Phys 780   "Mathematical Physics"

SYLLABUS

- Vector analysis:
  Introduction (vector algebra, notations, rotational matrix).
  Grad, div and curl. Dirac delta.
  Gauss, Stokes and Helmholtz theorems.
  Curved coordinates.

- Matrices:
  Orthogonal, symmetric, unitary, hermitian. Eigenvalues and eigenvectors.
  Diagonalization. Exponential of a matrix. Vibration of molecules.

- Hilbert space and expansion in orthogonal functions.

- Functions of complex variable I:
  Cauchy-Riemann conditions. Cauchy integral. Singularities.

- Differential equations:
  The Green's function. Separation of variables:
  Laplace equation. Wave equation. Diffusion equation.

- Special functions:
  Bessel
  Legendre

- Integral transforms:
  Fourier series and Fourier integral transform
  Laplace transform

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INSTRUCTOR Dr. Vitaly A. Shneidman, Rm. 452T, e-mail: vitaly@oak.njit.edu

TIME: 2:30-5:25
(office hours will be published by the second week of classes)

WEB page: http://web.njit.edu/∼vitaly/780/

Grading. Will be determined by cumulative points obtained on the mid-term exam (30%), final exam (40%) and homeworks (30%).

Textbook: Arfken & Weber, *Mathematical Methods for Physicists*, 6th ed.