

Spring 2024 Syllabus
PHYS 407, Electromagnetic Theory

Instructor: Dr. Todd Pittman

Office: Physics 318

e-mail: todd.pittman@umbc.edu

Office Hours: Wed. 2:00 – 4:00 pm

Lectures: MWF 9:00 – 9:50 am

Location: Physics 201

TA: Mathew Varghese

Course Text: *Introduction to Electrodynamics* (5th edition), by David J. Griffiths.

1. Course Overview

Welcome to E&M, one of the most fascinating and important subjects in physics! We are in for an exciting adventure this semester!

Before embarking on this journey, it is comforting to note that the pedagogy for E&M is fairly standardized. As Griffiths states in the Preface of our text, “*Unlike quantum mechanics or thermal physics (for example), there is a fairly general consensus with respect to the teaching of electrodynamics; the subjects to be included, and even their order of presentation, are not particularly controversial, and textbooks differ mainly in style and tone.*” I’ve certainly found this to be true, and I’ve certainly found the style and tone of Griffiths’ textbook to be outstanding! Consequently, we’ll be using Griffiths as the anchor point for our entire course, with a goal of sequentially working through Chapters 1 - 7 by early May.

This will primarily be a lecture format course, with lots of examples and discussion in class. In addition to the material in Griffiths, I’ll be incorporating lots of modern applications and experiences from my own research lab. Reading the relevant Griffiths chapters, working the HW problems thoroughly, and participating in the class discussions are the keys to success.

2. Course Grading

- Homework 20%
- Exam 1 (Late Feb.) 20%
- Exam 2 (Late March) 20%
- Exam 3 (Late April) 20%
- Final Exam (mid-May) 20%

3. Homework

We'll have roughly 10 HW assignments throughout the semester. HW will generally be assigned on Fridays, and due the following Friday (with some variation throughout the semester). When computing your overall HW grade, your lowest HW score will be dropped. HW assignments will be graded by the TA with my oversight/approval.

Understanding the HW problems is a key part of your learning E&M, and significant portions of the Exams will be along the lines of the HW problems. Homework will be turned in at the beginning of the class in which it is due. I cannot accept late HW, since it's just not fair to the other students.

More details on the HW expectations and grading will be provided in the "PHYS 407 HW Guidelines and Grading Rubric" document that will be handed out with the first HW assignment.

4. Exams

Exams 1, 2, and 3 will be standard 50-minute closed-book in-class exams. The Final Exam will also be a closed-book in-class exam; it will be a longer comprehensive exam covering material from the entire course.

5. Academic Integrity

As with all courses, Academic Integrity is required in PHYS 407:

By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal. To read the full Student Academic Conduct Policy, consult the UMBC Student Handbook, the Faculty Handbook, or the UMBC Policies section of the UMBC Directory.

6. Learning outcomes assessment

There are a number of educational objectives for physics students at UMBC. The 7 specific learning objectives for PHYS 407 are summarized below. By the end of this course, students should be able to:

1. Have a working understanding of vector analysis, of the physical meaning of differential operators such as the div and curl, and of related theorems such as the divergence, Gauss's and Stokes' theorems.
2. Solve problems in electrostatics that manifest an understanding of the divergence of electrostatic fields, the electric potential, and work and energy in electrostatics.
3. Demonstrate an ability to solve problems in electrostatics by solving Laplace's equation, and by using the method of images, or of separation of variables.
4. Understand electric fields in matter, through being able to solve problems involving the field of a polarized object, the electric displacement, and dielectrics.
5. Demonstrate an understanding of magnetostatics, through the ability to solve problems involving the Lorentz force and the Biot-Savart Law, as well as the divergence and curl of the magnetic field and vector potential of the magnetic field.
6. Understand magnetic fields in matter, through solving problems involving magnetization, the field of a magnetized object, the auxiliary field H , magnetic susceptibility and permeability and ferromagnetism.
7. Demonstrate an understanding of the electromotive force, the electromagnetic induction, and Maxwell's equations.

These objectives will be assessed by my observations of your participation in class discussions, as well as your performance on homework and written exams.

