INSTITUTE	**FACULTY OF COMPUTER APPLICATIONS**
PROGRAM	**MASTER OF SCIENCE (DATA SCIENCE)**
SEMESTER	**1**
COURSE TITLE	**PROGRAMMING FOR ANALYTICS**
COURSE CODE	**05MD0102**
COURSE CREDITS	**5**

Objective:

1. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
2. To learn the concepts of Object-Oriented Programming in Python.
3. To implement the concepts of Exception Handling and File Handling in Python.
4. To be able to understand the creation DB API in Python and use of Regular Expressions in python.
5. To implement and understand use of python Libraries for Data Science.

Course Outcomes: After completion of this course, student will be able to:

1. Ability to develop basic applications using various types of computational programs of python data structure and solve complex problems
2. Build their ability to develop Python Programs using Object-Oriented concepts
3. Develop understanding of Exceptions and File Handling in Python
4. Design a python application using the concepts of Regular Expression DB API
5. Ability to understand the basics of python libraries for Data Science.

Pre-requisite of course: Basics of Programming

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	4	50	30	20	25	25

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Contents : Unit	Topics	Contact Hours
1	**Introduction to Python** Introduction of Syllabus, Objects, expressions and numerical Types, Variables and assignments, Built-in Datatypes, Tuples, Lists, Dictionaries, Set, input function and type conversion, Strings and String Operations, Control Statements and Loop, User Defined Functions and various types of arguments , Positional, Keyword, Default, Variable Length, Returning multiple values from a function Local and Global Variables, The Global Keyword , Anonymous Functions or Lambdas Using Lambdas with filter, map and reduce function, Decorators, Generators	10
2	**Classes and Object-oriented Programming, Inheritance and Polymorphism and Abstract Classes and Interfaces** Classes: Creating a Class, The Self Variable, Constructor, Types of Variables, Namespaces, Types of Methods (Instance Methods, Class Methods, Static Methods), Passing Members of One Class to Another Class, Inner Classes, Special variables in python, Constructors in Inheritance Overriding Super Class Constructors and Methods, Types of Inheritance, Single Inheritance, Multiple Inheritance, Method Resolution Order (MRO), The super method, Polymorphism, Duck Typing Philosophy of Python, Operator Overloading, Method Overloading, Method Overriding, Abstract Method and Abstract Class, Interfaces in Python, Abstract Classes vs. Interfaces	10
3	**Exception Handling & Files** Exception Handling basics in python, All the basic keywords of exception in python, Custom exception in python, Modules in python, Files, Types of Files in Python, Opening a File, Closing a File, Working with Text Files Containing Strings, Knowing Whether a File Exists or Not, Working with Binary Files, The with Statement, Pickle in Python, the seek () and tell () Methods	10
4	**Regular Expressions & Python's Database** Regular Expressions, Sequence Characters in Regular Expressions, Quantifiers in Regular Expressions, Special Characters in Regular Expressions, , Using Regular Expressions on Files, Retrieving Information from a HTML File , Working with MySQL Connectivity Database, Using MySQL from Python, Retrieving All Rows from a Table, Inserting Rows into a Table, Deleting Rows from a Table, Updating Rows in a Table, Creating Database Tables through Python	10

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Contents : Unit	Topics	Contact Hours
5	**Python Modules for Data Science** Module (Library) installation procedure, Pandas' introduction and series, Introduction to DataFrames, Indexing in DataFrames, Masking and Boolean Indexing, Merging DataFrames, Creating DataFrames in various ways, Basic Operations on DataFrames data, Working with Missing data, Working with text data, Matplotlib Introduction, Scatter Plot, Line, Bar and Pie Chart, Histograms, Creating Subplots, Working with 3D Plots, Introduction to Numpy, Numpy Arrays, Special Arrays in Numpy, Basic operations in Numpy Arrays, Slicing and addressing arrays, , Array attributes, array creation routines, array from existing data, Array from ranges, Introduction to Scipy, Basic and special functions	10
Total Hours		**50**

