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Data Science — Complete Syllabus (Elective — Pathway, Option 4)

BTEUP Diploma in Electronics Engineering • 6th Semester • Session 2026-27
Subject 6.2.4 — Elective (Pathway), Option 4 (Theory) • Total 100 Marks • 3 Credits • L 3
– P 0 • Choose this OR Managerial Economics OR Finance Fundamentals OR Cyber Security

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
6.2.4	Elective (Pathway): Data Science	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
Data Science Total				3	40	60	100

What This Subject Aims To Do

To learn the basics of Data Science and its use in electronics; gain skills in collecting, cleaning and analysing data; use Python with tools like NumPy and Pandas; understand basic machine learning and how it applies to electronics; and apply data science in IoT, automation and signal processing.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Data Science	8	20%
2	Data Handling and Visualization	8	20%

3	Python for Data Science	8	20%
4	Introduction to Machine Learning	8	20%
5	Real-World Applications of Data Science	10	20%

Unit 1 — Introduction to Data Science (8 Periods, 20%)

Topics: What is Data Science? Evolution and Importance, Data Science vs. Data Analytics vs. Machine Learning, Applications in Electronics: IoT, Automation, Signal Processing, Overview of Data Science Workflow

In simple words: What data science is, how it differs from data analytics and machine learning, its uses in electronics, and the workflow from data to decision.

Unit 2 — Data Handling and Visualization (8 Periods, 20%)

Topics: Types of Data: Structured, Unstructured, Time-Series, Data Collection Methods (from sensors, logs, APIs), Data Cleaning Techniques, Introduction to Excel and CSVs, Visualization with Matplotlib / Seaborn / Excel, Basics of Statistics (mean, median, mode, std. dev.)

In simple words: Handling data: its types, collecting it from sensors, logs and APIs, cleaning it, visualising it, and the basic statistics that describe it.

Unit 3 — Python for Data Science (8 Periods, 20%)

Topics: Why Python for Data Science? Basics of Python Programming (variables, loops, functions) , Libraries: NumPy, Pandas – Data Manipulation , Reading sensor data from files , Mini project: Handling electronics-related datasets (e.g., temperature, voltage logs)

In simple words: Python for data work: the basics, NumPy and Pandas for manipulating data, and a mini-project on electronics datasets like temperature and voltage logs.

Unit 4 — Introduction to Machine Learning (8 Periods, 20%)

Topics: Supervised vs. Unsupervised Learning, Algorithms Overview: Linear Regression, KNN, Decision Trees, Real-world examples in electronics (e.g., fault prediction, pattern detection), Model Training, Testing, and Evaluation.

In simple words: Machine learning basics: supervised vs unsupervised learning, linear regression, KNN and decision trees, and how to train, test and evaluate a model.

Unit 5 — Real-World Applications of Data Science (10 Periods, 20%)

Topics: Data Science in IoT & Smart Devices, Signal and Image Data Analysis Basics, Introduction to Big Data Concepts (brief) , Ethics in Data Science and AI , Capstone Project Guidelines

In simple words: Data science in the real world: IoT and smart devices, signal and image data, big data in brief, ethics, and the capstone project.

Reference Books (as listed in the syllabus)

- “Doing Data Science” by Cathy O'Neil & Rachel Schutt
- “Data Visualization with Python and JavaScript” by Kyran Dale
- “Python Data Science Handbook” by Jake VanderPlas
- “Machine Learning for Absolute Beginners” by Oliver Theobald
- “Data Science for IoT Engineers” by Perry Lea
- Data Science & Machine Learning by Rashmi Singh

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Source: BTEUP 3rd Year curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.

Please confirm with your own polytechnic for any local changes.

