Course Syllabus

Intermediate Electromagnetism 2

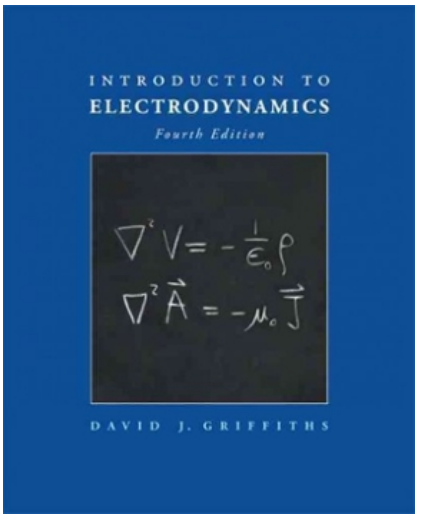
Jorge Luis Rodriguez

jrodrig@fiu.edu (mailto:jrodrig@fiu.edu)

(305) 348-0259

Office: CP 202

Hours: TTh 1:30PM to 3:30PM



Class meets: CP 117

MW 2:00PM - 3:15PM

Course Description and Purpose

This is the intermediate course in electromagnetism. It is the first course in a two-term sequence designed for physics majors and/or those interested in exploring electromagnetic phenomena at a deeper level. The course is more mathematically sophisticated and rigorous treatment than a typical introductory course such as PHY2049, even though the subject matter is mostly the same. With additional rigor, we are able to explore more realistic and interesting examples of electromagnetic phenomena. In the process, students will gain a deeper understanding of the concepts introduced in earlier work but will gain knowledge of the use of many important and useful mathematical tools and techniques. Specifically, we continue to develop our understanding of the theory of electromagnetic fields and waves by completing Maxwell's theory of electromagnetic phenomena that we began in the first semester. In this course we start by introducing time-dependent fields, electromagnetic induction, the theory of electromagnetic waves make suitable connections with special relativity, if time permits. All from basic principles usually beginning with Maxwell's equations. As with the first semester, we rely heavily on the 3-D vector calculus. Coulomb's law, Gauss's law, and continue our exploration of electrostatics and magnetostatics as well as the interaction of electromagnetic fields with matter.

Course Prerequisites

The following math courses are required. Vector Calculus MAC2313 and Differential Equations MAP2302. Additionally, an introductory course in electromagnetism such as Physics with Calculus 2 or PHY2049 is required as well as the first semester of this course PHY 4323. In fact, it is highly recommended that you **DO NOT** attempt this course unless you have successfully completed these prerequisite courses. Also, recommended are additional courses in mathematical methods for physicists and classical mechanics such as Methods in Theoretical Physics PHZ 3113 and Introduction to Classical Mechanics PHY 4221.

Textbook

Required: "Introduction to Electrodynamics 4th Edition" by David J. Griffiths

Reference: "Electromagnetic Fields 2nd Edition", by Roald K. Wangsness
Reference (Graduate Level): "Classical Electrodynamics 3rd Edition", by John D. Jackson

Reference (Math Handbook): "Mathematical Handbook of Formulas and Tables 4th Edition", by Murry R. Spiegel, Seymour Lipschutz, John Lui **PDF**

List of textbooks in electromagnetism - Wikipedia
(https://en.wikipedia.org/wiki/List_of_textbooks_in_electromagnetism#Undergraduate)

Course Objectives

Upon completing this course, students will be able to:

- have an excellent grasp of electromagnetic phenomena, including electrostatics, magnetostatics, electromagnetic properties of matter, time-dependent electromagnetic fields, Maxwell's equations, electromagnetic waves. the emission, scatter and absorption of radiation and the role played by special relativity in electromagnetic phenomena and mechanics.
- be able to apply these concepts in problem-solving beyond that learned at the introductory level. So the emphasis is placed on the use of vector calculus, partial and ordinary differential equations, line, surface, and volume integrals, solutions to boundary value problems all in the service of finding properties of electromagnetic field and potentials, both static and time-dependent.

Important Information

Before starting this course, please review the following pages:

- **Accessibility and Accommodation**
- **Grading Policy and Missing an Exam**
- **Academic Misconduct Statement**
- **Drops and Incompletes**
- **Covid-19 Information**

***The professor reserves the right to change or modify the syllabus at any time in any way during the semester.**

Grading Scheme

Grading Scheme for the course

Letter	Range%	Letter	Range%	Letter	Range%
A	90 or above	B	75 - 79.99	C	60 - 64.99
A-	85 - 89.99	B-	70 - 74.99	D	40- 59.99
B+	80 - 84.99	C+	65 - 69.99	F	39 or less

Course Summary:

Date	Details	Due
Sun Jan 23, 2022	Homework 7A: Electrodynamics (https://fiu.instructure.com/courses/127604/assignments/1602363)	due by 11:59pm
Sun Jan 30, 2022	Homework 7B: Electrodynamics (https://fiu.instructure.com/courses/127604/assignments/1716139)	due by 11:59pm
Sun Feb 13, 2022	Homework 7C: Electrodynamics (https://fiu.instructure.com/courses/127604/assignments/1716142)	due by 11:59pm
Wed Feb 16, 2022	Exam 1 (https://fiu.instructure.com/courses/127604/assignments/1602366)	due by 3:15pm
Mon Feb 28, 2022	Spring Break (https://fiu.instructure.com/calendar?event_id=548283&include_contexts=course_127604)	12am
Wed Mar 2, 2022	Spring Break (https://fiu.instructure.com/calendar?event_id=548284&include_contexts=course_127604)	12am
Wed Mar 9, 2022	Homework 8: Conservation Laws (https://fiu.instructure.com/courses/127604/assignments/1714505)	due by 11:59pm
Wed Mar 16, 2022	Homework 9A: Electromagnetic Waves (https://fiu.instructure.com/courses/127604/assignments/1714517)	due by 11:59pm
Wed Mar 23, 2022	Exam 2 (https://fiu.instructure.com/courses/127604/assignments/1714492)	due by 3:15pm
	Homework 9B: Electromagnetic Waves (https://fiu.instructure.com/courses/127604/assignments/1714520)	due by 11:59pm

Date	Details	Due
Fri Apr 8, 2022	Homework 10A: Potentials and Fields (https://fiu.instructure.com/courses/127604/assignments/1714525)	due by 11:59pm
Fri Apr 15, 2022	Homework 10B: Potentials and Fields (https://fiu.instructure.com/courses/127604/assignments/1714527)	due by 11:59pm
Mon Apr 18, 2022	Exam 3 (https://fiu.instructure.com/courses/127604/assignments/1714491)	due by 3:15pm
Fri Apr 29, 2022	Final Exam (https://fiu.instructure.com/courses/127604/assignments/1714494)	due by 12pm
Sun May 1, 2022	Roll Call Attendance (https://fiu.instructure.com/courses/127604/assignments/1764869)	due by 11:59pm