



COURSE CODE	COURSE NAME	CATEGORY	L	T	P	R	CREDIT	YEAR OF INTRODUCTION
23CST362	PROGRAMMING IN PYTHON	PEC	2	1	0	0	3	2023

Preamble :

The objective of the course is to equip the learners to develop multi-module software solutions for real world computational problems using Python. It encompasses the Python programming environment, syntax, data representations, intermediate level features, GUI programming, Object Oriented Programming and data processing. This course lays the foundation to develop modular software solutions including complex interactive applications, network applications, and data-driven intelligent applications.

Course Outcomes(CO): Upon successful completion of this course, students should be able to:

CO1	Understand and apply basic Python programming constructs including variables, expressions, and control statements using appropriate programming environments.
CO2	Develop modular Python programs using functions and built-in data structures such as lists, tuples, dictionaries, and sets to solve real-world problems.
CO3	Create simple graphical and GUI-based applications using event-driven programming in Python.
CO4	Apply object-oriented programming concepts such as classes, inheritance, and exception handling to design structured Python programs
CO5	Analyze and process data using Python libraries such as NumPy, Pandas, and Matplotlib for basic data visualization and manipulation tasks.

Mapping of course outcomes with program outcomes

[illegible]

Assessment Pattern :

Blooms Category	Continuous Assessment Tests		End Semester Examination Marks
	Test 1 (Percentage)	Test 2 (Percentage)	
Remember	30	30	30
Understand	50	40	40
Apply	20	30	30
Analyze			
Evaluate			
Create			

Mark distribution :

Mark Distribution Total Marks CIE Marks ESE Marks ESE Duration
 150 50 100 3

Continuous Internal Evaluation Pattern :

Attendance 10 marks
 Continuous Assessment Tests 25 marks
 Continuous Assessment Assignment 15 marks

End Semester Examination Pattern (3 Hours)

Part	Total Qns	No. of Qns to be answered	Marks
Part A	10	10	3
Part B	10	5	14
Total Marks			100

Book of Study :

1. Kenneth A Lambert., Fundamentals of Python : First Programs, 2/e, Cengage Publishing, 2016
2. Wes McKinney, Python for Data Analysis, 2/e, Shroff / O'Reilly Publishers, 2017
3. Julia Elman, Mark Lavin, Lightweight Django, First Edition , O'Reilly Publishers

Syllabus

Module 1: Programming Environment and Python Basics (6 Hours)

Getting started with Python programming – Interactive shell, IDLE, iPython Notebooks Detecting and correcting syntax errors, How Python works The software development process – A case study Basic coding skills – strings, assignment, and comments, Numeric data types and character sets, Expressions Using inbuilt functions and modules Control statements – Iteration with for/while loop Formatting text for output, A case study Selection structure (if-else, switch- case) Conditional iteration with while, A case study Testing control statements Lazy evaluation.

Module 2: Building Python Programs (8 Hours)

Strings and Text Files - Strings and text files – Accessing characters, substrings Data encryption Strings and number system String methods Text files, A case study on text analysis. Design with Functions - Functions as Abstraction Mechanisms Problem solving with top-down design Design with recursive functions Managing a program's namespace Higher-Order Functions. Data Representations - Lists - Basic list Operations and functions, List of lists, Searching and sorting list, List comprehension Slicing, Work with tuples. Sets. A case study with lists Dictionaries - Dictionary functions, dictionary literals, adding and removing keys, accessing and replacing values, traversing dictionaries, reverse lookup .

Module 3: GUI (8 Hours)

GUI - Event-driven programming Coding simple GUI-based programs : Windows, Labels, Displaying images, Input text entry, Popup dialog boxes, Command buttons, A case study .Exception Handling - Handle a single exception, handle multiple exceptions..

Module 4: Object Oriented Programming (6 Hours)

Design with Objects and Classes - Objects and Classes Methods, Instance variables Constructor Accessor and Mutator Data-Modeling Examples, Structuring classes with inheritance and polymorphism Abstract classes Interfaces.

Module 5: Data Analysis (8 Hours)

Numpy - NumPy - Basics Creating arrays Arithmetic Slicing Matrix Operations Random numbers. Plotting and visualization - Matplotlib - Basic plot Ticks, Labels, and Legends. Pandas - Working with CSV files Reading, Manipulating, and Processing Data.

Module i: Industry, Innovation, and Emerging Technologies / Indian Knowledge System /Sustainable Development Goals

Django - Hello Django Stateless Web Application Building a Static Site Generator Building REST API Client-Side Django with Backbone.js Single Page Web application .

Course Contents and Lecture Schedule

Sl. No	Topic	No. of Lectures
Module 1: Programming Environment and Python Basics		(6 Hours)
1.1	Getting started with Python programming – Interactive shell, IDLE, iPython Notebooks; Detecting and correcting syntax errors, How Python works; The software development process – A case study; Basic coding skills – strings, assignment, and comments, Numeric data types and character sets, Expressions; Using inbuilt functions and modules; Control statements – Iteration with for/while loop; Formatting text for output, A case study; Selection structure (if-else, switch- case); Conditional iteration with while, A case study; Testing control statements; Lazy evaluation	
Module 2: Building Python Programs		(8 Hours)

2.1	Strings and Text Files Strings and text files – Accessing characters, substrings;Data encryption;Strings and number system;String methods;Text files, A case study on text analysis	
2.2	Design with Functions Functions as Abstraction Mechanisms;Problem solving with top-down design;Design with recursive functions;Managing a program's namespace;Higher-Order Functions	
2.3	Data Representations Lists - Basic list Operations and functions, List of lists, ;Searching and sorting list, List comprehension ;Slicing, ;Work with tuples. Sets.;A case study with lists;Dictionaries - Dictionary functions, dictionary literals, ;adding and removing keys, accessing and replacing values, ;traversing dictionaries, reverse lookup	
Module 3: GUI		(8 Hours)
3.1	GUI Event-driven programming;Coding simple GUI-based programs : Windows, Labels, ;Displaying images, Input text entry, ;Popup dialog boxes, Command buttons, A case study	
3.2	Exception Handling Handle a single exception, ;handle multiple exceptions.	
Module 4: Object Oriented Programming		(6 Hours)
4.1	Design with Objects and Classes Objects and Classes;Methods, Instance variables;Constructor;Accessor and Mutator;Data-Modeling Examples,;Structuring classes with inheritance and polymorphism;Abstract classes;Interfaces	
Module 5: Data Analysis		(8 Hours)
5.1	Numpy NumPy - Basics;Creating arrays;Arithmetic;Slicing;Matrix Operations;Random numbers	
5.2	Plotting and visualization Matplotlib - Basic plot;Ticks, Labels, and Legends	
5.3	Pandas Working with CSV files;Reading, Manipulating, and Processing Data	
Module I: Industry, Innovation, and Emerging Technologies / Indian Knowledge System /Sustainable Development Goals (non-instructional hours)		
I.1	Django Hello Django ;Stateless Web Application ;Building a Static Site Generator ;Building REST API ;Client-Side Django with Backbone.js ;Single Page Web application	
Total Hours		36