



FLUID MECHANICS AND ITS APPLICATIONS

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PRE-REQUISITES : First year math courses

INTENDED AUDIENCE : Undergraduate students; Students preparing for GATE

INDUSTRIES APPLICABLE TO : It is a core course

COURSE OUTLINE :

This course introduces the subject of fluid mechanics from the conceptual and applications point of view. While it covers all the material required for GATE, it adds interesting insights into applications of fluid mechanics (without advanced mathematics), more than what is covered in most books in fluid mechanics.

ABOUT INSTRUCTOR :

Prof. Vijay Gupta studied at IIT Delhi and at University of Minnesota. He was professor and Dean at IIT Kanpur, Director at Punjab Engineering College Chandigarh, Vice-chancellor at Lovely Professional University, Jalandhar, and at Sharda University, Greater Noida. His area of research interest include experimental aerodynamics and bio-fluid mechanics.

COURSE PLAN :

Week 1: Introduction to Fluid Flow; Fluid-Flow Phenomena

Week 2: Fluid Statics - Pressure; Manometry and Surface Tension; Forces on Submerged Surfaces

Week 3: Description of Flows; Graphical Description of Flows

Week 4: Conservation of Mass; Energy Equation

Week 5: Energy Equation Continued; Engineering Energy Equation

Week 6: Momentum Equation; Differential Form of the Momentum Equation; Some Exact Solutions of N-S Equations

Week 7: Similitude and Modelling - I; Similitude and Scale Factors Approach; Similitude (Continued)

Week 8: Flow Measurement; Flow through Pipes; Flow through Pipes (Continued)

Week 9: Approximations in Fluid Mechanics; Low Reynolds number Flows

Week 10: Inviscid flows; Potential flows - I; Potential flows - II

Week 11: Lift on Wings; Propellers and Wind Turbines; Boundary layer Flows

Week 12: Integral methods in boundary layers; Separation in boundary layers; Application to ball games