

Physics 467, Methods of Theoretical Physics II

Spring Semester 2005

INSTRUCTOR: Krzysztof Wódkiewicz, P&A office #15, tel: 277-2506, email: wodkiew@phys.unm.edu

GRADER: M. Vogel

CLASS: Tuesday and Thursday, Room # 184 5:30-6:45pm.

TEXTBOOK: G. Arfken and H. Weber, *Mathematical Methods for Physicists*, (Academic Press, 5th edition).

This is an encyclopedic reference book in Mathematical Methods. It covers almost everything in this course and a lot more, but not the stochastic processes.

HOMEWORK: Homework will be assigned once a week and will be due one week after it is assigned.

EXAMS: There will be two exams. Tentative dates: (March 3, April 21) and a final. The exams will consist of a test of 10 questions and problems.

GRADING: Grades will be determined by 30% homework, 20% each for the two exams and 30% final.

OFFICE HOURS: Formal office hours will be 10:00 to 11:00 on Tuesday and Thursday. Otherwise, I will be in my office. I encourage questions both during the lecture and in private. If you are confused come and see or email me.

TOPICS TO BE COVERED

1. Methods of linear vector space and linear algebra

Banach space. Hilbert space. Linear operators. Self adjoint operators. Spectral theorem. Algebraic properties. Applications to Quantum Mechanics.

2. Applications of group theory in physics

General properties. The rotation group. The Lorentz group. Unitary representations. Lie Algebra. Symmetry groups and their generators. Examples from Quantum Mechanics.

3. Differential equations and Green's functions

Differential equations of mathematical physics. Green's functions. Elliptic and hyperbolic examples.

4. Methods of stochastic processes in physics

Introduction to random variables and stochastic processes. Markov and Gaussian stochastic processes. The Fokker-Planck equation. Elementary theory of Brownian motion.