SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Masters of Computer Applications

MCA Semester II

Subject Name: Python Programming and Data Science **Subject Code:** MTCA13204

Type of course: Professional Core Course

Prerequisite (if any): Basic concepts of Programming, Mathematics and Statistics

List of courses where this course will be prerequisite:

- Data Analytics
- Machine learning
- Data Visualization
- Internet of Things

Rationale: (should also include Description of the relevance of this course in the Program)

The recent trend in data storage and retrieval has generated a huge volume of information. The knowledge of Data Science will enable the student to know how to use the skills in Mathematics, Statistics, Programming, and other related subjects to organize large data sets. Then, the students can apply their knowledge to uncover solutions hidden in the data to take on business challenges and goals. Data Scientist is the most sought of job in the current era.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	4	5	60	25	15	60	40	200

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Content	Total Hrs.	Module Weightage
1	**Basics of Python** **The Basic Elements of Python**: Objects, expressions and numerical Types, Variables and assignments, IDLE, Branching programs, Strings and Input, and Iteration **Structured Types**: Tuples, Lists and Mutability, Functions as Objects, Strings, Tuples and Lists, Dictionaries	8	25
2	**Functions, Exception and File Handling** **Functions**: Difference between a Function and a Method, Function Handling, Returning Multiple Values from a Function, Pass by Object Reference, Types of arguments, Local and Global Variables, Passing a Group of Elements to a Function, Recursive Functions, Anonymous Functions or Lambdas (Using Lambdas with filter() Function, map() & reduce(), Function Decorators, Generators, __name__ variable **Exceptions**: Exceptions, Exception Handling, Types of Exceptions, The Except Block, The assert Statement, User-Defined Exceptions **Files**: 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	12	25
3	**Working with Python Libraries and Regular Expressions** **Libraries**: Introduction to NumPy, SciPy, Pandas, Matplotlib, Seaborn **Regular Expressions**: Regular Expressions, Sequence Characters in Regular Expressions, Quantifiers in Regular Expressions, Special Characters in Regular Expressions	11	20
4	**Python and Data Science** **Exploratory Data Science:** Creating Data Frame from .csv files, Excel spreadsheets, dictionaries and list, Various operations on Data Frames. Data Visualization with Matplotlib, Bar Graph, Histogram, Line Chart, Scatter Plot, Handling Missing Values. **Introduction to Classification and Case Study** **Introduction to Regression and Case Study**	14	30%

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	20	15	15	15	15

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Sr no	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Python Data Science Handbook: Essential Tools for Working with Data	Jake VanderPlas	O'Relly Media, ISBN : 978-1491912058	2016	-
2	Data Science From Scratch: First Principles with Python	Joel Grus	O'Relly Media, ISBN: 9781492041139	2019	2nd
3	Data Science with Python	Rohan Chopra, Aaron England,	Packt, ISBN: 9781838552862	2019	-
4	Machine Learning	Tom M. Mitchell	MGH		

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Ability to write programs in Python consisting of branches, loops and variables	15%
CO-2	Ability to understand Data Structures for Python	10%
CO-3	Ability to write Python functions to facilitate code reuse and handle exceptions	15%
CO-4	Ability to read and write files	10%
CO-5	Ability to understand the usage of Python Libraries	20%
CO-6	Ability to implement the concepts of Data Science	30%

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO-1	3	3	3	3	2	1	1	1	2	3	1	3			
CO-2	3	3	3	3	2	1	1	1	2	3	1	3			
CO-3	3	3	3	3	2	1	1	1	2	3	1	3			
CO-4	3	3	3	3	2	1	1	1	2	3	1	3			
CO-5	3	3	3	3	2	1	1	1	2	3	1	3			
CO-6	3	3	3	3	3	1	1	1	2	3	1	3			
Rationale*															

Rationale*: Explaining why it is matching this particular program outcome

List of Open learning website:

1. **NPTEL Course on Python for Data Science (https://nptel.ac.in/courses/106/106/106106212/)**
2. **E-Books References**
   a. **http://en.wikibooks.org/wiki/Python_Programming**
   b. **http://docs.python.org/release/3.0.1/tutorial/**
   c. **http://learnpythonthehardway.org/**
   d. **http://www.diveintopython.net/**
   e.

List of Open Source Software:

- Ubuntu with Python3

FOR LAB SESSIONS:

List of Experiments:

Sr. No.	Particulars
1.	Write a Python Program to Convert Celsius to Fahrenheit and vice –a-versa.
2.	Write a Python Program to Convert Decimal to Binary, Octal and Hexadecimal
3.	Write a program to make a simple calculator (using functions).
4.	Write a program in python to find out maximum and minimum number out of three user entered number.
5.	Write a program which will allow user to enter 10 numbers and display largest odd number from them. It will display appropriate message in case if no odd number is found.
6.	Write a Python program to check if the number provided by the user is an Armstrong number.
7.	Write a Python program to check if the number provided by the user is an Armstrong number.
8.	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 (donot use len()) c) Reverse string d) Find and replace operation e) check whether string entered is a palindrome or not
9.	Write a program in python to implement Fibonacci series up to user entered number. (Use recursive Function)

10.	Write a program in python to implement Factorial series up to user entered number. (Use recursive Function)
11.	Write a program in python to implement Salary printing file read operation. (File format: EmployeeNo, name, deptno, basic, DA, HRA, and Conveyance) should perform below operations. a) Print Salary Slip for given Employee Number b) Print Employee List for Given Department Number
12.	Write a program to create a regular expression to search for strings starting with m and having a total of 3 characters
13.	Write a program to create a regular expression to retrieve phone number, date of birth and email address of a person
14.	Implement a program to demonstrate classification problem.
15.	Implement a program to demonstrate regression problem.

Major Equipment Needed:

NA