Semester	Course Code	Title of the Course
Even	VACMAMP24	Mathematics with Python

Value-Added Course on "Mathematics with Python"
(Course Code: VACMAMP24)

Course Objectives

1. To understand the fundamental mathematical concepts and operations.
2. To gain proficiency in the Python programming language.
3. To explore mathematical libraries in Python such as NumPy, SciPy, and SymPy.
4. To apply Python to solve mathematical problems, optimization, and data analysis.
5. To develop skills in mathematical modeling and simulation.
6. To complete a hands-on project applying Python to a real-world mathematical problem.

Course Outcomes (CO)

Learners will be able to

1. Utilize Python programming for mathematical computations and analysis.
2. Apply Python's powerful libraries and tools to solve mathematical problems efficiently.
3. Develop a strong foundation for leveraging Python in various mathematical domains.

Course Syllabus

Week I: Introduction to Python Programming (5 hours)

Overview of Python programming language - Basic syntax, data types, and variables - Control flow statements: if, else if, else, loops - Functions and modules.

Week II: Mathematical Operations in Python (5 hours)

Arithmetic operations - Working with mathematical functions - Introduction to NumPy library for numerical computations - Basic array operations and linear algebra in NumPy.

Week III: Advanced Mathematical Computing with Python (5 hours)

Introduction to SciPy library for scientific computing - Numerical integration and solving differential equations - Statistical analysis with SciPy - Introduction to SymPy for symbolic mathematics- Python Matplotlib.

Week IV: Working with Numbers (5 hours)

Integers, floating-point numbers, and complex numbers in Python - Absolute value and rounding numbers - Mathematical constants and functions in Python's math module - Handling errors and exceptions in mathematical operations.

Week V: Sequences and Series (5 hours)

Introduction to sequences and series - Arithmetic sequences and series - Geometric sequences and series - Generating sequences using Python.

Week VI: Solving Equations (5 hours)

Solving linear equations in one variable - Solving quadratic equations - Solving systems of linear equations - Using Python to solve equations symbolically and numerically.

Text Books:

1. Adam Cunningham, Scientific and Mathematical Computing using Python, University at Buffalo, Department of Biostatistics, https://www.acsu.buffalo.edu
2. Y. Daniel Liang, Introduction to Programming using Python, Pearson Education, Inc., publishing as Prentice Hall, 2013. ISBN 13: 978-0-13-274718-9, ISBN 10: 0-13-274718-9.
3. Nichola Lacey, Python by Example, Learning to Program in 150 Challenges, Cambridge University Press, Markono Print Media Pte Ltd, Singapore, 2019. ISBN 978-1-108-71683-3

Assessment Methods:

- Weekly quizzes: 50% , converted to 20 marks
- Midterm project: 30%, converted to 20 marks
- Attendance and participation: 20%, converted to 10 marks
- Finally, 50 marks are converted to 100 marks.

Duration: 30 Hours.