Boston University
CAS PY351
Principles of Physics II
Electricity and Magnetism

Introduction to special relativity, foundations of quantum theory, and introduction to wave mechanics, topics in atomic and molecular structure, solid state, and nuclear physics. Lectures, discussions, and laboratory.

This course conforms to BU Hub requirements for Historical Consciousness, Scientific Reasoning II, and Critical Thinking.

Instructor:

Prof. Ed Kearns
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Teaching Fellow and Learning Assistant contact information is posted on piazza, as well as all office hours.

Prerequisites:

This course builds on your first two semesters of physics, and good grasp of mathematics is essential. Students should have taken PY211 or PY251, and PY212 or PY252. Students should have taken MA124 (or equivalent) as an absolute prerequisite; MA225 is a co-requisite. Many students in this class will have taken MA225 and are moving on to differential equations or linear algebra. If you have not met these requirements, or have any doubt about your preparation, please see the instructor.

Online Material:

PY351 will use **piazza**, an online collaborative bulletin board, for posting homework assignments, solutions, lecture notes, and for class announcements. Piazza is also the place where you will find course guidelines, schedules, contact information, and so on.

We will use **Blackboard Learn** for keeping track of grades. Use it to check your grades (labs, homework, quizzes, etc.) during the semester. *It will be your responsibility to check the accuracy of your grades.*

Links to online resources will be provided by email to all registered students.

Lectures:

The topic to be presented during each lecture is listed on the course calendar, and generally matches with a chapter of the textbook. Lecture attendance is required. In order to gain the most from each lecture, you should read the relevant sections of the textbook. Some supplementary reading will be assigned as needed, as well as online videos to view before class.

Textbooks and Reading:

Modern Physics from α to Z^0, by J. Rohlf. Wiley (1994).

Physics and Philosophy: The Revolution in Modern Science,
by W. Heisenberg. Harper-Collins 2007

Students will be expected to read scientific papers from early 20th century which played important roles in the development of our current physics description of matter and interactions in the universe. Other readings will cover the connection between modern physics and matters of great societal relevance. Readings will be assigned as the course progresses, with guidance posted to piazza.

Exams:

There will be three exams: two evening midterms plus a final during the regularly scheduled final exam period.

Discussion Sections:

Discussion sections are a required part of the course. You must have an assigned discussion section. The teaching assistant will supplement the lecture material, assist in problem solving, and help prepare you for exams.

Homework:

Problem sets will be posted on piazza, roughly a week before they are due. Homework sets are due *as scheduled.* You will either put your homework in boxes located on the ground floor of the Metcalf Science Center, or you will hand it in during discussion. See the homework itself for deadlines. You may work together to understand questions, but the solution you turn in must be your own. Your problem sets should be neat, readable, and sufficiently well organized that your approach to the problem is clear to the grader. For most full-length problems, at least one page of paper per problem is appropriate. Treat your homework solution with pride: be clear and neat throughout. If there is a computing component, such as a graph, include it neatly with good labels. The homework will be graded and will be returned during discussion section or lecture. Solutions will be posted on piazza. Once the solutions are posted we cannot accept homework for grading.

Labs:

Laboratory sections are a required part of the course. You will perform five experiments and write up your observations and measurements in a suitable laboratory notebook. A low-cost quadrille notebook is satisfactory. The notebooks are due at the end of each laboratory period. All labs are required. Turning in fewer than all assigned labs will result in a letter grade penalty for the course. Lab write-ups are available from:

http://physics.bu.edu/ulab/all_labs.html

and there is also a pinned piazza note with the schedule and links. To determine the room in which the lab is held, see the posted card on *any* lab room in SCI.

Makeup rules:

There will be no makeup exams except for very serious, documented excuses such as illness.

Students with valid excuses will generally be allowed to makeup a missing laboratory. One of the key measures of validity is advanced notice. If you need to miss a lab section, we would rather have you complete the work the same week, and that arrangement may be possible by attending a PY313 section. There will be an opportunity to makeup one missing lab at the end of the semester, only if a valid excuse is authorized in advance *in consultation* with the lecturer. If the consultation is not done in advance, you will still have to makeup the lab but there will be a scoring penalty. If you cannot complete all the labs there will be a letter grade penalty.

Grading Summary:

25% Final Exam
20% Midterm 1
20% Midterm 2
25% Homework incl. Writing Assignments
  8% Laboratory
  2% Instructors discretionary assessment (TF+Lecturer)

Academic Conduct:

You are expected to be familiar with and adhere to the College's Academic Conduct Code. The homework and labs you turn in must be your own work, subject to reasonable collaboration with your peers in this class as discussed above. Use of solution manuals, solutions from previous years, or solutions copied the Internet is expressly forbidden. Cheating on exams and quizzes will not be tolerated. Plagiarism on papers will be dealt with harshly. Transgressions will be reported to the CAS Academic Conduct Committee.

Basic schedule of the course material and textbook reading:

Week 1	Chapter 4	Relativity
Week 2	Chapter 4	Relativity
Week 3	Chapters 2 and 3	Black body radiation, Planck's Constant
Week 4	Chapter 3	Photoelectric Effect, Bohr Model
Week 5	Chapters 5 and 6	Wave Properties of Particles, Rutherford Scattering
Week 6	Chapter 8	Schrodinger Equation
Week 7	Chapter 8	Monday Schedule Schrodinger Equation
Week 8	Chapter 9	Hydrogen Atom
Week 9	Chapter 10	Multielectron Atoms
Week 10	Chapter 12	Quantum Statistics
Week 11	Chapter 13 and 14	Applications of Q.M.
Week 12	Chapter 11	Nuclear Physics
Week 13	Chapter 11	Nuclear Physics Thanksgiving Holiday
Week 14	Chapters 16 and 17	Particle Physics

See piazza post for more detailed calendar, and any revisions to the schedule.

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