FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF

CIVIL ENGINEERING

Marwadi University Marwadi Chandarana Group NAAC A+

Python for Data Analysis

01CI0817

Objective of the Course:

- To develop proficiency in creating based applications using the Python Programming Language.
- To understand the various data structures available in Python programming language
- To draw various kinds of data visualization techniques using PyLab, matplotlib and Pandas
- To perform file operations to read and write data in files

Credit Earned: 03

Prerequisite: Basics of Computer Programming

Student's learning outcomes:

After successful completion of the course, it is expected that students will be able to,

1. Understand Python syntax and its Python control flow statements
2. Apply Python programming to solve various problems including data analytics and visualization.
3. Learn methods to create and manipulate Python programs by utilizing the data structures.
4. Use various data visualization for effective interpretations and insights of data.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
02	00	02	03	50	30	20	25	25	150

Detailed Syllabus

Sr. No	Topic name	Hours
1	**Introduction to Python**	**05**
	1.1 Installation and working with python, Introduction of anaconda, jupyter notebook, Google colab Features, Python Interpreter and its working, Need of python.	03
	1.2 Role of python in Data science, machine learning and DL, Syntax and Semantics, Python variables, immutable variables and Blocks	02
2	**Python Data Types and Program Flow Controls:**	**08**
	2.1 Data Types, Declaring and using Numeric and string data type, string operations, Assignments, Operators, Expressions, Comments	04
	2.2 Conditional blocks using if, else and elif, Simple For loop, For loop using Ranges, While loops, Loop manipulation using Pass, Range Function in loop Continue, Break and Else	04
3	**Python Functions and Data Structures:**	**08**
	3.1 Organizing python codes using functions and Modules, Import modules, Pre-defined Functions, User Defined Functions math, date and other Functions	02
	3.2 Introduction to String, Operations on String, List, operations on list, Tuple, operations on tuple and Dictionary, operations on dictionary, working with in-built methods of String and List, Tuple and Dictionary manipulation using in-built methods	02
4	**Exception Handling and File Handling**	**09**
	4.1 Exception, Types of errors, Handling an exception, try, expect, else, try-finally clause, Argument of an Exception, Raising an Exception	03
	4.2 Files, Types of Files in python, Read and Write functions, Working with Text Files, Manipulating file pointer using Seek and Tell and various File Operations	06
5	**Classes, Objects and Regular Expressions, Data Analytics and Visualization**	**12**
	4.1 Creating Classes and Objects, Instance Variables, Access Specifiers, Importance of self, __init()__Method, Instance Method, Class Method.	04
	4.2 Regular Expressions, Match function, Search function, Matching vs Searching, Wildcard, Connecting with database.	04
	4.3 NumPy Library – Introduction and Installation of NumPy, NumPy Arrays, Array creation using built-in functions, Attributes and Methods, Array manipulation, Indexing and Iterating	04
	TOTAL	**42**

List of Practicals

Sr. No	Topic name

1	Develop programs to understand the control structures of python
2	Develop programs to learn different types of structures (list, dictionary, tuples) in python
3	Develop programs to learn concept of functions scoping, recursion and list mutability.
4	Use conditional statements and loops in Python programs
5	Develop programs to understand working of exception handling and assertions.
6	Develop programs for data structure algorithms using python – searching, sorting and hash tables.
7	Develop programs to learn regular expressions using python.
8	Develop chat room applications using multithreading.
9	Learn to plot different types of graphs using PyPlot.
10	Implement classical ciphers using python.
11	Draw graphics using Turtle.
12	Create simple visualizations, like charts and graphs,
13	Understand the Pandas and Numpy library for data analytics operation
14	Write a program to read CSV file and generate output using HTML table.

Suggested Theory Distribution

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

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
05%	25%	30%	15%	15%	10%

Instructional Method and Pedagogy:

1 Prerequisites of the course and its pattern shall be discussed at the commencement of the course.
2 Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.
3 A minimum of two internal exams will be conducted and an average of two will be considered as a part of a 15% overall evaluation.
4 At the end of each unit/topic, an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work.
5 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

6 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

7 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

8 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Recommended Study Material

1. Brown, Martin C. Python: The Complete Reference. United Kingdom, Osborne/McGraw-Hill, 2001.
2. E.Balagurusamy Introduction to Computing and Problem Solving Using Python. United Kingdom, Osborne/McGraw-Hill, 2017.
3. Publishing, Nexcod. Python: A Beginners Complete Reference Guide to Learn The Python Programming Language. N.p., Independently Published, 2019.
4. VanderPlas, Jake. Python Data Science Handbook: Essential Tools for Working with Data. United States, O'Reilly Media, 2016.
5. McKinney, Wes. Python for Data Analysis. Taiwan, O'Reilly Media, Incorporated, 2013.
6. Stephenson, Ben. The Python Workbook: A Brief Introduction with Exercises and Solutions. Germany, Springer International Publishing, 2019.

Web Links:

- https://nptel.ac.in/courses/106/106/106106145/\
- https://onlinecourses.swayam2.ac.in/aic20_sp33/preview
- https://nptel.ac.in/courses/106/106/106106182/
- https://nptel.ac.in/courses/106/106/106106212/
- https://www.python.org/
- https://www.kaggle.com/learn/python