



# INTRODUCTION TO FLUID MECHANICS

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**PRE-REQUISITES** : Basic knowledge of Mathematics

**INTENDED AUDIENCE** : Interested students

**INDUSTRIES APPLICABLE TO** : Oil Companies (IOCL, SHELL, BPCL and others), Automobile and Aviation companies (GE, AIRBUS, TATA Motors and others)

## **COURSE OUTLINE :**

This is an introductory course in Fluid Mechanics. The subject Fluid Mechanics has a wide scope and is of prime importance in several fields of engineering and science. Present course emphasizes the fundamental underlying fluid mechanical principles and application of those principles to solve real life problems. Special attention is given towards deriving all the governing equations starting from the fundamental principle. There is a well balanced coverage of physical concepts, mathematical operations along with examples and exercise problems of practical importance. After completion of the course, the students will have a strong fundamental understanding of the basic principles of Fluid Mechanics and will be able to apply the basic principles to analyze fluid mechanical systems.

## **ABOUT INSTRUCTOR :**

Prof. Suman Chakraborty is currently a Professor in the Mechanical Engineering Department as well as an Institute Chair Professor of the Indian Institute of Technology Kharagpur, India, and the Head of the eSchool of Medical Science and Technology. He is also the Associate Dean for Sponsored Research and Industrial Consultancy. His current areas of research include microfluidics, nanofluidics, micro-nano scale transport, with particular focus on biomedical applications. He has been awarded the Santi Swaroop Bhatnagar Prize in the year 2013, which is the highest Scientific Award from the Government of India. He has been elected as a Fellow of the American Physical Society, Fellow of the Royal Society of Chemistry, Fellow of ASME, Fellow of all the Indian National Academies of Science and Engineering, recipient of the Indo-US Research Fellowship, Scopus Young Scientist Award for high citation of his research in scientific/technical Journals, and Young Scientist/ Young Engineer Awards from various National Academies of Science and Engineering. He has also been an Alexander von Humboldt Fellow, and a visiting Professor at the Stanford University. He has 380+ Journal publications.

## **COURSE PLAN :**

**Week 1:** Introduction and Basic Principles

**Week 2:** Properties of Fluids

**Week 3:** Properties of Fluids and Fluid Statics

**Week 4:** Fluid Statics

**Week 5:** Fluid Kinematics (Part I)

**Week 6:** Fluid Kinematics (Part II)

**Week 7:** Dynamics of Inviscid Flows (Part I)

**Week 8:** Dynamics of Inviscid Flows (Part II)

**Week 9:** Integral Forms of Control Volume Conservation Equations (Part I)

**Week 10:** Integral Forms of Control Volume Conservation Equations (Part II)

**Week 11:** Integral Forms of Control Volume Conservation Equations (Part III); Dynamics of Viscous Flows (Part I)

**Week 12:** Dynamics of Viscous Flows (Part II)