

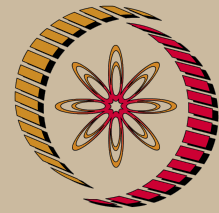
NOC: Computational Fluid Dynamics - Video course

COURSE OUTLINE

The course deals with the numerical solution of equations governing fluid flow and would be of interest to engineers and scientists—both aspiring and professional—with chemical/ mechanical/ civil/ aerospace engineering applications. In all these fields, one needs to deal extensively with fluid flow related phenomena and one needs to resolve flow-related features of the processes and equipment. Although the equations governing fluid flow have been formulated more than 150 years ago, it is only in recent years that these are being solved in the practical applications in which the flow occurs. The course deals with the basic techniques that enable the numerical solution of these equations.

COURSE DETAIL

Week .No	Topic
1	Introduction : calculation of flow in a rectangular duct
2	Calculation of fully developed flow in a triangular duct
3	Derivation of equations governing fluid flow
4	Equations for incompressible flow and boundary conditions
5	Basic concepts of CFD: Finite difference approximations
6	Basic concepts of CFD: Consistency, stability and convergence
7	Solution of Navier Stokes for compressible flows
8	Solution of Navier Stokes equations for incompressible flows
9	Solution of linear algebraic equations: basic methods
10	Solution of linear algebraic equations: advanced methods
11	Basics of finite volume method including grid generation
12	Turbulent flows and turbulence modelling



NP-TEL

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<http://nptel.ac.in>

Chemical Engineering

Pre-requisites:

At least one course in fluid mechanics. In addition, at least one course in numerical techniques and one course in computer programming would be essential

Additional Reading:

- Ferziger J.H. & Peric M. (1999) Computational Methods for Fluid Dynamics, Springer, Berlin, Germany.
- Hirsch C. (1988) Numerical Computation of Internal and External Flows, John Wiley & Sons, New York, USA.
- Patankar S.V. (1980) Numerical Heat Transfer and Fluid Flow, Hemisphere, Washington D.C., USA.
- Versteeg H.K. & Malalsekera W. (1995) An Introduction to Computational Fluid Dynamics: The Finite Volume Method, Longman Scientific & Technical, Harlow, Essex, UK.
- Anderson J.D. (1995) Computational Fluid Dynamics: The Basics

with
Applications, McGraw-
Hill, Inc.

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