Course Code	Course Title	L	T	P	C
PMDS508L	Python Programming	2	0	0	2
Pre-requisite	Nil	Syllabus version			
		1.0			

Course Objectives

1. To introduce the basic building blocks of algorithmic problem-solving.
2. To introduce core programming basics using Python language.
3. To introduce the data structures of Python and their applications.
4. To introduce the modules for data manipulation and visualization.

Course Outcomes

At the end of the course, the students will be able to

1. Classify various algorithmic approaches and categorize the appropriate data representation,
2. Build programs using control structures,
3. Develop solutions to problems using ordered and un-ordered collection of data types.
4. Utilize the in-built functions and modules and develop user defined functions and modules.
5. Demonstrate array operations, mathematical analysis and graphical representation of data.

Module:1	Algorithmic Problem Solving	2 hours

Building blocks of algorithms: Statements, state, control flow, functions, Developing an Algorithm, Flowchart and Pseudo code.

Module:2	Introduction to Python	3 hours

Introduction to Python - Indentation, variables, reserved words, basic data types: Integer, Floating point, Complex and Boolean; Operators and their precedence, Expressions, Mutability, Built-in Functions, and Importing from Packages.

Module:3	Control Structures	4 hours

Decision Making and Branching: if, if-else, nested if, multi-way if-elif statements; Looping: while-loop, for-loop, else clauses in loops, nested loops, break, continue and pass statements.

Module:4	Data Collections	4 hours

Strings: Comparison, Formatting, Slicing, Splitting, Stripping, Regular Expressions: Matching,Search and replace patterns; Lists, Tuples, Sets and Dictionaries – Operations, List Comprehension.

Module:5	Functions and Modules	5 hours

User-defined functions- parameters and arguments, namespaces and scope rules, Lambda function; Recursive functions, Generator Functions, Decorators. Built-in modules, User-Defined modules,

Module:6	Multidimensional Data Handling and Visualisation	5 hours

NumPy arrays – 1-d, multi-dimensional arrays and matrices. Difference between lists and arrays. Mathematical operations with arrays. Slicing arrays; Boolean masks; Broadcasting in NumPy. Python Plotting: matplotlib – Basic Plotting. Logarithmic Plots. Plots with multiple axes; interactive functions for 3d plotting.

Module:7	Scientific Data Analysis	5 hours

SciPy – Introduction, scipy.stats, scipy.integrate, scipy.optimize, scipy.interpolate. Pandas – Introduction. Series, DataFrame and Panel. Slicing the data. Reading and writing CSV, XLS and JSON files. Working with missing data, categorical data. Data visualization with Pandas.

Module:8	**Contemporary Issues**			**2 hours**
			Total Lecture hours	**30 hours**
Text Book(s)				
1	Eric Matthes, Python Crash course: A Hands-On, Project-Based Introduction to Programming, 2023, 3rd edition, William Pollock.			
Reference Book(s)				
1	Martic C Brown, Python: The Complete Reference, 2018, 4th Edition, McGraw Hill Publishers.			
2	Wes McKinney, Python for Data Analysis, 2022, 3rd Edition, O'Reilly Media.			
Mode of Evaluation: CAT, Assignment, Quiz and FAT				
Recommended by Board of Studies		15-02-2024		
Approved by Academic Council		No. 73	Date	14-03-2024