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Python Practical (Unit -1 & Unit - 2)** 1. Implement basic Python programs for reading input from console. 2 .Solve problems using decision and looping statements. 3. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data type list, 4. Write a Python program to perform following operation on given string input: a) Count Number of Vowel in given string b) Count Length of string (do not use len()) c) Reverse string d) Find and replace operation e) check whether string entered is a palindrome or not. 5. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data type tuple, 6. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data type dictionary. 7. Write a program to create a function which accepts two numbers and one arithmetic operator. Return the answer accordingly., 8. Write a program to display the use of local, global variable and global keyword. 9. Write a program to make use of map(), filter() and reduce() functions with context to lambda functions., 10. Write a program to demonstrate the use of decorator and generator. 11. Write a program to create a simple class with 2 methods and execute both methods, 12. Write a program to create a class for student with RollNo, Name, Age, Gender and methods named AddStudent() and DisplayStudent(). 13. Write a program to make use of class method and instance method, 14. Write a program to make use of inner class. 15. Create a Temperature class. Create 2 methods named convertFarenheit() and convertCelsius()., 16. Write a Python Program that creates a class and inherit into another class (Base Class : Student with rollno, name, gender, age) (Derived Class : Course with coursename, duration, fee). 17. Use appropriate functions for each classWrite a program to display MRO using multiple inheritance. Multiple inheritance can be done as per your choice., 18. Write a program to create abstract class with one method. 19. Write a program to create interface and utilize the same in other class., Write a program to overload addition (+) and subtraction (-) (Use appropriate methods to overload the same.	20

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
2	**Python Practical (Unit -3 & Unit - 4)** 1. Working with modules in python 2. Handle Exceptions using Python Built-in Exceptions, 3. Python program to demonstrate the use of Custom Exception. 4. Python program to demonstrate the use of seek () and tell () methods in python, 5. Perform File manipulations- open, close, read, write. 6. Write a python program to append content in a file, 7. Write a python program to copy from one file to another file. 8. Create a module with 4 functions of your choice. Import and use the functions using module in different ways., 9. Write a program to read a file and display its contents. At the end it shall also display no. of words available in file.. 10. Write a python program to use with in files, Consider a student table with following columns for all database related programs (rollno, name, gender, age, email, mobile, city) 1) Write a program to display all the records of student table (make use of fetchone() method) 2) Write a program to display all the records of student table (make use of fetchall() method) 3) Write a program to search for particular student and display the details of student. If student is not found, related message shall be displayed 4) Write a program to insert the details of student in above table, 5) Write a program to update the details of student in above table 6) Write a program to delete the details of student in above table 7) Write a program to display only those records who have valid email address as their information. Use regular expression here. 8) Write a program to load all the records from table and display only those details where names start with “N” and has length of 5 characters., Write a program to demonstrate the use of quantifiers in regular expression 10) Write a program to demonstrate the use of special characters in regular expression	16
3	**Python Practical (Unit - 5)** Write a program to enter course and no. of students in each course. Display information using pie graph. The course with maximum students shall be displayed separately as a separate slice of pie graph. 2. Write a program to read above excel file and how many male and female students are there using bar graph, 3. Write a program to enter age of 50 students and create a histogram to display age as group of 0-10, 11-20, 21-30, 31-40, 41-50, 51-60, 60-120. 4. Write a program to load excel file and use dropna() and fillna() functions separately, 5. Write a program to enter the profit of 5 years and display the profit as line graph.. 6. Write a program to enter the name of 5 companies and its employee size and display as bar graph, 7. Write a program to demonstrate the use of special functions of Scipy 8. Write a program to demonstrate the use of Numpy arrays, 9. Write a program to demonstrate the use of various operations of numpy arrays 10. Write a program to demonstrate various operations of dataframe.	10
Total Hours		**46**

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Textbook :

1 Core Python Programming, R Nageswara Rao, Dreamtech Press,, 2015

References:

1 A Beginners Guide to Python 3 Programming, A Beginners Guide to Python 3 Programming, Hunt, John, Springer, 2018

2 Core Python Programming, Core Python Programming, Wesley J. Chun, Prentice Hall,, 2018

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking**
10.00	15.00	25.00	25.00	15.00	10.00

Instructional Method:

1 Demo

2 Board Work

3 PPT

Supplementary Resources:

1 https://www.python.org/

2 https://www.tutorialspoint.com/python/

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