Physics with Scilab

Four Weeks Online Certificate Course
(3rd Edition)

Department of Physics, Shri Shivaji Science College, Amravati

05 - 29 September 2022

Introduction and Background

Scilab is a scientific software package for numerical computations providing a powerful computing environment for scientific applications. It was developed in 1990 by researchers from INRIA (French National Institute for Research in Computer Science and Control) and ENPC (National School of Bridges and Roads). It is now maintained and developed by Scilab Consortium joined to Digiteo Foundation. The current version is 6.1.1 released on Tue, 16 July 2021.

It is an open source, cross-platform numerical computational software and also a high-level, numerically oriented programming language. Due to the open source nature of the software, some user contributions (define new data types and operations) have been integrated into the main program. Using Scilab many numerical problems may be expressed in a reduced number of code lines, as compared to similar solutions using traditional languages, such as FORTRAN, C, or C++.

The computing and graphics tool in Scilab allows students to learn physical and mathematical concepts with ease. Scilab also includes a free package called Xcos for modeling and simulation of explicit and implicit dynamical systems, including both continuous and discrete sub-systems.

Scilab is fully compatible with Linux, Mac OS X, and Windows operating systems.

This course is designed for introducing the Physics students to Scilab and its effective use in solving the problems and simulating the concepts in Physics. The contents of this course have been chosen so as to bring about a deep understanding of common advanced physics problems.

Who should take this course

Any student of physics or mathematics (UG/PG) wishing to discover Scilab software, its environment and its capabilities.

Prerequisites

Be able to use computers and know college physics and mathematics concepts.

Duration of the Course

FOUR WEEKS (22rd August to 17th September 2022)

Five/Six video lectures will be released and two assignments (50 Marks each) will be given in one week. The lectures can be viewed at any time during that week and assignments shall have to be submitted before given deadline. The questions and discussions facility will be available through Google Classroom.

After successful completion of the course a certificate will be issued by Shri Shivaji Science College, Amravati depending on the performance.

What you will learn in this course

- **Introduction to Scilab environment**
- **Scilab datatypes, variables and constants**
- **Matrix operation in Scilab**
- **Plotting math functions in Scilab**
- **Changing axes properties in scilab plots**
- **Plotting Bar graphs in Scilab**
- **Putting Latex formatted text and math symbols in Scilab plots**
- **Solving algebraic equations in Scilab**
- **Introduction to Scilab functions**
- **Writing your own functions in Scilab**
- **Solving ordinary differential equations and Special Differential equations**
- **Differentiation & Integration**
- **Calculating Fourier coefficients and Plotting Fourier Series**
- **Conditional branching**
- **Creating codes to solve the problems in Physics**
- **Introduction to Xcos: The Scilab simulator**
- **Making simulations for Physical systems using Xcos**

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Coordinator
Dr. P.A. Nagpure
Associate Professor in Physics
Email: nagpurepa@yahoo.co.in