

PHY 5100 – Methods of Theoretical Physics I – Syllabus

Semester: Fall 2010

Lecturer:

Prof. **Alexey A. Petrov**, Room 358 Physics Building,
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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.

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

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. (if time allows)
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).

Final Grade:

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

Student Disability Services:

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Please be aware that a delay in getting SDS accommodation letters for the current semester may hinder the availability or facilitation of those accommodations in a timely manner. Therefore, it is in your best interest to get your accommodation letters as early in the semester as possible.