

UNIVERSITY OF MADRAS

M.Sc. DEGREE PROGRAMME IN COMPUTER SCIENCE

SYLLABUS WITH EFFECT FROM 2023-2024

Title of the Paper	Advanced Python Programming Practical		
Core–IV - Practical	I Year & I Semester	Credit:3	436C1D

Objectives:

Design, implement and test readable, efficient programs that take advantage of Python built-in capabilities and follow Python best practices.

Understand implementation differences and performance tradeoffs associated with various Python data structures.

Develop Python applications using the modules and packages available in the Python standard library.

Develop Python applications using third party libraries.

Design, implement and test Python programs that include a graphical user interface, data analysis and visualization, web data extraction and web applications.

Outcomes:

1.	Apply exception handling and user defined exception(s) Develop Module(s) and Package(s) in python	K1, K2
2.	Possess an ability to write database applications in Python	K1, K2
3.	Implement Object Oriented concepts in programming Apply Collection modules for the data types	K3, K4
4.	Possess the Object-oriented programming skills in Python. and the skill of to design graphical-user interfaces (GUI) in Python.	K4, K5
5.	Make use of Pandas and Numpy Libraries	K5, K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create		

1) Exception

- Write a python program to catch following exception i) Value Error ii) Index Error iii) Name Error iv) Type Error v) DivideZero Error
- Write a python program to create user defined exceptions.
- Write a python program to understand the use of else and finally block with try block.
- Write a python program that uses raise and exception class to throw an exception.

2) Numpy Library

- Create a numpy array from list, tuple with float type
- Python program to demonstrate slicing, integer and boolean array indexing
- Write a python program to find min, max, sum, cumulative sum of array.
- Write a python program to demonstrate use of ndim, shape, size, dtype.

3) Numpy Library: Linear Algebra

- Write a python program to find rank, determinant, and trace of an array.
- Write a python program to find eigenvalues of matrices
- Write a python program to find matrix and vector products (dot, inner, outer, product), matrix exponentiation.

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- d) Write a python program to solve a linear matrix equation, or system of linear scalar equations.
 - e) Create a white image using NumPy in Python and
 - f) Convert a NumPy array to an image and Convert images to NumPy array?
 - g) Perform Sorting, Searching and Counting using Numpy methods.
 - h) Write a program to demonstrate the use of the reshape() method.
- 4) Pandas Library
- a) Write a python program to implement Pandas Series with labels.
 - b) Create a Pandas Series from a dictionary.
 - c) Creating a Pandas DataFrame.
 - d) Write a program which make use of following Pandas methods i) describe() ii) head() iii) tail()
 - e) Write a program that converts Pandas DataFrame and Series into numpy.array.
 - f) Write a program that demonstrates the column selection, column addition, and column deletion.
 - g) Write a program that demonstrates the row selection, row addition, and row deletion.
 - h) Get n-largest and n-smallest values from a particular column in Pandas dataframe
- 5) Visualization
- a) Write a program which use pandas inbuilt visualization to plot following graphs: i. Bar plots ii. Histograms iii. Line plots iv. Scatter plots
 - b) Write a program to demonstrate use of groupby() method.
 - c) Write a program to demonstrate pandas Merging, Joining and Concatenating
 - d) Creating dataframes from csv and excel files.
- 6) Object Oriented Programming:
- a) Write a Python class named Person with attributes name, age, weight (kgs), height (ft) and takes them through the constructor and exposes a method get_bmi_result() which returns one of "underweight", "healthy", "obese"
 - b) Write a python program to demonstrate various kinds of inheritance.
 - c) Write a python program to demonstrate operator overloading.
 - d) Write a python program to create abstract classes and abstract methods.
- 7) MULTITHREADING
- a. Write a python program to create two threads to keep a count of number of even numbers entered by the user.
 - b. Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds.

Recommended Texts:

1. Martin C. Brown (Author), "Python: The Complete Reference" McGraw Hill Education, Fourth edition , 2018

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Reference Books:

1. R. Nageswara Rao , “Core Python Programming” Dreamtech Press India Pvt Ltd 2018.

Web References:

1. <https://realpython.com/tutorials/advanced/>
2. https://onlinecourses.nptel.ac.in/noc19_cs40/preview
3. https://onlinecourses.nptel.ac.in/noc19_cs41/preview

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	L	S	S	L	M
CO 2	S	L	S	L	S	L	M	M	M	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