Lecture Plan

Name of the college: Government College of Arts, Science and Commerce, Sanquelim- Goa

Name of Faculty: Mr. Amar R. Naik	**Subject:** Computer Science	
Paper code: CSC-311 Data Science	**Program:** T.Y.B.Sc.	**Division: -**
Academic year: 2025 - 2026	**Semester:** VI	**Total Lectures:** 45 T, 30 P

Course Objectives: This course will enable the student to:

1. To get started with basics of data science and learn all aspects of data science in its entirety.
2. Gain a strong understanding of how data is generated, collected, stored, and analyzed. To conduct cleaning, organizing, and prepare data for analysis to gain insightful patterns.
3. Use powerful statistical tools to summarize data, identify trends, and draw meaningful conclusions. To transform data into visuals. Learn to create informative charts, graphs to communicate insights effectively.
4. Understand how machine learning algorithms can learn from data, make predictions, and solve complex problems.

Course Outcomes:

Upon completion of the course students should be able to :

CO1. Remember the basic concepts & terminologies of Data Science, Machine Learning Algorithms and Ethics in Data Science

CO2. Understanding of fundamental concepts and techniques in data science. Proficiency in data manipulation, analysis, and visualization using tools like Python

CO3. Apply Python programming concepts in performing Data Analytics and writing programs for Machine Learning Algorithms.

CO4. Perform analysis on Data Sets for machine learning algorithms.

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
December 2025	01-12-2025	06-12-2025	3	Introduction to Data Science Why Learn Data Science Scope and applications of Data Science		Laptop, LCD Projector, PPT	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications.
	08-12-2025	13-12-2025	3	What is Big Data?, Examples of Big Data, Types of Big Data	Identify real-world examples of Big Data.	Laptop, LCD Projector, PPT	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications. Murtaza Haider, *Getting Started with Data Science*, Pearson India.
	15-12-2025	20-12-2025	3	Characteristics of Big Data Advantages of Big Data Processing Data Analytics Life Cycle		Laptop, LCD Projector, PPT	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media.
	22-12-2025	23-12-2025	1	Types of Data Analysis	List types of data analysis with examples.	Laptop, LCD Projector, PPT	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications.
January 2026	02-01-2026	03-01-2026	1	Types of Jobs in Data Analytics		Laptop, LCD Projector, PPT	Rachel Schutt & Cathy O'Neil, *Doing Data Science: Straight Talk from the Frontline*, O'Reilly Media.
	05-01-2026	10-01-2026	3	Data Science Tools and fundamental Areas of Study in Data Science Introduction to Data Preprocessing Data Types and Forms Possible Data Error Types Various Data Preprocessing Operations		Laptop, LCD Projector, PPT	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications.
	12-01-2026	17-01-2026	3	Introduction to Data Visualization Visual Encoding Data Visualization Libraries Basic Data Visualization Tools ISA I Assignment		Laptop, LCD Projector, PPT	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media.

	19-01-2026	24-01-2026	3	Role of Statistics in Data Science Importance of statistics in data-driven decision making Kinds of Statistics: Descriptive and Inferential Statistics	Explain role of statistics in data-driven decisions.	Laptop, LCD Projector, PPT	Murtaza Haider, *Getting Started with Data Science*, Pearson India.
	26-01-2026	31-01-2026	2	Basic concepts of Probability Theory Probability distributions and events	Solve basic probability problems.	Laptop, LCD Projector, PPT	Murtaza Haider, *Getting Started with Data Science*, Pearson India.
February 2026	02-02-2026	07-02-2026	3	Applications of probability in Data Science Overview of Machine Learning Types of Machine Learning: Supervised, Unsupervised and Reinforcement Learning		Laptop, LCD Projector, PPT	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media.
	09-02-2026	14-02-2026	3	Linear Regression Logistic Regression K-Nearest Neighbour (KNN) Classification ISA II – Written Test	Differentiate regression and classification techniques.	Laptop, LCD Projector, PPT	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media.
	16-02-2026	21-02-2026	3	Decision Tree Classification Random Forest Classification Naïve Bayes Classification Unsupervised Machine Learning: - Clustering Methods - Association Analysis Reinforcement Learning		Laptop, LCD Projector, PPT	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications.
	23-02-2026	28-02-2026	3	Overview of Social Media Analytics Importance and applications of Social Media Analytics Seven layers of Social Media Analytics	Identify applications of social media analytics.	Laptop, LCD Projector, PPT	Rachel Schutt & Cathy O'Neil, *Doing Data Science: Straight Talk from the Frontline*, O'Reilly Media.
March 2026	02-03-2026	07-03-2026	3	Social Media Analytics Cycle Key Social Media Analytics Methods Accessing Social Media Data		Laptop, LCD Projector, PPT	Rachel Schutt & Cathy O'Neil, *Doing Data Science: Straight Talk from the Frontline*, O'Reilly Media.
	09-03-2026	14-03-2026	3	Challenges to Social Media Analytics Overview of Business Analytics Scope and importance of Business Analytics ISA III - Quiz		Laptop, LCD Projector, PPT	Murtaza Haider, *Getting Started with Data Science*, Pearson India.

