FUNDAMENTAL OF FLUID MECHANICS FOR CHEMICAL AND BIOMEDICAL ENGINEERS

DR RAGHVENDRA GUPTA
Department of Chemical Engineering
IIT Guwahati

TYPE OF COURSE : New | Core | UG
COURSE DURATION : 12 Weeks (18 Jan’ 21 - 09 Apr’ 21)
EXAM DATE : 24 Apr 2021

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 :
Dr. 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 applications
Week 2: Fluid properties and flow field
Week 3: Dimensional analysis and similitude
Week 4: Fluid statics: pressure, gravity and surface tension
Week 5: Fluid kinematics
Week 6: Macroscopic balances
Week 7: Macroscopic balances (Cont’d)
Week 8: Differential analysis and application to laminar flows
Week 9: Inviscid flow, Boundary layer
Week 10: Flow around submerged objects
Week 11: Turbulent flow
Week 12: Turbulent flow (Cont’d), Pipe low