



# Indian Institute of Technology

## Course Details Report

**Course No: MA6460**

**Course Name: Computational Fluid Dynamics**

**Course Type:**

Theory

**Description:**

One of the main objectives of this course is to investigate various fluid flow systems with an aim at a deeper understanding of the basic principles of fluid mechanics. The student will be exposed to some of the difficulties that one may encounter in CFD, such as geometry simplification, mesh problems, convergence problems, multiple solutions, etc.

**Course Content:**

Review of the governing equations of Incompressible viscous flows, Stream function -vorticity approach, upwind schemes, Primitive variables, Staggered grid, Artificial compressibility, pressure correction and vortex methods; Compressible inviscid flows, central schemes with combined and independent space time discretisation, Compressible viscous flows, Explicit, implicit and PISO methods; Grid generation: Structured and unstructured grid generation methods; Finite volume method: Finite volume method to convection-diffusion equations.

**Text Books:**

1. P Wessling, Principles of Computational Fluid Dynamics, Springer,1991.
2. John D Anderson, Jr., Computational Fluid Dynamics, The Basicswith Applications, McGrawHill,1995.

**Reference Books:**

1. T J Chung, Computational Fluid Dynamics, Cambridge, 2002.
2. C A J Fletcher, Computational Techniques for Fluid Dynamics, Volumes I & II, Springer Verlag,1988.
3. C Hirsch, Numerical Computation of Internal and External Flows, Volume I & II, Wiley, 1991.
4. J C Tannehill, D A Anderson and R H Pletcher, Computational Fluid Mechanics and Heat Transfer, McGrawHill,1984.
5. H K Versteeg and W Malalasekera, An Introduction toComputational Fluid Dynamics, The Finite Volume Method,Addison Wesley, 1996.