Physics 116A Mathematical Methods in Physics Winter 2009

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Course Web Page

http://scipp.ucsc.edu/∼profumo/teaching/phys116A_09.html

Class Hours

Lectures: Tuesdays and Thursdays, 2:00 PM – 3:45 PM, Phys. Sc. 110
Discussion Section: Wednesday evening, 5:00 PM – 6:30 PM, ISB 235

Course Description

- Infinite series including power series
- Complex numbers and complex power series
- Topics in linear algebra including matrices and determinants, systems of linear equations, eigenvalue problems and matrix diagonalization
- Asymptotic expansions and special functions

Prerequisites

- Physics: 5A/L, 5B/M, 5C/N
- Mathematics: 23A, 23B

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Required Textbook (on reserve)

- *Mathematical Methods in the Physical Sciences* by Mary L. Boas

Other Introductory Textbooks

- *Mathematical Methods for Scientists and Engineers* by D. A. McQuarrie
- *Essential Mathematical Methods for Physicists* by G. B. Arfken and H. J. Weber

Course Outline

Infinite Series, Power Series	Boas, Chapter 1	Jan 6 – Jan 15
Complex Numbers	Boas, Chapter 2	Jan 20 – Jan 29
Linear Algebra and Vector Spaces	Boas, Chapter 3	Feb 3 – Mar 3
Special Functions	Boas, Chapter 11	Mar 5 – Mar 10
Review		Mar 12

Course Grading and Requirements

Student evaluations will be based on their performance in the following four tasks. The tasks and their relative weights in determining the students' overall course grades are given below:

- **30%** Weekly Homework (9 problem sets)
- **10%** Collaborative Learning Problems in Discussion Sections
- **20%** Midterm Exam (Tuesday, February 10, 2009, 2:00 PM – 3:30 PM)
- **40%** Final Exam (Thursday, March 19, 7.30PM – 10:00PM)

Weekly homework assignments will be handed out each Thursday and are due at the beginning of class on the Thursday of the following week. The homework problem sets are (effectively) not optional, and will consist of a few problems from Boas' textbook. You are encouraged to discuss the class material and homework problems with your classmates and to work in groups, but all submitted problems should represent your own work and understanding. Late homeworks can be submitted to the grader, but will not contribute any points to the final grade. The Grader will grade each homework, and is responsible for the given grade. Homework solutions will be made available on the course website each due date.

A few problems will be assigned at each discussion section to groups of 3-4 students (collaborative learning), coordinated by the teaching assistant. Grading will be given to those present to the discussion section. Under special circumstances, students can get the collaborative learning discussion section assignments in advance and turn them in to the Teaching Assistant if they cannot attend the section.

The midterm exam and the final exam will be held in the same classroom as the lectures. The midterm will be a 1.5 hour written exam on the material covered up to February 5th, while the final will be three hours long and cover the complete course material. Both the midterm and the final will be open-book (you can bring with you any book or notes), but only non-graphical, non-programmable calculators will be allowed (it will be to the discretion of the Instructor to decide whether a calculator is or not allowed). Laptop computers and cellular phone will not be allowed. A practice midterm and final will be handed out a week before the exams. You must take the final exam to pass the course.

The minimal score not to fail the class is 60%. The final evaluations will be as follows:

- 60% to 70%: **C** range
- 70% to 85%: **B** range
- 85% to 100%: **A** range