



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



MCA I Semester 2

Subject Name: Python Programming and Data Science

Subject Code: MTCA23205

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) Teaching and Examination Scheme

TEACHING SCHEME				Theory Marks		Practical Marks		Total
L	T	P	C	TEE	CAT	TEP	CAP	
3	0	0	3	60	40	0	0	100

CAT: Continuous Assessment Theory comprised of CA1 and CA2 **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) **CAP:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course





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Content:

Sr. No.	Content	Teaching 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 Mutable and Immutable objects: Lists, Tuples and Dictionaries; Commonly used Functions on Lists, Tuples and Dictionaries. Passing Lists, tuples and Dictionaries as arguments to functions.	8	20%
2	Functions and Exception 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	10	25%
3	File Handling 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	5	10%





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4	Regular Expressions Regular Expressions: Regular Expressions, Sequence Characters in Regular Expressions, Quantifiers in Regular Expressions, Special Characters in Regular Expressions	6	15%
5	Python and Data Science Libraries: Introduction to SciPy, Pandas, Matplotlib, Seaborn, Exploratory Data Science: Creating DataFrame 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. Classification: Introduction and Case Study (e.g., KNN, Decision Trees) Regression: Introduction and Case Study (e.g., Linear Regression, Polynomial Regression)	16	30%

Suggested Specification table with Marks (Theory):

%Distribution of 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:





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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'Reilly Media a, ISBN : 978-1491912058	2016	1 st edition
2	Data Science From Scratch: First Principles with Python	Joel Grus	O'Reilly Media, ISBN: 9781492041139	2019	2 nd edition
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 After learning this subject, students will be able to	Marks % Weightage
CO-1	Write programs using basics of Python, including data types, variables, control flow, and working with mutable and immutable objects	20
CO-2	Write Python functions to facilitate code reuse and handle exceptions	25
CO-3	Implement file handling operations in Python, including reading/writing text and binary files, and utilizing modules like pickle for data serialization	10
CO-4	Leverage regular expressions for effective pattern matching and string manipulation in Python to solve practical problems	15
CO-5	Employ Python libraries (Pandas, Matplotlib) for data analysis, visualization, and the development of classification and regression models	30





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Mapping with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13
CO-1	3	2	3	3	1	2	2	1	2	2	1	1	2
CO-2	3	2	3	3	1	3	2	2	2	3	2	2	1
CO-3	3	2	3	3	1	2	1	2	3	1	1	1	1
CO-4	2	3	3	3	1	3	2	2	3	2	2	2	1
CO-5	3	3	3	3	1	3	3	2	3	2	2	2	1
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/>

List of Open-Source Software:

- Ubuntu with Python3

Major Equipment Needed: NA

