

Course Code	Course Name	Group	Teaching Scheme (Hrs/Week)		Credits
			Lectures	Practical	
RJSPGITDSAI1P1	Professional Elective – I: Python for Data Science	PE	3	-	3
Course Objectives <ol style="list-style-type: none"> 1. To learn the concepts of python programming. 2. To provide in-depth knowledge of python. 3. To learn how to build and create programs for various applications in data science, Data Analysis, Data analysis. Learning Outcomes <p>Upon completion of this course, the student should be able to</p> <ol style="list-style-type: none"> 1. Create the programs in python for different applications. 2. Perform cleansing on data and various functions and classes. 3. Enable students to program in object-oriented programming. 					
Unit	Topics	Lectures			
Unit I	Introduction to Python Introduction to Python, Python: Keywords, Identifiers, Statements, Comments, Syntax and Indentation, Variables, Basic Data Types: Text (string/str), Numeric (int, float and complex), Boolean (bool), and None (NoneType), Type Casting, Exceptions, Python Operators, Python Date and Time, Python Input and Output Statements, Using Python Modules: import Statement and from...import Statement, Namespaces and Scoping. Python Flow Controls If-else Statement, for Loop, while Loop, continue and break statements, pass Statement. Python Data Structures: Built-in Data Structures: Sequence (list, tuple and range), Mapping (dictionaries/ dict), Set(set and frozen set), Binary (byte, bytearray and memoryview), User-Defined Data Structures: Array Data Structures - Array, Maps and Hash Tables, Records, Structs, Linked List, Heaps, Stacks, Queues and Trees. Python File Handling File formats: dat, txt, csv, tsv, xml and JSON, Opening and Closing Files: open() and close() Methods, Reading and Writing Files: read(), write() Methods, Renaming and Deleting files: rename() and remove() Methods.	10			

Unit II	<p>Python Functions Functions and arguments, Built-in Functions, User Defined Function, Static Variables, Global Local Functions, Recursive Functions, Global Keywords, Modules and Packages.</p> <p>Python Object Oriented Programming Introduction of Object Oriented Programming, Class, Object, Encapsulation, Inheritance, Polymorphism, Data Abstractions, Method Overloading and Overriding, Iterators, Operator Overloading.</p> <p>Exception Handling Python Assertions: assert statement, Difference between Syntax Error and Exception, Handling Exceptions: try-except Statement, try-except-else Statement, except Clause with Multiple Exceptions, try-finally Clause, Argument of an Exception, Raising an Exception: raise Statement.</p>	10
Unit III	<p>Advance Python Programming Regular Expressions, Abstract Classes, Constructors and Destructors, Decorators and Generators, Magic methods, Map, Flatmap and Lambdas, Web Scraping using Python libraries like BeautifulSoup, OS Module.</p> <p>Python Module: Numpy Numpy Arrays, Aggregation Functions, Array: Indexing, Slicing, Copying, Shaping, Reshaping, Splitting, Searching, Sorting and Filtering Operations, Array Iterations, Random Functions.</p> <p>Python Module: Pandas Pandas objects: Series, Dataframe and Index, Dataframe Operations: Descriptive Statistics, Filtering, Sorting, Subsetting Rows and Columns, Merge, Joins, Add and Remove Columns, Summarizing, Grouping Data, Pivot Tables, Data Preparation, Data Mining: Data Cleansing(Identifying and Correcting Obvious Errors), Data Imputation: Identifying and Correcting Null/Missing values, Rescaling - Normalization and Regularization, Covariance and Correlation, Outliers Detection, Vectorized String Operations, Report Generation.</p>	10

Unit IV	<p>Visualization in Python Introduction to Visualisation Libraries: Matplotlib, Seaborn and Bokeh, Introduction to Pyplot, Subplots, Formatting style of the Plot: Markers, Line, Labels axes, colors and Grid, Plotting with keyword Strings, Plotting with Categorical Variables, Understanding Charts: Scatter Plot, Gantt Chart, Heat Map, Box and Whisker Plot, Waterfall Chart, Area Chart, Pictogram Chart, Timeline, Highlight Table, Bullet Graph, Choropleth Map, Formatting Charts, Word Cloud, Network Diagram, Correlation Matrices.</p> <p>Introduction to API Introduction to Application Programming Interface, Types of Requests and Response Codes, Make a Get Request, Request Parameters, Extract and Display JSON Data from an API.</p> <p>Building and sharing applications using Streamlit Streamlit installation, Data Modeling and Data Flow, API Reference: visualize, mutate, and share data, Creating and deploying app.</p>	10
<p>References</p> <ol style="list-style-type: none"> 1. The Python Language Reference Manual, Guido Van Rossum, Fred L. Jr. Drake, Published By Network Theory Ltd. 2. Python: The Complete Reference Book by Martin Brown and Martin C. Brown. 3. Python in nutshell Book by <u>Alex Martelli</u>, <u>Anna Ravenscroft</u>, <u>Steve Hold</u> 4. Python for Data Analysis: Data Wrangling with pandas, NumPy, and IPython, Wes McKinney 5. “Programming Python, Book by Mark Lutz. ” 6. “Fluent Python, Book by Luciano Ramalho.” 7. “https://www.w3schools.com/python/default.asp” 		