7. Additional UMBC Policies, Procedures, and Resources

Accessibility and Disability Accommodations, Guidance and Resources

Accommodations for students with disabilities are provided for all students with a qualified disability under the Americans with Disabilities Act (ADA & ADAAA) and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) is the UMBC department designated to coordinate accommodations that creates equal access for students when barriers to participation exist in University courses, programs, or activities.

If you have a documented disability and need to request academic accommodations in your courses, please refer to the SDS website at sds.umbc.edu for registration information and office procedures.

SDS email: disAbility@umbc.edu

SDS phone: [410-455-2459](tel:410-455-2459)

If you will be using SDS approved accommodations in this class, please contact the instructor to discuss implementation of the accommodations. During remote instruction requirements due to COVID, communication and flexibility will be essential for success.

Sexual Assault, Sexual Harassment, and Gender Based Violence and Discrimination

[UMBC Policy](#) in addition to federal and state law (to include Title IX) prohibits discrimination and harassment on the basis of sex, sexual orientation, and gender identity in University programs and activities. Any student who is impacted by sexual harassment, sexual assault, domestic violence, dating violence, stalking, sexual exploitation, gender discrimination, pregnancy discrimination, gender-based harassment, or related retaliation should contact the University's Title IX Coordinator to make a report and/or access support and resources. The Title IX Coordinator can be reached at titleixcoordinator@umbc.edu or 410-455-1717.

You can access support and resources even if you do not want to take any further action. You will not be forced to file a formal complaint or police report. Please be aware that the University may take action on its own if essential to protect the safety of the community.

If you are interested in making a report, please use the [Online Reporting/Referral Form](#). Please note that, if you report anonymously, the University's ability to respond will be limited.

Notice that Faculty and Teaching Assistants are Responsible Employees with Mandatory Reporting Obligations

All faculty members and teaching assistants are considered Responsible Employees, per UMBC's [Policy on Sexual Misconduct, Sexual Harassment, and Gender Discrimination](#). Faculty and teaching assistants therefore required to report all known information regarding alleged conduct that may be a violation of the Policy to the Title IX Coordinator, even if a student discloses an experience that occurred before attending UMBC and/or an incident that only involves people not affiliated with UMBC. Reports are

required regardless of the amount of detail provided and even in instances where support has already been offered or received.

While faculty members want to encourage you to share information related to your life experiences through discussion and written work, students should understand that faculty are required to report past and present sexual harassment, sexual assault, domestic and dating violence, stalking, and gender discrimination that is shared with them to the Title IX Coordinator so that the University can inform students of their [rights, resources, and support](#). While you are encouraged to do so, you are not obligated to respond to outreach conducted as a result of a report to the Title IX Coordinator.

If you need to speak with someone in confidence, who does not have an obligation to report to the Title IX Coordinator, UMBC has a number of [Confidential Resources](#) available to support you:

[Retriever Integrated Health](#) (Main Campus): 410-455-2472; Monday – Friday 8:30 a.m. – 5 p.m.; For After-Hours Support, Call 988.

[Center for Counseling and Well-Being](#) (Shady Grove Campus): 301-738-6273; Monday-Thursday 10:00a.m. – 7:00 p.m. and Friday 10:00 a.m. – 2:00 p.m. (virtual) [Online Appointment Request Form](#)

Pastoral Counseling via [The Gathering Space for Spiritual Well-Being](#): 410-455-6795; i3b@umbc.edu; Monday – Friday 8:00 a.m. – 10:00 p.m.

Other Resources

[Women’s Center](#) (open to students of all genders): 410-455-2714; womenscenter@umbc.edu; Monday – Thursday 9:30 a.m. – 5:00 p.m. and Friday 10:00 a.m. – 4 p.m.

[Shady Grove Student Resources](#), [Maryland Resources](#), [National Resources](#).

Child Abuse and Neglect

Please note that Maryland law and [UMBC policy](#) require that faculty report all disclosures or suspicions of child abuse or neglect to the Department of Social Services and/or the police even if the person who experienced the abuse or neglect is now over 18.
