UNIVERSITY OF MADRAS

M.Sc. DEGREE PROGRAMME IN COMPUTER SCIENCE

SYLLABUS WITH EFFECT FROM 2023-2024

Title of the Paper	**Advanced Python Programming**		
Core–II - Theory	I Year & I Semester	Credit:4	436C1B

Objectives:

To Provide advanced programming knowledge in python environment

To Make interactive Python programs.

To develop GUI based applications

To utilise libraries and APIs for rapid application development

To use python as an analytical tool for different mathematical models

Outcomes:

1.	Be able to program decorators, closures, lambda, iterators and generators comprehensions with in OOP.	K1, K2
2.	Learn modern data structures to include collections, array, and queues	K2, K3
3.	Use platform independent file manipulation, file pattern matching using CSV, HTML, XML, JASON	K3
4.	Be able to set up a client-server program and also multi-process applications.	K4, K5
5.	Be able to use python as an analytical and presentation tool	K5, K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create		

UNIT I: Object Oriented Python – Class, Objects. member types (public. Private, protected) self, init method, method overloading. Inheritance, method overriding, Polymorphism, Encapsulation, Assertion, Decorators, Generators, Iterators.

UNIT II: Threading in Python: Thread, Starting a Thread, Daemon Threads, join() a Thread, Working With Many Threads, Using a Thread Pool Executor, Race Conditions, Basic Synchronization Using Lock, Deadlock, Producer-Consumer Threading, Producer Consumer Using Lock, Producer-Consumer Using Queue, Threading Objects, Semaphore, Timer

UNIT III: Database programming using Python: Connecting to a database (sqlite, mysql) using Python, Sending DML and DDL queries and processing the result from a Python Program. Network programming using Python: An introduction to client-server programming, Basics of TCP and UDP protocols, Introduction to socket programming, Building an HTTP client and server

UNIT IV: GUI in Python: Introduction to GUI building libraries, Widgets: Button - Canvas - Check button -Entry - Frame -Label – List box – Menu button - Menu - Message –Radio button - Scale - Scrollbar - Text – Top level – Spin box- Paned Window – Label Frame – Message Box

Basic image processing using Python: Introduction to digital image processing, Basic operations on an image: Crop - Scale - Rotate - Flip - Changing contrast, brightness and color - Edge detection, blur, sharpening

UNIT V: Basic numerical processing using Python: Introduction to numpy , Creation of vectors and matrices, Matrix manipulation Basic data analysis using Python: Introduction to Pandas ,Pandas data structures – Series and DataFrame , Data wrangling using pandas : Loading a dataset into a dataframe- Selecting Columns from a dataframe - Selecting Rows from a dataframe - Adding new data in a dataframe - Deleting data from a dataframe Basic data visualization using : Introduction to Matplotlib, Scatter plot , Line plot,Bar chart, Histogram, Box plot.

Recommended Texts:

1. John Hunt; Advanced Guide to Python 3 Programming; Springer Nature Switzerland AG; 2019

Reference Books:

2. Eric Matthes, Python Crash Course: A Hands-On, Project-Based Introduction to Programming, 2nd Edition, No starch Press, 2019.
3. Mark Lutz; Learning Python, 5th Edition; O'Reilly Media, 2013
4. Mark Lutz, “Programming Python”, 4th edition, O'Reilly Media, 2010.

Web References:

1. https://realpython.com/tutorials/advanced/

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	S	M	M	S	M	S	S	S	L	M
CO 2	S	L	S	M	S	L	M	M	S	S
CO 3	M	S	L	M	M	S	L	S	L	S
CO 4	L	S	S	L	S	M	S	L	S	M
CO 5	S	M	M	S	L	S	M	S	S	S

S-Strong M-Medium L-Low