

Fall 2021 Syllabus
PHYS 707, Advanced Electromagnetic Theory

Instructor: Dr. Todd Pittman
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Office Hours: Wed. 1 – 3 pm.

Lectures: Tues & Thurs 1:30 – 2:45
Location: Math/Psych 105

Primary Course Text: *Modern Electrodynamics* by A. Zangwill

Non-required reference texts: *Classical Electrodynamics* by J.D. Jackson
Introduction to Electrodynamics by D.J. Griffiths

Course Introduction

PHYS 607 / PHYS 707 is a two-semester sequence on electromagnetic theory. To a first approximation, PHYS 607 covered electrostatics (Zangwill Chapters 1 - 15) and PHYS 707 will cover electrodynamics (Zangwill Chapters 16 - 22).

This is essentially a class on Maxwell's equations (they're awesome!) and the behavior of electromagnetic fields in situations relevant to the research areas at UMBC.

Course Overview

I've decided to break with tradition and make this more of an "applied" course than a traditional "EM II" course. Rather than grind through the entire 2nd half of Zangwill, we'll go through Chapters 16 – 18 (and possibly 19) of Zangwill, and then get into a series of semi-independent 1-week "Applied Modules" that are directly relevant to the 4 main research areas in the UMBC Physics Department. Students will do the 1st four Applied Modules. If time permits at the end of the semester, I'll do 1 – 2 more Applied Modules.

Applied Modules

Students will fully prepare and execute 1-week Applied Modules. You are essentially the “Professor” for your 1-week module. This means you’ll prepare and deliver lectures, hand out a reference material package, and prepare and grade a HW set. The ground rules for the modules are to start with Maxwell’s equations, and then use them to lead into your topic.

Each student will also write an independent (sole author) paper on their topic (~ 5 – 10 pages, journal format). These papers will be handed out as the key component of your reference material package. Your papers will be graded by your peers as well as Dr. Pittman.

The general format of the 1-week Applied Modules will be:

- *Tuesday*: ~ 30 - 40 minute lecture during 2nd half of class. Hand out reference material package and HW set.
- *Thursday*: ~ 50 - 70 minute lecture/discussion.
- *Monday*: HW sets due by noon. Peer assessments due by noon. Grade HW sets Monday PM.
- *Tuesday*: HW “return and review” during 1st half of class.

Additional Applied Module info:

- Topics and the schedule will be chosen in early September.
- Detailed grading rubrics for the written papers and the HW sets will be given when topics are assigned.
- Detailed rubrics for peer assessment of the written papers and Applied Modules will be given when topics are assigned.
- You will have ~6 – 8 weeks to prepare your modules.
- **All students will turn in their Applied Module package (written papers, reference materials, HW sets and solutions, outline of lectures) on the same due day in late October (TBD).** You’ll then participate in the other modules, and wait for your turn to lead your module.

Course Schedule

- *Early September:* Brief electrostatics review.
- *Early September:* Applied Module topics and schedule chosen.

- *September/October:* Zangwill Chapters 16 – 18 (and maybe 19).

- *Mid/late October:* 1 or 2 possible dedicated in-class Applied Module prep sessions.
- *Late October:* All 4 Students turn in completed Applied Module materials.

- *Late October – Mid-December:* Applied Modules
 - Applied Module 1 (Student 1)
 - Applied Module 2 (Student 2)
 - Applied Module 3 (Student 3)
 - Applied Module 4 (Student 4)
 - Applied Module 5 (Dr. Pittman; as time permits)
 - Applied Module 6 (Dr. Pittman; as time permits)

Course Grading

We will have ~ 6 – 10 HW sets throughout the semester (2 - 4 on the Zangwill Chapters, 4 - 6 on the Applied Modules). HW sets on the Student modules will be graded by the Student "Professor", and reviewed by me. The overall course grade is determined by the following weightings:

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| • Average of HW set scores | 50% |
| • Individual paper average peer score | 10% |
| • Individual paper Dr. Pittman score | 20% |
| • Applied Module peer assessment | 10% |
| • Applied Module Dr. Pittman assessment | 10% |

Academic Integrity

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.

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 would create 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. If you will be using SDS approved accommodations in this class, please contact me (Dr. Pittman) 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](#) and Federal law (Title IX) prohibit 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 retaliation should contact the [University's Title IX Coordinator](#) to make a report and/or access support and resources [Mikhel A. Kushner, Title IX Coordinator (she/they) 410-455-1250 (direct line), kushner@umbc.edu]. 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 or thinking about 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 are Responsible Employees with Mandatory Reporting Obligations: All faculty members are considered Responsible Employees, per [UMBC's Policy on Sexual Misconduct, Sexual Harassment, and Gender Discrimination](#). Faculty are therefore required to report any/ all available information regarding conduct falling under the Policy and violations 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 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 assault, domestic and interpersonal 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.

UMBC Policies and Resources during COVID-19: <https://covid19.umbc.edu/fall-2021/>