



# FUNDAMENTAL OF FLUID MECHANICS FOR CHEMICAL AND BIOMEDICAL ENGINEERS

## **PROF. RAGHVENDRA GUPTA**

Department of Multidisciplinary  
IIT Guwahati

**PRE-REQUISITES** : The participant should have understanding of class 12 level mathematics

**INTENDED AUDIENCE** : UG students of Chemical Engineering, Bioengineering and biomedical engineering

**INDUSTRIES APPLICABLE TO** : All chemical, bioprocessing industries

### **COURSE OUTLINE :**

This basic course on fluid dynamics is designed specifically for Chemical Engineering. The participants will be introduced to properties of fluid and flow properties such as velocity, stress. The students will learn to analyse the fluid flow problem employing dimensional analysis, integral analysis and differential analysis. The course would focus more on viscous flow in pipes and around submerged objects such as spheres and cylinders. A number of problems relevant to chemical and biomedical engineering applications will be solved.

### **ABOUT INSTRUCTOR :**

Prof. Raghvendra Gupta is an Associate Professor in the Department of Chemical Engineering at Indian Institute of Technology Guwahati. He teaches courses related transport processes and fluid mechanics at IIT Guwahati. His research interests are based around understanding complex transport processes in chemical and biological systems using a combination of theoretical, numerical and experimental techniques.

### **COURSE PLAN :**

- Week 1:** Introduction and Application
- Week 2:** Fluid properties and flow field
- Week 3:** Dimensional analysis and similitude
- Week 4:** Fluid statics: pressure, gravity and surface tension
- Week 5:** Macroscopic balances
- Week 6:** Fluid kinematics
- Week 7:** Differential analysis-I
- Week 8:** Differential analysis-II
- Week 9:** Inviscid flow
- Week 10:** Flow around submerged objects
- Week 11:** Turbulent flow
- Week 12:** Pipe flow