	16-03-2026	21-03-2026	3	Business Analytics Life Cycle Basic tools used in Business Analytics Challenges faced in Business Analytics	Describe business analytics life cycle.	Laptop, LCD Projector, PPT	Murtaza Haider, *Getting Started with Data Science*, Pearson India.
	23-03-2026	28-03-2026	3	What is Ethics, Why Ethics in Data Science is important, Who regulates and owns our data, Data Science Ethics, Ethical practices in Data Science Revision		Laptop, LCD Projector, PPT	Rachel Schutt & Cathy O'Neil, *Doing Data Science: Straight Talk from the Frontline*, O'Reilly Media.
	30-03-2026	31-03-2026	1	Revision	-	-	-
PRACTICALS							
December 2025	01-12-2025	06-12-2025	-	-	-	-	-
	08-12-2025	13-12-2025	2	NumPy Foundation: Importing NumPy package, NumPy array attributes, Creating NumPy arrays.	Create NumPy arrays and inspect attributes	Laptop, LCD Projector	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications
	15-12-2025	20-12-2025	2	NumPy Foundation: Accessing an element of a NumPy array, slicing in NumPy array, Array concatenation. Pandas and DataFrame: Importing Pandas, Pandas data structure, DataFrame, Some useful DataFrame functions, Handling missing values in DataFrame.	Perform NumPy slicing and concatenation; create a DataFrame and handle missing values	Laptop, LCD Projector	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media
	22-12-2025	23-12-2025	2	How to import data in Python: Importing text data, Importing csv data, Importing excel data.	Import text, CSV and Excel datasets in Python.	Laptop, LCD Projector	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications
January 2026	02-01-2026	03-01-2026	2	How to import data in Python: Importing JSON data, Importing pickled data, Importing compressed data. Cleaning of imported data: Analyzing missing values, dropping missing values,	Import JSON and compressed data and perform data cleaning operations.	Laptop, LCD Projector	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications. Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly

				automatically filling missing values, how to scale and normalize data?, how to parse dates?, cleaning inconsistent data.			Media.
	05-01-2026	10-01-2026	2	Data Preprocessing: Loading data and exploration, handling missing values, handling duplicates, data type correction.	Perform data loading, exploration and basic data preprocessing.	Laptop, LCD Projector	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications.
	12-01-2026	17-01-2026	2	Data Preprocessing: Categorical feature encoding, feature scaling and normalization, data splitting. Combining data from multiple sources: Combining DataFrames vertically (stacking rows), Combining DataFrames horizontally (joining columns), without a common column, combining data from different file formats, combining data from databases.	Encode features, scale data, split dataset and combine multiple data sources	Laptop, LCD Projector	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications. Murtaza Haider, *Getting Started with Data Science: Making Sense of Data with Analytics*, Pearson India Education Services Pvt. Ltd.
	19-01-2026	24-01-2026	2	Create your own dataset (DataFrame, CSV file)	Create a dataset using DataFrame and export it as a CSV file.	Laptop, LCD Projector	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media
	26-01-2026	31-01-2026	2	Data Visualization: bar chart, line chart, histogram, scatter plot, box plot, heat map (Use visualization tools such as Tableau, Gapminder, PowerBI)	Visualize dataset using different charts and plots	Laptop, LCD Projector	Rachel Schutt & Cathy O'Neil, *Doing Data Science: Straight Talk from the Frontline*, O'Reilly Media.
February 2026	02-02-2026	07-02-2026	2	Web Scraping, Implementation of Linear Regression Machine Learning Algorithm	Scrape data from a website and implement Linear Regression.	Laptop, LCD Projector	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media.
	09-02-2026	14-02-2026	2	Implementation of Logistic Regression Machine Learning Algorithm.	Implement Logistic Regression on a sample dataset.	Laptop, LCD Projector	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media.
	16-02-2026	21-02-2026	2	Implementation of Decision Tree Machine Learning Algorithm.	Implement Decision Tree algorithm for	Laptop, LCD Projector	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and*

					classification.		
	23-02-2026	28-02-2026	2	Implementation of K-Means Machine Learning Algorithm	Implement K-Means clustering on a sample dataset.	Laptop, LCD Projector	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media
March 2026	02-03-2026	07-03-2026	2	Implementation of K-Nearest Neighbors Machine Learning Algorithm.	Implement K-Nearest Neighbors classification algorithm	Laptop, LCD Projector	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media.
	09-03-2026	14-03-2026	2	Handling Time Series Data: How to handle date and time?, transforming time series data, manipulating time series data, comparing time series growth rates.	Perform basic time series data handling and transformation.	Laptop, LCD Projector	Dr. Gypsy Nandi & Dr. Rupam Kumar Sharma, *Data Science Fundamentals and Practical Approaches*, BPB Publications.
	16-03-2026	21-03-2026	2	Data Cross Validation (train test and validation split)	Apply train–test–validation split on a dataset.	Laptop, LCD Projector	Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media.
	23-03-2026	28-03-2026	2	Practice		Laptop, LCD Projector	
	30-03-2026	31-03-2026	-	Practice			

* Assessment Rubrics

Component	Max Marks
ISA 1	7.5
ISA 2	7.5
ISA 3	7.5
Best 2 ISAs	
Practical Examination	25
Semester End Examination	60