Course Code	Course name	L	T	P	C
CSEG1035	Python Programming	2	0	0	2
Total Units to be Covered: 06		Total Contact Hours: 30			
Prerequisite(s):		Syllabus version: 1.0			

Course Objectives

1. Develop a strong foundation in Python programming language, including syntax, data types, control structures, and functions, enabling students to write efficient and reliable code.
2. Understand and apply object-oriented programming (OOP) principles in Python to design and build modular, reusable, and maintainable software solutions.
3. Gain proficiency in utilizing Python libraries and modules for tasks such as data manipulation, web scraping, data analysis, and visualization, empowering students to work with real-world data effectively.
4. Explore advanced topics in Python, including concurrency, file I/O, exception handling and equipping students with the skills to build robust and scalable applications.

Course Outcomes

CO1. Demonstrate proficiency in Python programming by writing code that adheres to Python syntax, utilizes appropriate data types, and implements control structures effectively.

CO2. Apply Python collections, such as lists, tuples, dictionaries, and sets, along with the design and implementation of reusable functions, to solve complex programming problems, demonstrating proficiency in data organization, manipulation, and modular code design.

CO3. Implement advanced Python features and techniques, such as modules and packages, file handling, exception handling and regular expression to create robust and reliable applications.

CO4. Apply object-oriented programming (OOP) concepts in Python to design and develop modular software solutions that promote code reusability and maintainability.

CO5. Utilize Python libraries and modules for data manipulation, analysis, and visualization, demonstrating the ability to work with real-world data sets and extract meaningful insights.

CO-PO Mapping

Program Outcomes / Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	-	-	-	-	2	-	-	-	-	-	-	-	2	1	-
CO 2	-	-	-	-	2	-	-	-	-	-	-	-	2	1	-
CO 3	-	-	-	-	2	-	-	-	-	-	-	-	2	1	-
CO4	-	-	-	-	2	-	-	-	-	-	-	-	2	1	-
CO5	-	-	-	-	2	-	-	-	-	-	-	-	2	2	-
Average	-	-	-	-	2	-	-	-	-	-	-	-	2	1.2	-

1 – Weakly Mapped (Low) **2 – Moderately Mapped (Medium)**

3 – Strongly Mapped (High) **"_" means there is no correlation**

Syllabus

Unit I: Introduction to Python **6 Lecture Hours**

Introduction, Working with Python, Interactive mode and Scripting mode, Dynamic Types, Mutable and immutable data types, Basic Syntax, Comments, String Values, String Methods, The format Method, String Operators, Numeric Data Types, Input & Output functions, Escape sequence characters, Python Tokens (Keyword, identifier, special symbols, literals, constants, operators), Naming Conventions, Operators (Arithmetic, relational, logical, assignment, bitwise, membership, identity), Operators precedence and associativity, Type function and id function, Indentation, Decision Making Statements (if, if else, elif, nested if, match statement), range function, looping structures (while loop, for loop), break, continue, pass statement, else in loops, nested loops.

Unit II: Collections and Functions **5 Lecture Hours**

String initialization, String Operators, String functions, indexing, slicing, split() function, List initialization, List methods, List operations, indexing, slicing, list comprehension, Nesting in lists, tuple initialization, tuple methods, tuple operations, nesting in tuple, List vs Tuple,Set initialization, Set methods, Set operations, Dictionary initialization, Dictionary methods, nesting in Dictionary, Sorting data collections, typecasting collections, Applications of collections, Introduction, Defining user defined function, Parameters, Function Documentation, Keyword and Optional Parameters, default argument, Variable length Arguments, Scope, Passing Collections to a Function, Passing Functions to a Function, Recursion, map, filter, Lambda function, Inner Functions, Passing mutable and immutable datatypes in functions

Unit III: Module, Packages and Regular Expressions **4 Lecture Hours**

Introduction to modules and packages, creating modules and packages, Standard Modules – sys, math, time, os, Need for Regular Expressions, Regular Expression Functions (match, search, sub, findall, finditer), Meta characters, Character Class, Groups

Unit IV: File and Exception Handling **4 Lecture Hours**

File Access Modes, File handling Functions, Writing Data to a File, Reading Data from a File, Additional File Methods, With Statement, Working with Directories, Applications of File Handling, Errors vs Exceptions, The Exception Model, Exception Hierarchy, Exception Handling (try, except, else, finally), Handling Multiple Exceptions, raise, assert.

Unit V: Class and Objects in Python **5 Lecture Hours**

OOP Concepts, Classes in Python, Creating Classes and Objects, methods in classes, Constructor, Special Methods in classes, Class Variables and Object Variables, Public and Private data members, Built-in Class Attributes, Garbage Collection, Abstract class, Inheritance, types of inheritance, Polymorphism (Function overriding, operator overloading)

Unit VI: Data Analysis and Visualization **6 Lecture Hours**

Numpy – Overview, numpy Ndarray, Datatypes, Array creation, List vs Array, numpy attributes, numpy operations, Numpy Broadcasting, Numpy Functions (String,

mathematical, statistical, sorting and searching), Numpy Special functions (reshape(), sum(), random(), zeros(), ones(), mean(), dot(), std(), empty(), arange(), numpy.linspace())

Pandas – Overview, Pandas Data Structures: Series and Data Frame, Operations on a Series (head, tail, vector operations), Data Frame operations(create, display, iteration, select column, add column, delete column), Binary operations in a Data Frame (add, sub, mul, div), Matching and broadcasting operations, Handling Missing data and filling values, Data Aggregation, Comparisons, Boolean reductions, comparing Series, Combining Data Frames, Importing/Exporting Data between CSV files and Data Frames.

Matplotlib- Introduction, Matplotlib Pyplot, Plotting, markers, Line, Labels, Grid, Customizing plots, Creating Different Types of Plots (Line Graph, Bar chart, Histograms, Scatter Plot, Pie Chart), Creating and working with Subplots

Total lecture Hours 30

Textbooks

1. Martin C. Brown, "Python: The Complete Reference", 4th Edition, McGraw Hill, 2018.

2. Paul Barry, "Head First Python", 2nd Edition, O'Reilly, 2016.

Reference Books

1. Luciano Ramalho, "Fluent Python", 2nd Edition, Learning Python Series, O'Reilly, 2015.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme

Components	IA	MID SEM	End Sem	Total
Weightage (%)	50	20	30	100