Mathematical Methods in Engineering and Science

MECHANICAL ENGINEERING

Type of Course	: Repurposed
Course Snapshot	: Elective / UG/ PG
	: PG students of Emgineering and science
Pre-requisites	: UG Maths background
Course Duration	: 30 hours / 12 weeks
Industry Support	: It will be of immense value to any company involved in analysis/computation

COURSE OUTLINE:

The purpose of this course is to summarise, crystallise, enhance and give a forward orientation to the mathematical methods taught in undergraduate curriculum, with projections to future requirements. It is needed as background necessary to appreciate specialised advanced subjects in engineering and science, and also to engage in professional analysis, modelling, design and research. The major sections of the audience include (a) postgraduate students, (b) teachers of applied mathematics and engineering subjects (or physics/economics), (c) senior undergraduate students, and (d) scientists and engineers in research laboratories and industry.

INSTRUCTOR:

Prof. Bhaskar Dasgupta
Department of Mechanical Engineering
IIT Kanpur

ABOUT INSTRUCTOR:

Prof. Bhaskar Dasgupta is a professor in the Department of Mechanical Engineering at the Indian Institute of Technology Kanpur. His teaching and research areas are robotics,theory of machines, computer aided design, optimization, applied mathematics, communication skills etc. He is the author of the PG textbook Applied Mathematical Methods (Pearson, 2006). His other interests are languages, literature, history and philosophy.

COURSE PLAN:

Week 1   : Solution of Linear Systems
Week 2   : The Algebraic Eigenvalue Problem
Week 3   : Topics in Linear Algebra and Calculus
Week 4   : Introduction to Optimization
Week 5   : Doubt resolution and discussion on assignments 1-3
Week 6   : Topics in Numerical Analysis
Week 7   : Ordinary Differential Equations
Week 8   : Doubt resolution and discussion on assignments 4-6
Week 9   : ODE Applications in Approximation Theory
Week 10   : ODE Applications in Approximation Theory
Week 11   : Brief Overviews of PDE's, Complex Analysis, Variational Calculus
Week 12   : Doubt resolution and discussion on assignments 10-12