COURSE MODULE OF THE SUBJECT TAUGHT FOR THE SESSION 2025-26 (EVEN SEM)

Course Syllabi with CO's

Faculty Name: Dr. Anitha D B			**Academic Year: 2025 – 2026**				
Department: CSE- Data Science							
Course Code	**Course Title**	**Core / Elective**	**Prerequisite**	**Contact Hours**			**Total Hrs/ Sessions**
				L	**T**	**P**	
BDS613B	Exploratory Data Analysis	Elective	Basics of Programming	3	-	-	40L
Course Objectives	CLO1: To equip students with Python, IPython, and Jupyter for data analysis tasks. CLO2: To provide a comprehensive understanding of NumPy for scientific computations. CLO3: To introduce foundational and advanced data manipulation techniques using Pandas CLO4: To enhance data visualization skills using Matplotlib and Seaborn CLO5: To introduce Machine Learning concept with practical applications using Scikit-Learn. CLO6: To promote the practical application of data analysis tools and techniques on real-world datasets						
Topics Covered as per Syllabus							
Module-1 **Introduction to Python and NumPy:** Getting Started in IPython and Jupyter, Enhanced Interactive Features, The Basics of NumPy Arrays, Sorted Arrays, Structured Data: NumPy's Structured Arrays **Textbook: Chapter 2, Chapter 5, Chapter 11, Chapter 12, Chapter 1(Not for CIE/SEE),** **Module-2** **Data Manipulation with Pandas - I:** Introducing Pandas Objects, Handling Missing Data, Hierarchical Indexing, Pivot Tables. **Textbook: Chapter 13, Chapter 16, Chapter 17, Chapter 21** **Module-3** **Data Manipulation with Pandas - II:** Vectorized String Operations, Working with Time Series, HighPerformance Pandas: eval and query **Textbook: Chapter 22, Chapter 23, Chapter 24** **Module-4** **Data Visualization with MatPlotlib:** General Matplotlib Tips, Simple Line Plots, Simple Scatter Plots, Visualization with Seaborn **Textbook: Chapter 25, Chapter 26, Chapter 27, Chapter 36** **Module-5** **Introduction to Machine Learning:** Machine Learning, Introducing Scikit-Learn, Hyperparameters and Model Validation. **Textbook: Chapter 37, Chapter 38, Chapter 39**							

List of Textbooks
1. Text Books: 1. Jake VanderPlas - Python Data Science Handbook: Essential Tools for Working with Data, Oreilly 2nd Edition, 2022.
List of Reference books
1. https://python4csip.com/files/download/Data%20Visualization.pdf
Web links and Video Lectures (e-Resources)
• Numpy Tutorial - https://www.w3schools.com/python/numpy/default.asp • Pandas Tutorial - https://www.w3schools.com/python/pandas/default.asp • Matplotlib Tutorial - https://www.w3schools.com/python/matplotlib_intro.asp • Introduction to ML with Scikit Learn - https://scikit-learn.org/1.4/tutorial/basic/tutorial.html
Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning • Programming Assignment-1: Implementation of important concepts of data manipulation using NumPy and Pandas (Python) - 10 Marks • Programming Assignment-2: Implementation of simple Machine Learning models with Visualization using Python (MatPlotlib, Scikitlearn) - 15 Marks

Course Outcomes	**CO1**: Demonstrate the application of the NumPy for performing data analysis tasks. **CO2**: Make use of Pandas for various data manipulation tasks. **CO3**: Apply advanced data manipulation techniques to real-world datasets. **CO4**: Develop data visualizations using Matplotlib and Seaborn to effectively communicate data insights. **CO5**: Explain the fundamental concepts of machine learning and validation models using Scikit-Learn.

Internal Assessment Marks: For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks. For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Subject Code	**BDS613B**	**TITLE:** Exploratory Data Analysis						**Faculty Name**	Dr. Anitha D B			
List of Course Outcomes	**Program Outcomes**											**Total**
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	
CO-1	2	-	-	-	2	-	-	-	-	-	-	-	4
CO-2	2	2	2	-	2	-	-	-	-	-	-	-	8
CO-3	2	2	2	-	2	-	-	-	-	-	-	-	8
CO-4	2	2	2	-	2	-	-	-	-	-	-	-	8
CO-5	2	-	-	-	-	-	-	-	-	-	-	-	2
Total	**10**	**06**	**06**	-	**08**	-	-	-	-	-	-	-	**30**

Note: 3 = Strong Contribution, 2 = Average Contribution, 1 = Weak Contribution, - = No Contribution

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Subject Code	BDS613B	TITLE: Exploratory Data Analysis	Faculty Name	Dr Anitha D B

List of Course Outcomes	Program Specific Outcomes			Total
	PSO-1	PSO-2	PSO-3	
CO-1	2	-	-	2
CO-2	2	-	-	2
CO-3	2	-	-	2
CO-4	2	-	-	2
CO-5	2	-	-	2
Total	10	-	-	10