Third-Year of Bachelor of Science
Vocational Skill Course – Physics
Revised syllabus according to CBCS NEP - 2020

Course Title**: Numerical Methods using Python**

SEMESTER-V

W.E.F. 2025-2026

RECOMMENDED BY THE BOARD OF STUDIES IN PHYSICS
AND
APPROVED BY THE ACADEMIC COUNCIL

Devrukh Shikshan flrasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and
Vid. Dadasaheb flitre Science College (Autonomous), Devrukh.
Tal.Sangmeshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No: 02/2025

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangmeshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Bachelor of Science
Name of the Department	:	Physics
Name of the Class	:	Third Year
Semester	:	Five
Paper	:	**VSC - IV**
No. of Credits	:	02
Title of the Course	:	**Numerical Methods Using Python**
Course Code	:	**PHVS302**
Name of the Vertical in adherence to NEP 2020	:	Vocational Skill Course
Eligibility for Admission	:	
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	**5.5**
Pattern of Marks Distribution for SEE and CIA	:	60:40
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2025-2026
Ordinances /Regulations (if any)		

Syllabus for Third Year of Bachelor of Science in Physics

(With effect from the academic year 2025-2026)

SEMESTER – V **Paper - Physics VSC – IV**

Course Title: Numerical Methods Using Python **No. of Credits – 02**

Type of Vertical: Vocational Skill Course **COURSE CODE: PHVS302**

Course Learning Outcomes:

After completing the course, the learner will be able to…

Course Learning Outcome No.	Course Learning Outcome
CLO-01	Understand advantages/limitations of python for numerical computations
CLO-02	Elaborate the purpose of using numerical methods
CLO-03	Use numpy, matplotlib and mayavi for plotting and data visualization
CLO-04	Implement various root finding and interpolation methods in python
CLO-05	Write python codes for approximating derivatives
CLO-06	Implement numerical integration methods in python
CLO-07	Numerically solve initial value problems using python

Syllabus for Third Year of Bachelor of Science in Physics

(With effect from the academic year 2025-2026)

SEMESTER - V **Paper – Physics VSC-IV**

Course Title: Numerical Methods Using Python **Credits – 02**

Type of Vertical: Vocational Skill Course **COURSE CODE: PHVS302**

COURSE CONTENT

Module	Practicals	Lectures
1	**1.** Representation of Numbers in python, Numerical Error and Instability	**02**
	2. 2D and 3D plotting using python Introduction to numpy and matplotlib and scipy. Numpy arrays, manipualtions, matrix operations. Basic data plotting, plotting functions, using attributes, examples, Introduction and using grace for plotting and curve fitting, problems Data Visualization – Introductions to tools like mayavi	**08**
	3. Interpolation Introduction, Linear interpolation, Cubic Spline interpolation, Lagrange/ Newton polynomial interpolation, Problems	**10**
	4. Root Finding Introduciton, Tolerance, Bisection Method, Newton-Raphson Method, Problems	**10**
2	**5. Numerical Differentiation** Introduction, Finite difference approximating derivatives, Higher order derivatives, Problems	**10**
	6. Numerical Integration Introduction, Riemann Integral, Trapezoidal Rule, Simpson's Rule, Computing integrals in python, Problems	**10**
	7. ODEs – Initial Value Problems Introduction, Euler Method, Predicator-Corrector Method, Runge-Kutta Method, Python ODE solvers,	**10**
	Total	**60**

References:

- Online help wiki/video tutorials/YT channels

Access to the Course

The course is available for students admitted for Bachelor of Science.

Methods of Assessment

The assessment pattern would be 60:40, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

Pattern of Evaluation

The Examination/Evaluation pattern shall be framed by the Board of Examination with its final approval from the Academic Council of the College.