Semester: VI	
Course Title: BUSINESS DATA ANALYTICS	
Course Code: C3BC230641P	**Credits: 4**
Classes/week : 4	**Marks: 100**
Category: Major (Core)	
Theory/Practical/Composite : Practical	
No. of Units : 4	

Course Overview: This course provides learners with a comprehensive understanding of Business Data Analytics using Python, covering core programming concepts, data manipulation, and analytical techniques for business applications. It introduces essential libraries such as NumPy, Pandas, and SciPy, along with data visualization tools like Matplotlib and Seaborn to interpret and communicate insights effectively. The course also examines the complete data lifecycle—from data collection and preprocessing to transformation and feature selection—ensuring reliable analysis. It further explores descriptive, predictive, and prescriptive analytics using statistical methods and machine learning models. Through hands-on applications across business domains, learners develop the ability to analyze real-world data and generate actionable insights for informed decision-making.

Course Outcomes: By the end of this course, learners will be able to:

CO1: **Recall** and **explain** fundamental Python programming concepts, including data types, control structures, functions, and data structures used in business data analytics.

CO2: **Use** Python libraries such as NumPy, Pandas and SciPy to perform data manipulation and basic statistical analysis.

CO3: **Demonstrate** and **construct** appropriate visual representations of business data using Matplotlib and Seaborn to communicate insights effectively.

CO4: **Analyze** datasets by performing data pre-processing techniques such as data cleaning, transformation, normalization, and feature selection using Scikit-learn.

CO5: **Analyze and evaluate** business data using descriptive, predictive and prescriptive analytical models including descriptive statistics, correlation, regression, classification, clustering and performance metrics to derive meaningful insights.

CO6: **Design** end-to-end business data analytics solutions by integrating data processing, visualization and machine learning techniques for real-world decision-making.

Prerequisites: A basic understanding of computer fundamentals, data handling concepts and elementary statistics is expected to grasp Business Data Analytics using Python; no prior knowledge of python programming or machine learning techniques is required.

SYLLABUS

Unit with Topic Name	Content	Number of Classes	CO Mapping	Cognitive Level
I. Introduction to Python for Business Data Analytics	**A. Introduction to Python:** Basic Syntax, Data types, Type Casting, Operators; Control Flow (Conditional Statements,	**12**	**CO1 CO2**	**K1(Remember) K2(Understand) K3 (Apply)**

	Loops); Functions; Module; Data Structures - List, Dictionary, Tuple, Set **B. Python for Data Analysis**: Hypothesis Testing; Importing Libraries- NumPy for numerical computation; Pandas for data manipulation and analysis (Dataframes, Series): Handling Missing Data, Data Aggregation and Grouping; SciPy for Scientific and Technical Computing			
II. Business Data Visualization	Line Chart, Bar chart, Pie chart, Scatter plot, Histogram, Box plot, Funnel Chart; Plotting with Matplotlib, Subplot; Advanced Visualization with Seaborn	**08**	**CO3**	**K3 (Apply)** **K6 (Create)**
III. Overview of Business Data Journey	Introduction to Scikit-Learn; Loading Dataset: Duplication Checking, Missing Value Calculation; Data Pre-Processing - Outlier Detection, Data Cleaning; Data Transformation (Drop / Replace/ Imputation, Categorical to Numerical Conversion, Data Normalization/ Standardization, Data Reduction/Feature Selection, Selection of Independent and Dependent Variable	**20**	**CO4**	**K4 (Analyze)**

IV.	**Key Types of Business Data Analytics: Descriptive, Predictive and Prescriptive**	**A. Descriptive:** Descriptive Statistics, Interquartile Range (IQR); Correlation; Heatmap plot, Ordinary Least Squares Linear Regression Analysis **B. Predictive, Prescriptive:** Exploratory Data Analysis; Classification (Logistic Regression/ kNN / Decision Tree/ Random Forest/ SVM); Clustering (K-Means); Splitting Dataset (Training, Testing); Model Evaluation (Accuracy, Precision, Mean Squared Error, Mean Absolute Error, Recall, F1-Score, Confusion Matrix, Classification Report)	**20**	**CO5 CO6**	**K4 (Analyze) K5 (Evaluate) K6 (Create)**

** Hands-on demonstrations for each unit will be conducted using business use cases drawn from domains such as Marketing, Sales, Operations, Supply Chain, Finance, and Human Resource Management.

Text Books

1. **U Dinesh Kumar, Business Analytics: The Science of Data - Driven Decision Making, WILEY.**
2. **R. Evans James, Business Analytics, Pearson Education.**
3. **Reema Theraja, Python Programming using Problem Solving Approach, Oxford University Press.**
4. **Bharti Motwani, Data Analytics using Python, WILEY.**
5. **Umesh R. Hodeghatta, Umesha Nayak, Practical Business Analytics Using R and Python: Solve Business Problems Using a Data-driven Approach, Apress.**

Suggested Readings

1. **Bowei Chen, Gerhard Kling, Business Analytics with Python: Essential Skills for Business Students, Kogan Page.**
2. **Daniel Groner, Python for Data & Analytics: A Business-Oriented Approach, Prospect Press.**
3. **Subhashini Chellappan, Seema Acharya, Big Data and Analytics, WILEY.**
4. **Allen Downey, Jeffrey Elkner, Chris Meyers, Learning with Python, Dreamtech Press.**
5. **Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Business Analytics Principles, Concepts, and Applications: What, Why, and How, Pearson Education.**

Web Resources
1. https://www.anaconda.com/
2. https://www.python.org/downloads/
3. https://colab.research.google.com/
4. https://www.kaggle.com/datasets
5. https://www.simplilearn.com/tutorials/data-analytics-tutorial/data-analytics-with-python
6. https://www.simplilearn.com/resources/data-science-business-analytics/tutorials
7. https://courses.analyticsvidhya.com/courses/introduction-to-analytics
8. https://www.geeksforgeeks.org/data-analysis-with-python/
9. https://courses.analyticsvidhya.com/courses/introduction-to-data-science
10. https://github.com/firmai/python-business-analytics
11. https://www.kaggle.com/learn/python
12. https://www.datacamp.com/community/tutorials/python
13. https://mode.com/python-tutorial
14. https://365datascience.com/tutorials/python-tutorials/data-analysis-python/
15. https://www.udemy.com/topic/python/free/

****Latest edition of the book and latest version of the software are recommended.**

Course outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive levels
CO1	**Recall** and **explain** fundamental Python programming concepts, including data types, control structures, functions, and data structures used in business data analytics.	**K1 (Remember)** **K2 (Understand)**
CO2	**Use** Python libraries such as NumPy, Pandas and SciPy to perform data manipulation and basic statistical analysis.	**K3 (Apply)**
CO3	**Demonstrate** and **construct** appropriate visual representations of business data using Matplotlib and Seaborn to communicate insights effectively.	**K3 (Apply)** **K6 (Create)**
CO4	**Analyze** datasets by performing data pre-processing techniques such as data cleaning, transformation, normalization, and feature selection using Scikit-learn.	**K4 (Analyze)**
CO5	**Analyze** and **evaluate** business data using descriptive, predictive and prescriptive analytical models including descriptive statistics, correlation, regression, classification, clustering and performance metrics to derive meaningful insights.	**K4(Analyze)** **K5 (Evaluate)**
CO6	**Design** end-to-end business data analytics solutions by integrating data processing, visualization and machine learning techniques for real-world decision-making.	**K6 (Create)**