Fordham University   Spring 2008
PYRU 3100: Mathematical Methods in Physics

Lectures: Mon. 4:00-5:15 pm., Thurs. 4:00-5:15 pm,
                 Tue. 5:30 – 6:20 pm
Classroom: Room 101, Freeman Hall

Instructor: Kunal Das
Office: 210 Freeman Hall
Phone: 718-817-4181
Email: kdas@fordham.edu

Office Hours: Tue. 2:00 – 4:00 p.m., Thurs. 12:00 – 2:00 p.m.
                     or walk in any time I am in my office

Scope of the Course: This course is the first in a sequence of four courses offered in the physics department aimed at providing students with the essential mathematical tools used in physics and engineering. The course will be focused on the theory and solution of linear differential equations and on multivariable and vector calculus. In addition, the Mathematics programming software *Mathematica* will be introduced and used to solve problems related to the material in this course.

Textbooks + Software:
<u>Primary</u>:   *Multivariable Calculus* (8th Ed), Anton, Bivens, and Davis (Wiley)
                 Differential Equations with Applications, P. D. Ritger and N.J. Rose (Dover)

<u>Supplemental</u>: *Mathematical methods in the Physical Sciences* (3rd Ed), M. L. Boas (Wiley)
                   Mathematica for Students (<u>Software</u>) Wolfram Research

Grading:

Homework:	10%
Quizzes	15%
Mathematica:	10%
Midterm – I:	20%
Midterm – II:	20%
Final:	25%

Homework problem sets will be assigned regularly during the semester. A random selection of problems from each set will be graded. <u>Late homework will not be accepted</u>. Quizzes will be based primarily on homework problems.

Course Outline

- Methods for Solving First Order Differential Equations
- Applications of First order Differential Equations
- Linear Second Order Differential equations
- Applications of Linear Second Order Differential Equations
- Series Solutions
- Systems of Linear Differential Equations
- Vector Algebra
- Gradient, Divergence, Curl, Laplacian, Line Integrals,
- Green's theorem, Divergence Theorem, Stoke's Theorem
- Multi-dimensional Integrals
- Line Integrals
- Surface Integrals, Flux

Mathematica: Basic commands and usage for simple mathematical problems will be covered initially, followed by applications to selected problems from the material covered in the course.