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

Integrated MCA II Semester - 4

Subject Name: Python Programming **Subject Code:** IMCA13405

Type of course: Professional Core Course

Prerequisite (if any):

- Understanding of Problem solving techniques using a programming language and basic data structures.
- Basic understanding of programming concepts, including variables, expressions, data types, and control flow.

List of Courses where this course will be prerequisite:

- Data Analytics
- Machine learning
- Data Visualization
- Internet of Things.
- Artificial Intelligence

Rationale:

This course introduces students to Python programming, a versatile language widely used in fields like web development, data science, and AI. It covers essential programming concepts such as data structures, control flow, string manipulation, and file handling, including working with CSV and JSON files. With a focus on libraries like NumPy for scientific computing and exception handling for robust applications, the course equips students to apply Python skills to real-world problems in data science, machine learning, IoT, and more, laying the foundation for advanced studies in these areas.

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	-	-	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

Content:

Sr. No.	Content	Teaching Hrs.	Module Weightage
1.	**Introduction to Python, Strings** **Introduction**: History and Application areas of Python; Structure of Python Program; Identifiers and Keywords; Operators and Precedence; Basic Data Types and type conversion; Statements and expressions; Input/Output statements. **Strings**: Creating and Storing Strings, Built-in functions for strings; string operators, String slicing and joining; Formatting Strings.	5	12%
2.	**Control Flow Statements and Mutable and Immutable objects:** **Conditional Flow statements:** Loop Control Statements; Nested control Flow; continue and break statements, continue, Pass and exit. **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. Using Math and Numpy modules for lists of integers and arrays.	12	26%
3.	**Functions and Regular Expressions:** **Functions:** Built-In Functions, Function Definition and call; Scope and Lifetime of Variables, Default Parameters, Command Line Arguments; Lambda Functions; Assert statement; Importing User defined module; **Regular Expressions:** Regular Expressions, Sequence Characters in Regular Expressions, Quantifiers in Regular Expressions, Special Characters in Regular Expressions	12	26%
4.	**Files and Exception Handling:** **Files:** Types of Files; Creating, Reading and writing on Text and Binary Files; The Pickle Module, Reading and Writing CSV Files. Reading and writing of csv and JSON files. **Exception Handling:** Try-except-else-finally block, raise statement, hierarchy of exceptions, adding exceptions.	10	23%

5.	**Data visualization, Data manipulation and Analysis:** **Data visualization:** Plotting various 2D and 3D graphics; Histogram; Pi charts; Sine and cosine curves using matplotlib module, Introduction to CGAL via Python Bindings, Combine CGAL with matplotlib for 2D visualizations, openCV for real time plotting **Data manipulation and Analysis**: Handling of datasets using pandas	**6**	**13%**

Suggested Specification table with Marks (Theory):

%Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
33	20	33	14	0	0

Legends: R: Remembrance, U: Understanding; A: Application, N: Analyze, 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 \Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Introduction to Python Programming	Venkatesh, Nagaraju Y	Khanna Publishing House	2021	1st edition
2	Introduction to Computing & Problem Solving With PYTHON	Jeeva Jose	Khanna Publishing House	2023	2nd edition
3	Python Programming a Modular approach	SheetalTaneja& Naveen kumar	A Modular approach with Graphics, Database, Mobile and Web applications	2017	1st edition
4	Think Python	Allen Downey	O'Reilly	2015	2nd edition
5	An introduction to Python for absolute beginners	Bob Dowling, Cambridge Univ.	Khanna Publishing House	-	1st edition
6	Introduction to Computation and Programming using Python	John Guttag	PHI India.	2016	3rd edition

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % Weightage
CO-1	Understand and explain Python's basic syntax, keywords, data types, and operators to write simple Python programs	12
CO-2	Apply decision-making and looping constructs to control the flow of execution in Python programs	10
CO-3	Manipulate and process data effectively using Python's built-in data structures such as strings, lists, tuples, and dictionaries	16
CO-4	Develop reusable and modular programs using user-defined functions, function arguments, and lambda expressions	26
CO-5	Implement file handling operations for data storage and processing	12
CO-6	Apply exception handling mechanisms to develop robust and error-free Python programs	11

CO-7	Visualize, manipulate, and analyze data effectively using libraries like Matplotlib, Pandas, CGAL, and OpenCV for real-time plotting and computational geometry applications.	13

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO 12	PO 13
CO-1	3	2	1	1	0	0	1	0	0	1	0	0	0
CO-2	3	2	2	1	0	0	1	0	0	1	0	0	0
CO-3	3	2	3	2	2	0	2	0	0	1	0	0	0
CO-4	3	2	3	3	2	0	2	0	0	1	0	0	0
CO-5	3	2	3	3	3	2	2	0	0	1	0	0	0
CO-6	3	2	3	3	3	3	2	0	0	1	0	0	0
CO-7	3	3	3	3	3	3	3	2	2	1	2	2	2
Rationale*													

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

List of Open Source/learning website:
https://www.learnpython.org/
https://www.w3schools.com/python/default.asp

List of Open-Source Software: NA

Major Equipment Needed: NA