Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Pharmacy College
Semester-I (B.pharm)

Subject: Basics of Python Programming for Pharmaceutical Sciences (BPHBP11351)

Type of course: Major (Core)

Prerequisite: B.pharm

Rationale: The pharmaceutical industry is rapidly advancing with the integration of technology, data science, and artificial intelligence (AI). To prepare budding pharmacists for these technological shifts, it is essential to introduce the fundamentals of Python programming and Artificial Intelligence (AI) at an early stage of their education.

Teaching and Examination Scheme:

Course Code	Course Title			Course Type
BPHBP11351	Basics of Python Programming for Pharmaceutical Sciences (Theory)			Core
Credit	Hours Per Week (L-T-P)			Max. Hours
	L	T	P	30
2	2	--	--	
Maximum Marks	SE			ESA
50	20			30

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Objectives:

The objectives of this course are to:

1. Introduce the fundamentals of Python programming for pharmaceutical sciences.
2. Develop basic programming skills using control structures, functions, and data structures.

3. Provide knowledge of data handling techniques for structured dataset management.
4. Familiarize students with data analysis tools such as NumPy and Pandas for healthcare datasets.
5. Enable students to visualize and interpret pharmaceutical data.

Course Content:

Unit No.	Topics	No. of Lectures
I	Introduction to Python programming • Installing Python and an Integrated Development Environment (IDE) [Jupyter Notebook, PyCharm, VS Code etc.], Advantages of IDEs over text editors. • Python variables and data types (integers, floats, strings, booleans), Type casting and basic operators (arithmetic, comparison, logical), Input and output operations. • Basic string operations and manipulation techniques. Introductionto standard libraries and third-party libraries, installing and uninstalling libraries.	**6 Hours**
II	Control Structures & Functions • Conditional statements (if, if-else, if-elif-else), nested conditions • Loops (for loop, while loop). • Break and continue statements. • Defining and calling functions, passing arguments and returning values. • Writing modular programs for simple pharmaceutical applications- dosage calculation and BMI calculation.	**6 hours**

III	Data Structures & File Handling • Lists, tuples, and dictionaries. • Indexing and slicing lists, basic operations on lists and dictionaries, string manipulation techniques. • Introduction to NumPy arrays, basic operations using NumPy (array creation, arithmetic operations). • Reading and writing CSV files. • Understanding structured healthcare datasets. • Importing small pharmaceutical datasets and performing basic data access and manipulation tasks.	**6 hours**
IV	Data Handling with Pandas • Introduction to Pandas library. • Pandas Series and DataFrame structures. • Reading CSV and Excel files-PK study datasets and ADR reports • Inspecting datasets using functions such as head(), tail(), info(), and describe(). • Data cleaning techniques and handling missing values. • Filtering and selecting data based on conditions. • Grouping data and performing aggregation functions.	**6 Hours**
V	Data Visualization with Matplotlib • Introduction to Matplotlib. • Creating line plots, histograms, scatter plots, and box plots. • Labeling axes, titles, and legends. • Create plots and visualize pharmaceutical datasets - concentration-time curves for oral and IV administration, ADR reporting rates across drugs, dissolution profiles. • Scientific interpretation of plots.	**6 Hours**

Suggested Specification table with Marks (Theory):35

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	40%	00	00	00

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Sr. No	Active Learning Activities	Marks
1	Faculty demonstrates a simple Python program (e.g., BMI or dosage calculation) and provides practice questions; students write the program, execute it, and submit the source code with output.	05
2	Faculty provides the topic "Role of Python in Pharmaceutical Sciences" and poster-making guidelines; students prepare a handmade/digital poster and submit it.	05
	Total	10

Course Outcome:

After learning the course, the students should be able to:	
CO1	Explain the fundamentals of Python programming, including variables, data types, operators, and libraries.
CO2	Analyze program logic using control structures and functions.
CO3	Organize, manipulate, and retrieve data using data structures and file handling techniques.
CO4	Analyze pharmaceutical datasets using Python libraries.
CO5	Visualize and interpret pharmaceutical data using graphical tools.

Recommended References *(Preferably Latest Editions)*:

1. Weiss, C.J., 2017. *Scientific Computing for Chemists with Python*. Available at: https://weisscharlesj.github.io/SciCompforChemists/notebooks/introduction/intro.ht ml
2. Perkovic, L., 2015. *Introduction to Computing Using Python: An Application Development Focus*. 2nd ed. Hoboken: Wiley.
3. Sweigart, A., 2025. *Automate the Boring Stuff with Python*. 3rd ed. Available at: https://automatetheboringstuff.com/
4. W3Schools, n.d. *Python Tutorial*. Available at: https://www.w3schools.com/python/

5. Datasets for Education and Research:

Mentors and students can access healthcare datasets from sources such as Kaggle (healthcare records), government agencies (healthdata.gov, WHO, https://www.data.gov.in/), and clinical trial registries (https://ctri.nic.in/, https://clinicaltrials.gov/). *Always use data responsibl*