CHRIST
(DEEMED TO BE UNIVERSITY)
BANGALORE · INDIA

DEPARTMENT - MATHEMATICS

Course Pack
FOR
MATHEMATICAL MODELS USING PYTHON PROGRAMMING-MAT451

MAT451 - MATHEMATICAL MODELS USING PYTHON PROGRAMMING

Total Teaching Hours For Semester : 30 **Total Teaching Hours For Semester : 2**

Max Marks : 50 **Credits : 2**

Course Objectives/Course Description:

The course *Mathematical Models using Python Programming* is aimed at enabling the students study the Mathematical Models with the help of Python programming language. It is designed with a learner-centric approach wherein the students will acquire mastery in the subject by using Python Programing language as tool.

Learning Outcome

On successful completion of the course, the students should be able to

Acquire proficiency in using Python

Demonstrate the use of Python to understand and interpret the concepts in Mathematics.

Unit-1 **Teaching Hours:30**

Proposed Topics

Complex Arithmetic, functions in Python
Inverse, Determinant and Eigenvalues in Python
Transpose and Upper/Lower Triangular parts in Python
Solving Linear Systems in Python
Plotting of Scalar and Vector fields
Mathematical Model: Interest Rates
Mathematical Model: Growth of a population – Exponential Model
Mathematical Model: Logistic Growth
Mathematical Model: A Simple Pendulum
Mathematical Model: Spreading of a Disease

Text Books And Reference Books:

H P Langtangen, *A Primer on Scientific Programming with Python,* 2nd ed., *Springer*, 2016.

Essential Reading / Recommended Reading:

B E Shapiro, *Scientific Computation: Python Hacking for Math Junkies*, Sherwood Forest Books, 2015.

C Hill, *Learning Scientific Programming with Python*, Cambridge Univesity Press, 2016.

Amit Saha, *Doing Math with Python: Use Programming to Explore Algebra, Statistics, Calculus, and More!*, no starch press:San Fransisco, 2015.

Evaluation Pattern

The course is evaluated based on continuous internal assessments (CIA) and the lab e-record. The parameters for evaluation under each component and the mode of assessment are given below.

Component	**Parameter**	**Mode of Assessment**	**Maximum Points**
CIA I	Mastery of the concepts	Lab Assignments	**20**
CIA II	Conceptual clarity and analytical skills in solving problems in sequence and series.	Lab Exam - I	**10**
Lab Record	Systematic documentation of the lab sessions.	e - Record work	**07**
Attendance	Regularity and Punctuality	Lab attendance	**03** 95-100% : 3 90-94% : 2 85-89% : 1
CIA III	Proficiency in executing the commands appropriately, understand sequence, series and functions of a complex variable.	Lab Exam - II	**10**
Total			**50**