Physics 361– V0100 Mathematical Methods in Physics

The course will present a concise applications-oriented treatment of advanced topics in applied math relevant to undergraduate students in science and engineering. The syllabus is

1. Complex variables
2. Linear vector spaces
3. Sturm-Liouville theory
4. Special functions (Bessel, Legendre, etc.)
5. Partial differential equation – classification and boundary conditions
6. Separation of variables
7. Green's functions
8. Integral transforms
9. Other topics if time permits

Text: D. A. McQuarrie, *Mathematical Methods for Scientists and Engineers* (University Science Books, 2003)

Prerequisites: Mathematics 346 and 391 and Physics 207-208

Instructor: Joel Koplik, Steinman 1M-19, 650-8162, jkoplik@ccny.cuny.edu
Class hours: Tu,Th 4:00 to 5:40 PM in Marshak 417S
Office hours: Monday-Thursday afternoons 1 – 4 PM

Grading: weekly problems sets - 1/3 of grade
two in-class exams - 1/3 of grade
final exam - 1/3 of grade

Similar books:

G B Arfken, H J Weber and F E Harris, *Mathematical Methods for Physicists,* 7th ed. (Academic)
K F Riley, M P Hobson and S J Bence, *Mathematical Methods for Physics and Engineering* by Riley, Hobson and Bence, 3rd ed. (Cambridge)
F W Byron and R W Fuller, *Mathematics of Classical and Quantum Physics* (Dover)
P Dennery and A Krzywicki, *Mathematics for Physicists* (Dover)
J W Dettman, *Mathematical Methods in Physics and Engineering* (Dover)
H W Wyld, *Mathematical Methods for Physicists* (CRC Press)
J Mathews and R L Walker, *Mathematical Methods of Physics* (Addison-Wesley)

More advanced books:

C M Bender and S Orszag, *Advanced Mathematical Methods for Scientists and Engineers* (McGraw-Hill)
R Courant and D Hilbert, *Methods of Mathematical Physics* (Wiley), 2 vol.
P M Morse and H Feshbach, *Methods of Theoretical Physics* (McGraw-Hill), 2 vol.
E T Whittaker and G N Watson, *A Course of Modern Analysis* (Cambridge)

Handbooks:

M Abramowitz and I A Stegun, *Handbook of Mathematical Functions* (Dover)
I S Gradshteyn and I M Rhyzik, *Table of Integrals, Series and Products* (Academic)

The course will present a concise applications-oriented treatment of advanced topics in applied math relevant to undergraduate students in science and engineering. After completing the course, students will be able to

a. Understand the linear vector space context of differential equations
b. Solve ordinary differential equations by series and eigenfunction methods
c. Understand the types of partial differential equation along with the appropriate boundary conditions for each.
d. Solve partial differential equations by separation of variables, Green's function and transform methods.
e. Understand complex variable theory and its use for evaluation of integrals and integral transforms.