COMPUTATIONAL FLUID DYNAMICS FOR INCOMPRESSIBLE FLOWS

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TYPE OF COURSE : Rerun | Elective | UG/PG
COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 23 Apr 2022

PRE-REQUISITES : No specific pre-requisite. Fundamental knowledge of Mathematics and Fluid Mechanics should be sufficient.

INTENDED AUDIENCE : Undergraduate and postgraduate students of Mechanical Engineering and similar branches; Faculty members associated with Mechanical Engineering; Practicing engineers associated with fluid and thermal industries.

INDUSTRIES APPLICABLE TO : BHEL, NTPC, Eaton

COURSE OUTLINE :
This is an introductory course on computational fluid dynamics (CFD). This course will primarily cover the basics of computational fluid dynamics starting from classification of partial differential equations, linear solvers, finite difference method and finite volume method for discretizing Laplace equation, convective-diffusive equation & Navier-Stokes equations. The course will help faculty members, students and researchers in the field to get an overview of the concepts in CFD.

ABOUT INSTRUCTOR :
Prof. Amaresh Dalal is currently an Associate Professor in the Department of Mechanical Engineering of the Indian Institute of Technology Guwahati. He received his Ph.D. degree from Indian Institute of Technology Kanpur in 2009 and he was Post-doctoral Research Associate at Purdue University from Sep 2008 - Dec 2009. He has research interests in the area of Computational Fluid Dynamics and Heat Transfer, Finite Volume Methods and Unstructured Grid Techniques, Multiphase Flows. He received Prof KN Seetharamu Medal and Prize for the Best Young Researcher in Heat Transfer-2017 from Indian Society of Heat and Mass Transfer.

COURSE PLAN :

Week 1**:** Introduction to Computational Fluid Dynamics

Week 2**:** Classification of PDEs

Week 3**:** Finite Difference Method

Week 4**:** Elliptic equations

Week 5**:** Parabolic equations

Week 6**:** Hyperbolic equations

Week 7**:** Stability Analysis

Week 8**:** Vorticity-stream function formulation

Week 9**:** MAC Algorithm

Week 10**:** Finite volume method

Week 11**:** Finite volume method,cont'd

Week 12**:** SIMPLE algorithm