

# 50:750:301 – Electromagnetic Theory

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<b>Office</b>	CNS 216C	<b>Final Exam</b>	TBA

**Class meeting time: W, 12:30 p.m. - 3:20 p.m.**

**Text: “Physics,”** Introduction to Electrodynamics” by David J. Griffiths

ISBN-10: 1108420419, *Hardcover*

ISBN-10: 9332550441, *Paperback*

You are welcome to purchase older versions of this text, but please be aware that I will be assigning readings and homework problems based on the 4<sup>th</sup> edition. If you choose to use an older edition, you will be responsible for cross-referencing assigned chapter readings and homework problems.

## **Description:**

This course focuses on the principles of electrodynamics and is primarily taught to junior level physics majors. The prerequisites for this course include Modern Physics and Calculus I – III. This course utilizes many techniques from vector calculus (Calculus III).

Throughout this semester, you will become familiar with electrostatics, magnetostatics, electric fields in matter, magnetic fields in matter, and electrodynamics. We will develop the mathematical framework that describes the connection between fields, their sources, and their associated potentials. These topics will be explored using various mathematical techniques such as geometry, vector calculus, and differential equations. The material learned in this course will be relevant to other undergraduate courses and essential for more advanced graduate courses. Concepts in this course are also tested in the physics GRE.

## **Specific Student Learning Outcomes (SLOs) Objectives:**

1. Understand the problem-solving process and develop critical thinking skills.
2. Calculate the electric field due to a variety of charge distributions.
3. Develop the concept of scalar potential for electric fields
4. Learn to solve the Laplace equation in cartesian and spherical coordinates
5. Extend the concept of electric fields in free space to dielectrics
6. Calculate the magnetic field for various of current distributions
7. Calculate the magnetic field in various types of material
8. Apply mathematical techniques from vector calculus to electrodynamics problems

## **Details:**

- 1) I will be available during office hours to provide you will help on the course material and answer any questions you may have. If you need assistance outside of office hours, please email me to schedule a time.
- 2) **There are no make-up exams.** If you miss an exam, you must provide a written medical excuse or the equivalent. If the excuse is accepted, you receive the average of the other three exams that you will have completed. If you miss the final exam, you will need a medical excuse **and** must contact the instructor within 48 hours of the final to discuss your options (not taking the final exam is not an option).
- 3) Homework will be assigned for each chapter, but not every assignment will be collected and graded. You are strongly advised to have tried all problems by the due date as I

typically review some of the problems in class and you will gain the most benefit from this if you have done the homework problems beforehand. The exams will be based on homework and the lecture notes.

- 4) In addition to exams, I reserve the right to administer quizzes that will count towards your final grade. There will be no make-up quizzes. Students missing a lecture quiz will receive a zero for that quiz. The lecture quizzes are intended to assess your study habits and help you stay on track.

### Grading:

- 4 Hourly Examinations (3 semester + 1 final) – 20% each, total 80% of final grade
- Homework– 20% of final grade

A	90-100%	C	67-75%
B+	87-89%	D	55-66%
B	80-86%	F	<55%
C+	76-79%		

### Instructor's Statement:

- Do not engage in any form of academic dishonesty. I will report any violations of this policy to the campus Judicial Officer. If you do not know what academic dishonesty is, please consult this statement:  
<http://www.camden.rutgers.edu/RUCAM/info/Academic-Integrity-Policy.html>.
- Please note that it is necessary to explain all steps that you take on exams – make an effort to **clearly** show your work. Answers without justification will not be accepted!
- Do not use cell phones in class or disrupt class in any way. If you do so, you will be asked to leave and will not be welcomed back for the rest of the class period. The use of computers will be at my discretion – in general they will not be necessary.
- Attendance is strongly suggested at all class meetings in accordance with the policies and guidelines set forth in the student manual.
- Attending the lecture is not enough. Take notes in class and read the relevant sections in the textbook. In addition, make sure to review all example problems and attempt all the homework problems.

### Class Resources:

Lecture notes, answer keys, homework solutions, and announcements will all be posted on the course's Canvas site.

<https://canvas.rutgers.edu/>

### Tentative Class Outline:

Vector Analysis (Chapter 1)

Electrostatics (Chapter 2)

#### Test 1

Potentials (Chapter 3)

Electric Fields in Matter (Chapter 4)

#### Test 2

Magnetostatics (Chapter 5)

Magnetic Fields in Matter (Chapter 6)

#### Test 3

Electrodynamics (Chapter 7)

#### Test 4 (Accumulative)