MATHEMATICAL METHODS (2022)

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Course start date: September 6 (Tuesday)
Timings: 11:30 am – 1:00 pm (Tues/Thurs)
Venue: AG-80
Off Hrs: 2:00-4:00 pm Mon & Thurs

Syllabus

1. **Linear Algebra: Vectors and Matrices (13 Lectures)**
    a. Vectors
        i. Vector algebra, differentiation and integration, Vector operators
        ii. Line, surface, and volume integrals Integral theorems and applications
        iii. Vector spaces, basis sets, linear operators, generalized vector spaces
    b. Matrix representations and operators
        i. Notation, algebra and matrix operations, special square matrices
        ii. Change of basis, eigenvalues and eigenvectors and applications

2. **Ordinary Differential Equations (12 Lectures)**
    a. Introduction and elementary methods
        i. Classifications of equations, Solution methods for first order ODE
    b. Higher order ODE and solutions
        i. Linear equations with const and variable coefficients,
        ii. Fourier series and transforms, convolutions/deconvolutions
        iii. Solutions using Laplace transforms and Green`s functions
    c. Series solutions of ODE
        i. Solutions about ordinary and singular points, Fuch`s theorem, Frobenius Method

Course Textbooks:

1. M. L. Boas, *Mathematical methods in physical sciences*, 3rd editions, Wiley-India (2006)
2. K. F. Riley, M. P. Hobson, S.J. Bence, *Mathematical methods for physics and engineering*,3rd edition, Cambridge University Press (2002)

Grading:

Final Exam in December
Assignments every two weeks (first assignment Sept 13) + in-class discussion

Grade distribution:

Assignments (20%) + in-class discussion (12 presentation + 8 participation=20%) + written exam (60%)