New Jersey Institute of Technology, Department of Physics,

Physics 433, Section 002 (CRN 14265) Spring 2017:

Electromagnetism II

Mondays and Wednesdays, 11:30 am to 12:55 pm, FMH 110

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Office Hours: Wednesdays and Thursdays, 10:00 am to 11:00 am, and by appointment

Textbook: David J. Griffiths, **Introduction to Electrodynamics** (4th edition), Pearson, 2013, ISBN-13: 978-0321856562

Announcements:

- **Moodle:** I will be posting additional material in Moodle. Go to http://moodle.njit.edu, log in with your UCID. Rutgers students check here: http://moodle.njit.edu/rutgers_students.php

Grading:

Your final grade in Physics 433 will be determined by your performance on the following:

- **Exams:** Two exams will be given during the normal class period. The Schedule is:
  - Exam 1: ***Wednesday, March 1***
  - Exam 2: ***Wednesday, April 12***
- **Final Exam:** A comprehensive examination of the entire semester's work will be given at the end of the semester, during the exam period (5/5-5/11)
- **Homework:** Homework assignments will be posted in Moodle, together with the due date.
- **Attendance and quizzes:** Attendance at the lectures is expected, and participation is part of the grade together with quizzes. All these factors will be combined in the following proportion:

  - 36% for the common exams (18% each)
  - 34% for the final exam
  - 30% for the total homework grade

Your final grade will be determined using the following scale:

Total Score	**Final Grade**
85% and above	A
75% - 84%	B+
65% - 74%	B
55% - 64%	C
50% - 54%	D
49% and less	F

Academic Integrity:

NJIT policy is zero-tolerance for cheating of any kind and for student behavior that disrupts learning by others. Incidents will be immediately reported to the Dean of Students. The penalties for violations range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on a student's permanent record. Avoid situations where your own honorable behavior could be misinterpreted. http://www.njit.edu/academics/integrity.php

Courtesy:
Please, do not eat, drink, or create noise that interferes with the work of students or instructors. Cellular phones, wireless devices, and messaging devices of all kinds should be turned off during class meetings and exams.

Syllabus:

Week 1, Magnetic Fields in Matter	(Ch. 6)	*Week 8, Spring Break*	
Week 2, Magnetic Fields in Matter	(Ch. 6)	Week 9, Electromagnetic Waves	(Ch. 9)
Week 3, Electrodynamics	(Ch. 7)	Week 10, Electromagnetic Waves	(Ch. 9)
Week 4, Electrodynamics	(Ch. 7)	Week 11, Potentials and Fields	(Ch. 10)
Week 5, Electrodynamics	(Ch. 7)	*Second Exam 04/12*	
Week 6, Conservation Laws	(Ch. 8)	Week 12, Radiation	(Ch. 11)
First Exam 03/01		Week 13, Radiation	(Ch. 11)
Week 7, Electromagnetic Waves	(Ch. 9)	Week 14, Radiation	(Ch. 11)

Learning Outcomes:

- Explain the origin of the different types of magnetic behavior in materials. Evaluate the effects of magnetic fields on materials in simple situations with the help of the magnetic auxiliary field, the magnetization and the magnetic susceptibility
- Describe the electric currents in conductors due to electric fields using Ohm's law.
- Describe electromagnetic induction due to changing magnetic fields. Calculate the induced electric field in a number of situations using Faraday's law.
- Recognize Maxwell's equations as the complete and unified description of electromagnetism. Describe the meaning of the different terms in the equations and the expression of Maxwell's equations in the presence of matter.
- Describe the conservation of charge. Evaluate energy, momentum, and angular momentum of radiation in certain situations.
- Identify electromagnetic waves as solutions of Maxwell's equations. Describe the propagation of these waves both in vacuum and in matter. Explain polarization of waves.
- Describe electromagnetic phenomena using advanced and retarded potentials. Use potentials to describe the field generated by a moving point charge.
- Analyze the electromagnetic dipolar radiation generated by a distant radiating source.
- Calculate physical properties in situations where the Special Theory of Relativity is relevant. Explain why Electromagnetism is a Relativistic Field Theory.