STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2023 – April 2024

Department   : MATHEMATICS
Name of the Faculty : Dr. V. DHANALAKSHMI
Course Title   : MATHEMATICAL PYTHON
Course Code   : 23MT/PE/MP15
Shift   : 1

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	recall the knowledge of essential Python programming syntax	K1
CO2	demonstrate a comprehensive understanding of the core Python programming fundamentals	K2
CO3	apply advanced mathematical problem-solving techniques, such as optimization, curve fitting, solving differential equations, and mathematical modeling, using Python, demonstrating their ability to transfer and adapt their knowledge to solve complex real-world problems.	K3
CO4	critically assess and analyse data visualizations, demonstrating the ability to create meaningful and effective visual representations of mathematical data and functions using Matplotlib.	K4
CO5	evaluate the solutions in diverse mathematical contexts	K5

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Nov 22 – 23, 2023 (Day Order 1 & 2)	1	**Python Fundamentals** 1.1 Introduction to Python 1.2 Overview of Python and its Significance in Mathematics 1.3 Setting up Python Environment	K1 – K5	2	CO1-5	Lecture	Quiz
Nov 24-30, 2023 (Day Order 1 to 6)	1	**Python Fundamentals** 1.4 Basic Python syntax, Variables, and Data Types 1.5 Input/Output and Basic Arithmetic Operations 1.6 Conditional Statements (`if, elif, else`) 1.7 Loops (`for` and `while`)	K1 – K5	5	CO1-5	Lecture Coding Sessions	Coding Exercises
Dec 1-7, 2023 (Day Order 1 to 6)	1	**Python Fundamentals** 1.8 Functions, Parameters, and return Statements. 1.9 Scope and Namespaces 1.10 Data Structures in Python: Lists, Tuples, and Dictionaries 1.11 Iterating through Data Structures	K1 – K5	5	CO1-5	Lecture Coding Sessions Tutorials	Code Completion
Dec 8-9, 2023 (Day Order 1, 3)	1	**Python Fundamentals** 1.12 List Comprehensions and Generator Expressions	K1 – K5	3	CO1-5	Lecture Coding Sessions	**Comp 1 : 15 marks**

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Dec 11-15, 2023 (Day Order 2 to 6)	2	**File Handling and Modules** 2.1 Reading and Writing Files 2.2 Working with CSV and JSON Data	K1 – K5	3	CO1-5	Lecture Coding Sessions	Code Completion
Dec 16 – 22, 2023 (Day Order 1 to 6)	2	**File Handling and Modules** 2.3 Introduction to Modules and Libraries 2.4 Creating and using Custom Modules	K1 – K5	5	CO1-5	Lecture Coding Sessions	Algorithm Implementation
Jan 3 – 6, 2024 (Day Order 1 to 4)	2	**File Handling and Modules** 2.5 Exception Handling and Debugging: Understanding Exceptions and Errors 2.6 Using `try-except` Blocks for Error Handling	K1 – K5	4	CO1-5	Lecture Coding Sessions	Code Review and Debugging
Jan 8 – 12, 2024	**C.A. Test – I** (Unit 1 & part of Unit 2)						
Jan 13, 2024 (Day Order 1)	2	**File Handling and Modules** 2.7 Debugging Techniques and Tools	K1 – K5	2	CO1-5	Lecture	Code Review and Debugging
Jan 18 -20, 2024 (Day Order 4 to 6)	3	**Mathematical Problem Solving with Python** 3.1 Numerical Computations: Working with NumPy for Numerical Computing	K1 – K5	2	CO1-5	Lecture Coding Sessions	Code Completion

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jan 22-29, 2024 (Day Order 1 to 6)	3	**Mathematical Problem Solving with Python** 3.2 NumPy Arrays, Operations and Functions 3.3 Solving Mathematical Equations using NumPy 3.4 Symbolic Mathematics with SymPy: Introduction to Symbolic Mathematics	K1 – K5	5	CO1-5	Lecture Coding Sessions Tutorials Collaborative Learning	Numerical Computations
Jan 30 – Feb 2, 2024 (Day Order 1 to 4)	3	**Mathematical Problem Solving with Python** 3.5 Using SymPy for Algebraic Manipulation 3.6 Solving Equations Symbolically and Symbol Manipulation	K1 – K5	4	CO1-5	Lecture Coding Sessions Tutorials	**Assignment: Symbolic Mathematics Tasks 15 marks**
Feb 5- 6, 2024 (Day Order 5 to 6)	3	**Mathematical Problem Solving with Python** Revision	K1 – K5	1	CO1-5	Lecture	Quiz
Feb 7 – 14, 2024 (Day Order 1 to 6)	4	**Graph Theory with Python (NetworkX package)** 4.1 Construction of Graphs 4.2 Degree and Distance Related Parameters 4.3 In-built Functions for Different Graph Classes	K1 – K5	5	CO1-5	Lecture Coding Sessions Tutorials	Quiz

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 15 – 22, 2024 (Day Order 1 to 6)	4	**Graph Theory with Python (NetworkX package)** 4.4 Computation of Graph Parameters using in-built Functions 4.5 Graph Operations and Graph Connectivity 4.6 Customization of Graphs 4.7 Digraphs 4.8 Matrices and Algorithms of Graphs 4.9 Graph as Models	K1 – K5	5	CO1-5	Lecture Coding Sessions Tutorials	Assignment: Explore graph theory applications in different domains
Feb 23 – 24, 2024 (Day Order 1 & 5)	4	**Data Visualization with Matplotlib** 4.10 Creating Various Types of Plots (line, scatter, bar, etc.) 4.11 Customizing Plot Appearance 4.12 Visualizing Mathematical Functions and Data	K1 – K5	4	CO1-5	Lecture Coding Sessions Tutorials	Case Studies
Feb 26 – Mar 1, 2024 (Day Order 2 to 6)	5	**Advanced Mathematical Problem Solving** 5.1 Optimization Techniques (gradient descent)	K1 – K5	3	CO1-5	Lecture Coding Sessions	Quiz
Mar 2, 2024 (Day Order 1)	5	**Advanced Mathematical Problem Solving**	K1 – K5	2	CO1-5	Lecture	Case Studies

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
		5.2 Curve Fitting and Regression Analysis					
Mar 4 –8, 2024	**C.A. Test – II** (Units 3 & 4)						
Mar 9 – 16, 2024 (Day 6 & Day Order 1 to 6)	5	**Advanced Mathematical Problem Solving** 5.3 Solving Differential Equations using Python 5.4 Simulation of Mathematical Models	K1 – K5	5	CO1-5	Lecture Coding Sessions	**Project: Use of Python for various computing 20 marks**
Mar 18 - 19, 2024 (Day Order 2 to 3)	5	**Advanced Mathematical Problem Solving** Revision	K1 – K5	1	CO1-5	Collaborative Learning	Quiz
Mar 20-22, 2024 (Day Order 4 to 6)	**REVISION**						