Physics 116C Mathematical Methods in Physics III Fall 2017

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Course Web Page

http://scipp.ucsc.edu/∼profumo/teaching/phys116C_17/phys116C_17.html

Class Hours

Lectures: MWF, 10:40AM - 11:45AM, N. Sci Annex 101
Discussion Sections: Tuesday 12-1PM, Thimann 391, and Thursday 4-5PM, ISB 235

Course Description

- Fourier series and transforms
- Dirac-delta function
- Green's functions
- Series solutions of ordinary differential equations
- Legendre polynomials and functions
- Bessel functions
- Sets of orthogonal functions
- Partial differential equations

Prerequisites

- Physics: 116A, 116B
- Mathematics: 23A, 23B

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Required Textbook (on reserve)

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

Other 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

Topic	Boas, Chapter #	Lecture #
Fourier series and transforms	7	1-6
Dirac-delta function	8.11	7-8
Green's functions	8.12	9-11
Series solutions of ordinary differential eqs.	12	12-14
Legendre polynomials and functions	12	15-17
Bessel functions	12	18-20
Sets of orthogonal functions	12	20-22
Partial differential equations	13	23-27
Review		28-29

Course Grading and Requirements

Grades will be based on performance in the following three tasks: weekly homework, midterm, and final exam. The tasks and their relative weights in determining the students' overall course grades are given below:

- **35%** Weekly Homework (9 problem sets)
- **25%** Midterm Exam (Friday November 3, lecture time)
- **40%** Final Exam (Tuesday, December 12 8:0011:00 AM)

In addition, up to 10% bonus will be given based upon participating in the "bonus problem" at the beginning of the weekly discussion sections.

Homework

Weekly homework assignments will be posted on Canvas each Wednesday and are due at the beginning of class on the Wednesday of the following week,

when solutions will also be posted. 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. You have one "late-homework pass". The Grader will grade each homework, and is responsible for the given grade. Grades for each homework set will consist of 2 points (mostly correct), 1 point (less than 50Homework solutions will be typically made available on the course website the day after the homework due date.

Midterm and Final

The midterm exam and the final exam will be held in the same classroom as the lectures. The midterm will be a 1 hour written exam in class (regular lecture time) on Friday November 3, on the material covered up to Friday October 27, while the final (Tuesday, December 12 8:0011:00 AM) 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). Laptop computers and cellular phones of any kind will not be allowed. One or more practice midterm and final will be handed out a week before the exams. You must take the final exam to pass the course.

Final Grade

The minimal score not to fail the class is 60%.
The final grade will follow the percent guideline below:

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