

COURSE CURRICULUM

Modules	Day	Date	Topics
Basics of Python Programming	1	10/06/2024	Getting started with Python-setting up of the working environment in Python, Running Python scripts/Jupyter notebooks, Introduction to Python Programming
	2	12/06/2024	Python objects with details of shell/Number/variables/Range/List comprehension/Functions etc.
	3	14/06/2024	Python objects with details of shell/Number/variables/Range/List comprehension/Functions etc. (contd.); Introduction to Python libraries like NumPy & Matplotlib
	4	17/06/2024	Demonstration of Applications of Python libraries in numerical computing
Problem Solving using CFD	5	19/06/2024	Introduction to FDM & FVM; General discussion on how to tackle a problem with CFD; PDEs and their classifications
	6	21/06/2024	Discretization of partial derivatives using forward, backward & central difference schemes; Treatment of Boundary Conditions using Python; Comparing efficiency of different schemes through Python Programming
Solution of 1-D problems using Python	7	24/06/2024	Steady state Diffusion: Illustration on the effect of grid size, Concept of iterative solution and convergence; Discussion on different iterative solvers
	8	26/06/2024	Comparing performance of Jacobi, Gauss-Seidel and SOR iterative methods using Python
	9	28/06/2024	Unsteady state Diffusion: Explicit method - exploring concept of numerical stability and CFL condition
	10	01/07/2024	Detailed discussion on Implicit solution of unsteady diffusion using NumPy functions
	11	03/07/2024	Unsteady Advection: Need for upwinding; 1 st and 2 nd order upwinding; Solution of Burger's equation using Python

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Modules	Day	Date	Topics
Solution of 2-D equations using Python	12	05/07/2024	Detailed numerical solution of Advection-Diffusion equation using Python
	13	08/07/2024	Optimizing Code Performance through vectorization
	14	10/07/2024	Detailed discussion on plotting of numerical simulation results using Matplotlib library
	15	12/07/2024	Visualization of 2-D Data: Line Plots, Contour Plots & Vector plots and their significance
Solution of 2-D Navier-Stokes equation using Python	16	15/07/2024	Overview of governing equations of fluid flow
	17	17/07/2024	Introduction to Stream Function-Vorticity Method & Its derivation along with the derivation of its boundary conditions
	18	19/07/2024	Solution of Navier-Stokes equation in stream function-vorticity formulation using Python-I
	19	22/07/2024	Solution of Navier-Stokes equation in stream function-vorticity formulation using Python-II
	20	24/07/2024	Detailed discussion on parametric study and solution post-processing
	21	26/07/2024	Brief overview of miscellaneous applications of Python for flow analysis