PHYS 610; Mathematical Methods; Fall 2017

PHYS 622-3; Classical Electrodynamics; Winter, Spring 2018

This page and its links contain all of the general information you need for the course, and they will be updated frequently. Please check this page regularly, and make sure you hit your browser’s 'Reload' button so you get the latest version.

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 and third quarters cover 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 and third quarters will result in knowledge of Maxwell's equations and their static and dynamic solutions.

Time and Location:

- 610: MW 2:00 - 3:50 in 318 WIL
  622,3: TBA
- Speaking of time, here is the official time from NIST

Lecture Notes:
• The table of contents for 610 will be updated as the course proceeds and the links will be populated or modified. My lecture notes are messy and hard to read, and I will keep modifying them as we go along, so you may find them of limited utility. 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 that you'll even be able to read.

• The tentative table of contents for 622,3 is here, with links to a scanned version of my current notes. Typeset notes for an earlier version of this 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: 459 Willamette
  • office hours:
    • real: I'll try to keep an open office policy. Catch me after class if possible; otherwise, just stop by my office. If I'm really busy I'll kick you out, but usually I'll be able to accommodate you if I'm in. If your schedule and mine turn out to never overlap, send email and make an appointment.
    • virtual: anytime. My e-mail response time is rarely longer than a few hours, and usually it is much shorter.

TA:

• Rudy Resch
  • office: TBA
  • email: TBA at you-know-where
  • office hours: TBA

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:
  ○ M. Abramowitz and I.A. Stegun, *Handbook of Mathematical Functions*
  ○ C.M. Bender and S.A. Orszag, *Advanced Mathematical Methods for Scientists and Engineers*
  ○ R. Courant and D. Hilbert, *Methods of Mathematical Physics*
  ○ P. Denorry 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*
  ○ D.E Soper, *Classical Field Theory*

**Exams and Grading**

Midterm 610: Take-home midterm in lieu of homework assignment #6
Final 610: Thursday, Dec 7, 2:45 - 4:45, 318 WIL
Midterm 622: TBA
Final 622: TBA
Midterm 623: TBA
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, just go ahead.

Homework problems will be assigned weekly on Thursday, and will be due the following Thursday in class. Problems will be posted on this page in pdf format. I will post scans of my solutions, also in pdf format. Homework grading policy TBA.

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:** 09/27/2017, past due, [Solutions](#)
- **Problem Assignment #2:** 10/04/2017, past due, [Solutions](#)
- **Problem Assignment #3:** 10/11/2017, past due, [Solutions](#)
- **Problem Assignment #4:** 10/18/2017, past due, [Solutions](#)
- **Problem Assignment #5:** 10/25/2017, past due, [Solutions](#)
- **Takehome Midterm in lieu of #6:** past due
- **Problem Assignment #7:** 11/08/2017, past due, [Solutions](#)
- **Problem Assignment #8:** 11/15/2017, past due, [Solutions](#)
- **Problem Assignment #9:** 11/22/2017, past due, [Solutions](#)
- **Problem Assignment #10:** 11/29/2016, optional, [Solutions](#)

**Problem Sets for PHYS 622-3**

- **Problem Assignment #1:** 01/10/2017, past due, [Solutions](#)
- **Problem Assignment #2:** 01/17/2018, due 01/24/2018
- **Problem Assignment #3:** 01/24/2018, due 01/31/2018
- **Problem Assignment #4:** 01/31/2018, due 02/07/2018
- **Problem Assignment #5&6:** 02/07/2018, due 02/21/2018
- **Takehome Midterm:** 02/07/2017, due 02/21/2017 (See Instructions!)
Problem Assignment #7: 02/21/2018, due 02/28/2018
Problem Assignment #8: 02/28/2018, due 03/07/2018
Problem Assignment #9: 03/07/2018, due 03/14/2018

last update 1/9/2018
Dietrich Belitz
Department of Physics
University of Oregon
Eugene, OR 97403
USA