

Fall 2018 Syllabus  
**PHYS 707, Advanced Electromagnetic Theory**

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

Lectures: Wed & Fri 9:00-10:15  
Location: Public Policy 203

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 15 - 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 2<sup>nd</sup> half of Zangwill, we'll go through Chapters 16 - 18 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. Student teams (of ~2) will do the 1<sup>st</sup> five Applied Modules. If time permits at the end of the semester, I'll do 1 – 2 more Applied Modules.

## Applied Modules

Student teams (of ~2) 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 his/her topic (~ 5 – 10 pages, journal format). Ideally these will cover two different & coordinated aspects of your topic. 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:

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

Additional Applied Module info:

- Teams, 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 ~5 – 7 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 mid/late October (TBD).** You’ll then participate in the other modules, and wait for your turn to lead your module.

## Course Schedule

- *Early September: Zangwill Chapter 15 review.*
- *Early September: Applied Module teams, topics, and schedule chosen.*
  
- *September/October: Zangwill Chapters 16 – 18 (and maybe 19).*
  
- *October 24 & 26: no class\**
- *~ mid/late October: All 5 teams turn in completed Applied Module materials.*
  
- *Late October – Mid-December: Applied Modules*
  - Applied Module 1 (Student team 1)
  - Applied Module 2 (Student team 2)
  - Applied Module 3 (Student team 3)
  - Applied Module 4 (Student team 4)
  - Applied Module 5 (Student team 5)
  - Applied Module 6 (Dr. Pittman; as time permits)
  - Applied Module 7 (Dr. Pittman; as time permits)

*\*I will be at a Quantum Optics research conference on Oct. 24 & 26. Depending on how our schedule evolves, we will either use that class time as dedicated Applied Module preparation time, or we will make up these classes at the end of the semester.*

## Course Grading

We will have ~ 8 – 11 HW sets throughout the semester (3 - 4 on the Zangwill Chapters, 5 - 7 on the Applied Modules). HW sets on the Student team modules will be graded by the Student team, and reviewed by me.

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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**

As with all courses, Academic Integrity is required in PHYS 707:

*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.*

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