PHYS 410/510, Mathematical Methods for Scientists, Spring 2013

This page and its links contain all of the general information you need for this 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.

Time and Location:

- TR 10:00 - 11:50 in 318 Willamette
- Speaking of time, here is pretty accurate time courtesy of NIST:

Table of Contents, and Lecture Notes:

- The table of contents will be updated as the course proceeds. This is a newly developed experimental course. My lecture notes are accordingly messy, hard to read, and I will keep modifying them as we go along. I therefore not make them publicly available. 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.

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:**

- TBA
- email: TBA
- phone: TBA
- office: TBA
- office hours: TBA

**Textbooks and other helpful material:**

1. **Recommended texts:**
2. 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.
3. **Other useful books:**
   - M. Abramowitz and I.A. Stegun, *Handbook of Mathematical Functions*
   - N.I. Aitchiezer and I.M. Glazman, *Theory of Linear Operators in Hilbert Space*
   - G.B. Arfken, *Mathematical Methods for Physicists*
   - 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*
   - I.S. Gradshteyn and I.M. Ryzhik, *Table of Integrals, Series, and Products*
   - M.J. Lighthill, *Introduction to Fourier analysis and generalized functions*
   - P.M. Morse and H. Feshbach, *Methods of Theoretical Physics*
   - M. Stone and P. Goldbart, *Mathematics for Physics*
   - E.T. Whittaker and G.N. Watson, *A course of modern analysis*
   - C.W. Wong, *Introduction to Mathematical Physics*

**Exams and Grading**
Midterm: Tuesday, May 7, in class
Final: Tuesday, Jun 11, 8:00 - 9:45, 318 WIL

Your grade will be mostly based on the exams (see below), 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.

Homework will be graded and count for 25% of the class grade. If your performance on the final is better than on the midterm, the final will count 75% and the midterm will not count. If your performance on the midterm is better than on the final, the midterm will count 25% and the final will count 50%. In marginal cases participation in class will be taken into account.

Homework, and Lecture Notes:

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 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.

Homework problems will be assigned weekly on Thursday via a posting in pdf format on this page, and will be due the following Thursday at 5pm in [location TBA]. I will post my solutions, also in pdf format. We will use roughly one quarter of total class time (usually in the form of one hour on Thursday) to discuss the solutions of the homework problems.

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, or you will be in for an unpleasant surprise at exam time.

I will also make my (hand written) lecture notes available in pdf format. Please keep in mind, however, that anybody else's lecture notes, including the lecturer's, are next to useless unless you have your own set taken by YOU. My notes are only meant as a permanent record of my blackboard art to check against.

Lecture notes
Lecture notes will be posted in pdf format as the course progresses. You can access them through the table of contents link.

Problem Sets
Problem Assignment #1: 04/04/2013, due 04/11/2013
Problem Assignment #2: 04/11/2013, due 04/18/2013
Problem Assignment #3: 04/18/2013, due 04/25/2013
Problem Assignment #4: 04/25/2013, due 05/02/2013
Problem Assignment #5: 05/02/2013, due 05/09/2013
Problem Assignment #6: 05/09/2013, due 05/16/2013
Problem Assignment #7: 05/16/2013, due 05/23/2013
Problem Assignment #8: 05/23/2013, due 05/30/2013

last update 3/29/2013

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Eugene, OR 97403

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A sort of Course Syllabus for Physics 410/510:

Spring Term 2013:

- Class Meets MWF 11-1150 am in Willamette 318 in
- There is no required textbook

The Course Website is:

http://homework.uoregon.edu/pub/class/atm

Course Title: Atmospheric Stuff

What does that mean?

Topics could include:

- Atmospheric Dynamics
- Atmospheric Thermodynamics
- Radiative Transfer
- Fluid Dynamics
- Water vapor dynamics and precipitation
- Atmosphere-Ocean Interactions
- Deep Ocean Transport
- Forecasting and observational Tools
- Atmospheric Optics
- Signatures of Climate Change

Each one of those topics is actually a complete course in any Atmospheric Science Department. That means this course will be a broad course aimed at making you more literate in these core areas of atmospheric science.

Instructor: G. Bothun, Dept of Physics

- Office/Lab: 417 Willamette Hall
- email: dkmatter@uoregon.edu
- office hours: just email me to schedule a time

Math Required:

At some point, we will be working with partial differential equations in this class. If you have never seen them before it likely won't be that big of deal.

Grading and Course Requirements:

- Homework Assignments - probably 5 of them; these can be done with a partner
- One Midterm: probably in Week 6
• Comprehensive final

• I may have the graduate students in this class work in a team of 2 to prepare a research presentation (20 minutes or so) of a current topic in atmospheric science. I don't know yet. Everything is Fluid. Its dynamic ...