The magnetic field of a steady current

Feb 6 Section 31 Thermodynamic relations in a magnetic field  
Feb 11 Section 32 The total free energy of a magnetic substance  
Feb 13 Section 33 The energy of a system of currents  
Feb 18 Section 34 The self-inductance of linear conductors  
**Feb 20 Exam 2.**  
Feb 25 Section 53 The magnetic properties of superconductors  
Section 54 The superconductivity current  
Feb 27 Section 58 Equations of the quasi-static field  
Mar 3 Section 59 Depth of penetration of a magnetic field into a conductor  
Mar 5 Section 60 The skin effect  
Mar 10 Spring Break  
Mar 12 Spring Break  
Mar 17 Section 61 The complex resistance  
Mar 19 Section 62 Capacitance in a quasi-steady current circuit  
Mar 24 Section 63 Motion of a conductor in a magnetic field

**Mar 26 Exam 3**

Mar 31 Section 75 The field equations in a dielectric in the absence of dispersion  
Apr 2 Section 77 The dispersion of the permittivity  
Section 78 The permittivity at very high frequencies  
Apr 7 Section 80 The field energy in dispersive media  
Apr 9 Section 82 The analytical properties of the frequency-dependent permittivity  
Apr 14 Section 83 A plane monochromatic wave  
Section 84 Transparent media  
Apr 16 Section 86 Reflection and refraction of electromagnetic waves  
**Apr 23 Exam 4 FINAL 10-12:50 p.m.**

Course assignments (assignments and exams): Homework will be assigned weekly. There will be four evenly spaced exams, including the final, based on a set of problems that will be posted on the course webpage. You will be allowed to use your textbook, mathematical tables, and a calculator, but no other books or notes, during exams. Participation in the class is expected and will be recorded. Questions will be asked during class to individuals by name with the expectation of best effort to answer them.

Methods of evaluation: Homework will be graded and will count for 20% of the final grade. Exams count for 18% of the final grade each. In class participation counts as 8%. + and – grades will be given. The final course grade will be available on myucf.

**Other Policies**

Missed work policy: It is the policy of the Department of Physics that making up missed work will only be permitted for University-sanctioned activities and bona fide medical or family reasons. Authentic justifying documentation must be provided in every case (and in advance for University-sanctioned activities). At the discretion of the instructor, the make-up may take any reasonable and appropriate form including (but not limited to) the following: giving a replacement exam, replacing the missed work with the same score as a later exam, allowing a dropped exam, replacing the missed work with the homework average.

Late homework: Homework that is handed in late for reasons other than an excusable absence will receive zero points and will be counted toward the average. An excusable absence is one that can be documented to be caused by illness, death in the immediate family, serious family emergencies, travel related to your graduate work, court-imposed legal obligations, or observation of a religious holiday. In case of an excusable absence, late homework will be accepted by the instructor no more than one week after the official due time.

Golden Rule: Many incidents of plagiarism result from students' lack of understanding about what constitutes plagiarism. However, they are expected to familiarize themselves with UCF's policy. Please read this information at the website <http://goldenrule.sdes.ucf.edu> UCF Creed: Please read this information at the website <http://creed.sdes.ucf.edu>

Disabilities and access statement: The University of Central Florida is committed to providing reasonable accommodations for all persons with disabilities. This syllabus is available in alternate formats upon request. Students with disabilities who need accommodations in this course must contact the professor at the beginning of the semester to discuss needed accommodations. No accommodations will be provided until the student has met with the professor to request accommodations. Students who need accommodations must be registered with Student Disability Services, Student Resource Center Room 132, phone (407) 823-2371, TTY/TDD only phone (407) 823-2116, before requesting accommodations from the professor.

Collaboration policy: Students may discuss assignments and form study groups, but must develop and write their own solutions to problems and questions. It must be obvious on that paper that the result has not been copied from another source. In particular, if a student collaborates with someone to work on problem sets, the onus is on the student to prove to the grader that he/she wrote down his/her derivations and answers independently. Copying from another student's paper is very obvious in a class of this size, and will immediately result in zeros on the assignment for all parties involved.