

Physics 116A Mathematical Methods in Physics Winter 2008

Instructor: Stefano Profumo
Office: ISB, Room 325
Phone Number: 831-459-3039
Office Hours: Tuesdays and Thursdays 2:30 – 3:30 PM (or by app.)
E-mail: profumo@scipp.ucsc.edu

Teaching Assistant: John Kehayias
Office: ISB, Room 262
Phone Number: 831-459-5010
Office Hours: Wednesdays 4:00 – 5:00 PM
E-mail: kehayias@physics.ucsc.edu

Course Web Page

<http://scipp.ucsc.edu/~profumo/teaching/phys116A.html>

Class Hours

Lectures: Tuesdays and Thursdays, 12:00 PM – 1:45 PM, Phys. Sc. 114
Discussion Section: Wednesday evening, 5:00 PM – 6:30 PM, ISB 235

Course Description

Infinite series including power series, asymptotic expansions, special functions defined by an integral, complex numbers and some functions of a complex variable, topics in linear algebra including matrices and determinants, solving systems of linear equations, eigenvalue problems and matrix diagonalization, introduction to tensors.

Prerequisites

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

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
- *A Mathematical Methods for Physicists* by G. B. Arfken and H. J. Weber
- *Advanced Engineering Mathematics* by E. Kreyszig

Course Outline

Infinite Series, Power Series	Boas, Chapter 1	Jan 8 – Jan 15
Complex Numbers	Boas, Chapter 2	Jan 17 – Jan 24
Linear Algebra and Vector Spaces	Boas, Chapter 3	Jan 29 – Feb 26
Tensor Analysis	Boas, Chapter 10	Feb 28 – Mar 4
Special Functions	Boas, Chapter 11	Mar 6 – Mar 11
Review		Mar 13

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:

- **40%** Weekly Homework (9 problem sets)
- **15%** First Midterm Exam (Tuesday, January 29, 2008, 12:00 PM)
- **15%** Second Midterm Exam (Tuesday, February 26, 2008, 12:00 PM)
- **30%** Final Exam (Wednesday, March 19, 8:00 - 11:00 AM)

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 not optional. 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. In order that homework can be graded efficiently and returned quickly, there will be a 50% penalty for late homework. This penalty may be waived in special circumstances if you see the instructor before the original due date. Homework solutions will be made available each Monday (following the Thursday due date); no late homeworks will be accepted after that.

The two midterm exams and the final exam will be held in the same classroom as the lectures. Each midterm will be a one hour exam, and will be followed by a shortened lecture of 45 minutes. The final exam will be three hours long and cover the complete course material. You must take the final exam to pass the course.