

THE CUNY GRADUATE CENTER
PHYSICS PROGRAM
MATHEMATICAL METHODS

- Main reference:
 - H. Shima & T. Nakayama:
Higher Mathematics for Physics and Engineering
- Additional references:
 - J. Nearing: *Mathematical Tools for Physics*
 - M. Stone & P. M. Goldbart: *Mathematics for Physics*

Note: Each numbered lesson corresponds to a two-hour class.

<u>Lesson</u>	<u>Chapters</u>	<u>Topics</u>
1	Handout	The Method of Multiple Scales
2	Handout	Simulating ODEs in Matlab
3	Handout	Review of Linear Algebra
4	4	Hilbert Spaces
5	15	Ordinary Differential Equations
6	16.1-16.2	Systems of ODEs I
7	16.3-16.5	Systems of ODEs II
8	5.1-5.2	Orthonormal Polynomials I
9	5.3-5.4	Orthonormal Polynomials II
10	7.1-7.3	Complex Functions I
11	7.3-7.5	Complex Functions II
12	9.1-9.2	Contour Integrals I
13		Review for Midterm
14	Midterm	

<u>Lesson</u>	<u>Pages</u>	<u>Topics</u>
15	9.3-9.5	Contour Integrals II
16	11	Fourier Series
17	12	Fourier Transformation and Fast Fourier Transform
18	13	Laplace Transformation
19	Handout	The Method of Steepest Descent
20	Handout	Airy Functions
21	Handout	Partial Differential Equations I
22	Handout	Partial Differential Equations II
23	Handout	Numerical Solution of PDEs
24	Handout	Review of Probability Theory
25	Handout	Stochastic Differential Equations
26	Handout	Path Integrals
27	Handout	Basics of Monte-Carlo Simulations
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28		Review for Final
