Introduction to Computational Fluid Dynamics

Course Code:            Credits:   3
Course Type:           Theoretical
Requisites:           Num. Computations, Fluid Mechanics2, Heat Transfer 1
Course Length:          51 hours

Outlines:

1- Importance and Use of Computational techniques in Engineering
2- Mathematical and Physical Classification of Partial Differential Equations
3- Relation between physical and mathematical characteristics of equations
4- Basic grid generation techniques (Structured and Unstructured methods)
5- Basic Discretization Methods (Finite Difference, Finite Volume and Finite Element Methods)
6- Model Equations (Laplace, Poisson, Heat Conduction, Wave, Linear and non-linear wave equations, Inviscid and Viscous Burger’s Equations)
7- Basic Techniques for solving model equations
8- Analysis of Consistency, Stability and Convergence of methods
9- Numerical solution of Incompressible Fluid Flows (pressure based and density based methods)
10- Numerical solution of compressible Fluid Flows (Central and Upwind methods)

References: