Overview, and Expected Learning Outcome

This first quarter of the year-long sequence is designed to teach mathematical concepts and methods that are useful in physics in general, and in the theory of classical electromagnetism in particular. The second quarter covers basic notions and simple applications of classical electrodynamics. Successful completion of the first quarter will result in knowledge of simple algebraic structures that frequently appear in physics, and of basic concepts and methods in analysis. Successful completion of the second quarter will result in knowledge of Maxwell's equations as well as their static and simple dynamic solutions.

Time and Location:

- 610: MW 10:00 - 11:50 in 318 WIL
- 622: MW 10:00 - 11:50 in 318 WIL
- 623: MW 10:00 - 11:50 remotely via Zoom

Speaking of time, here is the official time from NIST

Lecture Notes :
• The table of contents for 610 may be updated as the course proceeds. The links are to a scanned version of my handwritten notes that and hard to read. I will write everything I say on the board, so if you take good notes then by the end of the term you’ll have your own set of my lecture notes. Typeset notes for parts of an earlier version of 610 are here. These were typeset by Wenqian Sun based on my scanned notes and his own notes. They are not a verbatim transcript of the handwritten notes.

• The tentative table of contents for 622,3 is here, with links to a version of my handwritten notes. Typeset notes for an earlier version of the course are here. More generally, keep in mind that anybody else’s lecture notes, including the lecturer’s, are next to useless unless you have your own set taken by YOU. This goes for textbooks as well. My notes are only meant as a record of my blackboard art to check against.

Instructor:

• Dietrich Belitz

  • email:
  • phone: 6-4738
  • office: 445 Willamette
  • office hours: TBA
    • real: Suspended for Spring 2020
    • virtual: anytime. My e-mail response time is rarely longer than a few hours, and usually it is much shorter.

TA:

• James Amarel
  • office: 445 WIL
  • email: jamarel at you-know-where
  • office hours: remotely by email appointment

Textbooks and other helpful material:

• Recommended texts:
  These are books that I used heavily in preparing the lecture notes. They are NOT required, and my lectures are designed to be self-contained. They all are
excellent reference texts, but make sure you really like a book before you buy it. If you find some other books more useful for background reading or reference, by all means use those.

Recommended books for 610:
- M.J. Lighthill, Introduction to Fourier Analysis and Generalized Functions

Recommended books for 622,3:
- J. Schwinger et al., Classical Electrodynamics

Other useful books:
- C.M. Bender and S.A. Orszag, Advanced Mathematical Methods for Scientists and Engineers
- R. Courant and D. Hilbert, Methods of Mathematical Physics
- P. Dennery and A. Krzywicki, Mathematics for Physicists
- J.D. Jackson, Classical Electrodynamics
- F.E. Low, Classical Field Theory
- P.M. Morse and H. Feshbach, Methods of Theoretical Physics
- F.W.J. Olver et al., NIST Handbook of Mathematical Functions
- D.E Soper, Classical Field Theory

Exams and Grading

Midterm 610: Take-home, see problem sets
Final 610: Monday, Dec 9, 10:15 - 12:15, 318 WIL
Midterm 622: TBA
Final 622: Tuesday, Mar 17, 10:15, 318 WIL
Midterm 623: See Assignment #13
Final 623: TBA

Homework will count for 20% of the grade. Your grade will thus be mostly based on the exams, but it will be next to impossible to do well on the exams unless you have spent a lot of time and effort on the homework problems. If your performance on the final is better than on the midterm, the midterm will not count and the final will count 80%. If your performance on the midterm is better than on the final, the midterm will count for 30% of the grade and the final for 50%.

Homework:
The homework problems are an integral part of the course, and spending substantial time on the homework will be essential for understanding the material discussed in class. One can learn very little physics by just reading a book, or listening to lectures, so make sure you allow adequate time for doing the homework problems. Also, doing well on the exam will be next to impossible without a thorough understanding of the homework problems.

Note: Of course I know that the solutions to most of my homework problems can be found on the web. But hey, this is graduate school; if you want to kid yourself, go ahead. Homework problems will be assigned weekly on Wednesday, and will be due the following Wednesday in class.

Problems will be posted on this page in pdf format. I will post scans of my solutions, also in pdf format.

Collaborating on the homework is okay, and even encouraged. You should make sure, however, that you really understand the material yourself rather than just tagging along.

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**Problem Sets for PHYS 610**

- **Problem Assignment #1**: 10/02/2018, past due, [Solutions](#)
- **Problem Assignment #2**: 10/09/2019, past due, [Solutions](#)
- **Problem Assignment #3**: 10/16/2019, past due, [Solutions](#)
- **Problem Assignment #4**: 10/23/2019, past due, [Solutions](#)
- **Take-Home Midterm**: 10/30/2019, due 11/13/2019 *(Please read the instructions)*
- **Problem Assignment #5**: 10/30/2019, past due, [Solutions](#)
- **Problem Assignment #6**: 11/06/2019, past due, [Solutions](#)
- **Problem Assignment #7**: 11/13/2019, past due, [Solutions](#)
- **Problem Assignment #8**: 11/20/2019, past due, [Solutions](#)
- **Problem Assignment #9**: 11/27/2019, past due, [Solutions](#)

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**Problem Sets for PHYS 622, 623**

- **Problem Assignment #1**: 01/08/2020, past due, [Solutions](#)
- **Problem Assignment #2**: 01/15/2020, past due, [Solutions](#)
- **Problem Assignment #3**: 01/22/2020, past due, [Solutions](#)
- **Problem Assignment #4**: 01/29/2020, past due, [Solutions](#)
- **Problem Assignment #5**: 02/05/2020, past due, [Solutions](#)
- **Problem Assignment #6**: we'll skip this one
- **Problem Assignment #7**: 02/19/2020, past due, [Solutions](#)
- **Problem Assignment #8**: 02/26/2020, past due, [Solutions](#)
- **Problem Assignment #9**: 03/04/2020, past due, [Solutions](#)
- **Final Exam (Remotely)**: 03/17/2020, 10:15 - 12:15, scans due 12:30
- **Problem Assignment #10**: 04/01/2020, past due, [Solutions](#)
Problem Assignment #11: 04/08/2020, due 04/15/2020 at 12:00 noon by email to jamarel at you-know-where

Problem Assignment #12: 04/15/2020, due 04/22/2020 at 12:00 noon by email to jamarel at you-know-where

Problem Assignment #13 = Takehome Midterm: 04/22/2020, due 05/06/2020 at 12:00 noon by email to dbelitz at you-know-where

Problem Assignment #14: 04/29/2020, due 05/06/2020 at 12:00 noon by email to jamarel at you-know-where

last update 4/9/2020
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