

PHY 5100 – Methods of Theoretical Physics I – Syllabus

Semester: Fall 2007

Lecturer:

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Lecture Time/Room:

Lecture **Monday, Wednesday, Friday 9.35-10.30 am**, 185 Physics Building

Required Text:

G.B. Arfken and H.J. Weber, **Mathematical Methods for Physicists**, (6th edition, Elsevier/Academic Press).

Office Hours: Monday 1:00 – 2:00 pm or by appointment.

Grading:

Your course grade will be determined by your performance in homework assignments, one Midterm Exam and a Final Exam on the basis of the following distribution.

Homework Projects (typically every week)	30%
Midterm Exam	30%
Final Exam	40%

The completed homework assignments are due at 5 pm on the date specified; typically one week after the assignment is given. Late submissions will not be accepted.

Course description and objectives:

This course provides an introduction to mathematical methods for theoretical physics. It includes topics in vector analysis, linear algebra, infinite series, functions of complex variables, and introduction to special functions.

Topics to be covered (approximate):

1. **Vector analysis.** Coordinates. Scalar and vector products. Triple products. Differential operators: gradient, divergence and curl. Gauss' and Stokes' theorems.
2. **Vector analysis in curved coordinates.** Spherical polar coordinate system. Circular cylinder coordinate system. Introduction to tensors.
3. **Determinants and matrices.**
4. **Infinite series.** Convergent tests. Alternating series. Series of functions. Taylor's expansion. Power series.
5. **Functions of complex variable.** Complex algebra. Cauchy-Riemann conditions. Cauchy's integral theorem. Laurent expansion. Advanced topics.
6. **Introduction to special functions.** Dirac Delta function. The Gamma function. The Beta function.
7. **Differential equations.** (if time allows)

The material discussed in class will approximately correspond to the first nine chapters of Arfken & Weber's book (minus group theory chapter).

Grading:

The overall course grade will be determined on the basis of the following grading curve:

Grade	Cumulated Score	Grade	Cumulated Score
A	85-100	C	60-64
A-	80-84	C-	55-59
B	75-79	D	45-49
B-	70-74	D-	40-44
C+	65-69	E	0-39

Website: <http://www.physics.wayne.edu/~apetrov/PHY5100/>