Tulsiramji Gaikwad-Patil College of Engineering and Technology

Wardha Road, Nagpur- 441108

NAAC Accredited (A+ Grade)

An Autonomous Institute affiliated to RTMNU Nagpur

Second Year (Semester-IV) B.Tech. (CSE)

Course Code: BCS32425 Python for AI & Data handling (Honor)

Teaching Scheme	
Lectures	3 Hrs/week
Tutorial	-
Total Credit	3

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
CA	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of ESE: 03Hrs 00Min.	

Course Objective:

1	To understand Python basics, data types, functions, modules, and file handling
2	To apply Python data structures, NumPy, and Pandas for data manipulation.
3	To analyse data through visualization, exploratory analysis, and real-world datasets.
4	To implement data pre-processing, feature engineering, and basic machine learning workflows.
5	To develop AI-ready data pipelines using TensorFlow/Keras and automate data collection and cleaning

Course Contents

Unit I	**Overview of Python:** Features, Applications, and Setup, Python Basics: Data Types, Variables, Operators, Conditional Statements, Loops, Functions and Modules: Built-in Functions, Lambda Functions, Importing Modules, File Handling: Reading and Writing Text, CSV, JSON Files, Exception Handling and Debugging, Introduction to Jupyter Notebook / Google Colab.
Unit II	**Python Data Structures:** Lists, Tuples, Dictionaries, Sets String Operations and Comprehensions, NumPy: Arrays, Indexing, Slicing, Mathematical Operations, Broadcasting, Pandas: Series, DataFrame, Import/Export Data, Handling Missing Values, Filtering, Data Manipulation and Aggregation.
Unit III	**Introduction to Data Visualization, Matplotlib:** Line, Bar, Scatter, Histogram, and Pie Charts, Seaborn: Heatmaps, Pairplots, Distribution Plots, and Regression Plots, Exploratory Data Analysis (EDA): Summary Statistics, Correlation, and Outlier Detection, Real-World Dataset Visualization (Kaggle / UCI Datasets).
Unit IV	**Data Preprocessing:** Encoding, Normalization, Standardization, Splitting Data: Train-Test Split, Cross-Validation Feature Engineering: Feature Extraction, Selection, and Scaling, Introduction to Scikit-learn: Basic ML Workflow and Dataset Utilities, Simple Linear Regression and Model Evaluation Metrics.
Unit V	**Working with Real Datasets** (CSV, JSON, APIs, Web Scraping), Introduction to Data Pipelines Basics of TensorFlow and Keras for Data Handling, Automating Data Collection and Cleaning Tasks, Mini Project: Build a small AI-ready dataset and perform EDA + Visualization.

Text Books

T1	**Dr. Charles R. Severance**, *Python for Everybody*, CreateSpace.
T2	**Mark Lutz**, *Learning Python*, O'Reilly.

Reference Books

R1	**Aurélien Géron**, *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*, O'Reilly.
R2	**John V. Guttag**, *Introduction to Computation and Programming Using Python*, MIT Press.

Useful Links	
1	https://docs.python.org
2	https://numpy.org/doc/

Sr. no.	Course Outcomes	CL	Class Session
1	Understand Python programming, functions, modules, and file handling.	2	9
2	Apply data structures, NumPy arrays, and Pandas for data analysis.	2	9
3	Analyze and visualize datasets using Matplotlib, Seaborn, and EDA techniques.	5	9
4	Preprocess data, perform feature engineering, and implement basic ML models.	6	9
5	Build AI-ready datasets, automate data pipelines, and perform exploratory analysis	6	9

				Apr. , 2025	1.00	Applicable for AY 2025-26 Onwards
Chairman HOD	Dean Academics	Vice Principal (Academics)	Principal	Date of Release	Version	

of Computer Science & Engineering
ulsiramji Gaikwad Patil College of
Engineering & Technology, Nagpur

Vice Principal
(Academics)
G.H. Raisoni College of Engineering
Nagpur

Principal
G.H. Raisoni College of Engineering & Technology, Nagpur