COURSE TITLE	**PROGRAMMING WITH PYTHON**
COURSE CODE	**01AI0302**
COURSE CREDITS	**4**

Objective:

1. Understand the basic programming construct of python
2. The course will cover theory as well as practical aspects of a subject through scheduled lectures and labs, course will cover the need of python.
3. The course will cover how python programming constructs are used to solve problems easily and effectively
4. It covers conditional and looping statements, functions, exceptional handling, file handling ,OOP Concepts
5. Student will understand the basic programming construct of python. The course will cover theory as well as practical aspects of a subject through scheduled lectures and labs, course will cover the need of python, role of python in Data Science, Machine Learning, etc. The course will cover how python programming constructs are used to solve problems easily and effectively, It covers conditional and looping statements, functions, exceptional handling, file handling ,OOP Concept,RE and data analytics and visualization also.

Course Outcomes: After completion of this course, student will be able to:

1. Understand the programming constructs of python in order to solve problems effectively (Understanding)
2. Compare other language programming constructs and python programming in order to understand the simplicity and efficiency. (Evaluate)
3. Apply python programming in order to solve various problems including data analytics and visualization. (Apply)
4. Create object-oriented solution by applying various concept like polymorphism, inheritance and package with python programming(Apply)
5. Analyse different deep learning models in Image related projects. (Analyse)

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

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Contents : Unit	Topics	Contact Hours
1	**Introduction to Python** Installation and working with python, Introduction of anaconda, jupyter notebook, Google colab Features, Python Interpreter and its working, Need of python ,Role of python in Data science, machine learning and DL, Syntax and Semantics, Python variables, immutable variables and Blocks	5
2	**Python Data Types and Program Flow Controls** Data Types, Declaring and using Numeric and string data type, string operations, Assignments, Operators, Expressions, Comments 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	8
3	**Python Functions and Data Structures** Organizing python codes using functions and Modules, Import modules,Pre-defined Functions, User Defined Functions math, date and other Functions 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	8
4	**Exception Handling and File Handling** Exception, Types of errors, Handling an exception, try, expect, else, try-finally clause, Argument of an Exception, Raising an Exception 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	9
5	**Classes, Objects and Regular Expressions** Creating Classes and Objects, Instance Variables, Access Specifiers, Importance of self, , __init()__Method, Instance Method, Class Method, Regular Expressions, Match function, Search function, Matching vs Searching, Wildcard, Connecting with database	6
6	**Data Analytics and Visualization** NumPy Library – Introduction and Installation of NumPy, NumPy Arrays, Array creation using built-in functions, Attributes and Methods, Array manipulation,Indexing and Iterating Pandas Library – Introduction to Pandas, Pandas Series, Data Frame, Importing and Exporting data with Excel files, Manipulating a Data Frame, Handling missing values, Scaling, Visualization – Introduction to Matplotlib, Types of Charts, Legends, annotations and style, Plotting directly from Pandas Data Frame and NumPy Arrays	9
Total Hours		**45**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical 1** To study for the installation of Anaconda, jupyter notebook and Configuration of Google Colab Environment	2

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
2	**Practical 2** Program to demonstrate different number datatypes in python	2
3	**Practical 3** Program that uses for loop to print all the odd numbers in the range input by user	2
4	**Practical 4** Program to create, concatenate and print a string and accessing substring from a given string	2
5	**Practical 5** Python program to create, append and remove lists in python.	2
6	**Practical 6** Program to demonstrate working with tuples in python	2
7	**Practical 7** Program to demonstrate working with dictionaries in python	2
8	**Practical 8** Python program to map two lists into a dictionary	2
9	**Practical 9** Python program to count the frequency of words appearing in a string using a dictionary	2
10	**Practical 10** Program to demonstrate the File handling functionality in python	2
11	**Practical 11** Python program to read the contents of a file in reverse order	2
12	**Practical 12** Python program to demonstrate matrix operations using numpy library	2
13	**Practical 13** Program to implement all the import and data handling functionalities of Pandas library in Python	2
14	**Practical 14** Program to implement all the 2D visualization functionalities of MatPlotLib in Python	2
Total Hours		**28**

Textbook :

1 Introduction to Computing and Problem Solving with Python, Jeeva Jose and P. Sojan Lal., -, -

2 Python: The Complete Reference , Martin C. Brown, -, -

3 Python for Data Analysis, Wes McKinney, -, -

References:

1 Brown, Martin C.. Python: The Complete Reference, Brown, Martin C.. Python: The Complete Reference, -, Osborne/McGraw-Hill, 2001

Suggested Theory Distribution:

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

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
20.00	25.00	25.00	15.00	15.00	

Instructional Method:

1. 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.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1. https://nptel.ac.in/courses/106/106/106106145/
2. https://onlinecourses.swayam2.ac.in/aic20_sp33/preview
3. https://nptel.ac.in/courses/106/106/106106182/

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