



PHYSICS

COMPUTATIONAL SCIENCE AND ENGINEERING USING PYTHON

Instructor Name : MAHENDRA VERMA (IIT Kanpur - Physics)

COURSE DURATION : Jan-Mar 2017 **CORE / ELECTIVE :** Core **UG / PG:** PG

PRE-REQUISITES : Basic knowledge of calculus, linear algebra, and ordinary and partial differential equations. Basic knowledge of computing is recommended.

INTENDED AUDIENCE : PG students of Science and Engg. (specially Physics, Mathematics, Mechanical, Aerospace, and Chemical Engineering). Advance UG students too can take this course.

INDUSTRIES APPLICABLE TO : Companies involved in Computational fluid dynamics, computational electrodynamics, etc.

COURSE OUTLINE : Computing has become a major tool in science and engineering so much so that it is called the third pillar along with experiments and theory. In this course, we first introduce Python programming language. Then we cover basic numerical algorithms covering interpolation, integration, differentiation, ODE and PDE solvers, and basic linear algebra. Python implementation of these algorithms will be covered.

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COURSE PLAN

Week 1:About computers, Python: Variables and Array

Week 2:Python: Control structures, Programming style, and Plotting

Week 3:Errors, Data input/output, Interpolation

Week 4:Numerical integration and differentiation

Week 5:ODE solvers, ODE solvers, Fourier transform

Week 6:PDE solvers, PDE solvers, PDE solvers

Week 7:will be updated soon

Week 8:will be updated soon