



AI LABS & RESEARCH CENTER

Data Science & Data Analytics with AI — Detailed Course Syllabus

MindForge AI Labs & Research Center's Data Program begins with a Common Foundation in Python, Excel, and SQL — then specializes into either Track 1: Data Science with AI & ML, or Track 2: Data Analytics with AI. Both tracks integrate modern Generative AI tools and conclude with a critical-thinking module and a real-world capstone project.

Program Duration: 7–9 Weeks Total (Tentative) — Common Foundation: 2.5–4 Weeks + Track 1 / Track 2: 3.5–5 Weeks | **Mode:** Classroom / Online | **Format:** Live projects + Practical assessments

Common Foundation — Shared by Both Tracks

Every learner completes this foundation before choosing a specialization. It covers Python programming, Excel for data analysis, and SQL essentials used in both tracks.

Total Duration: 2.5–4 Weeks (Tentative)

Foundation 1 — Python Programming

Duration: 1–1.5 Weeks

- Python setup: Anaconda, Jupyter Notebook, Google Colab
- Variables, data types, operators, control structures, loops
- Working with Lists, Sets, Dictionaries, and Strings
- Python functions: built-in, user-defined, lambda, recursive functions
- Object-Oriented Programming: classes, objects, constructors, inheritance, polymorphism
- File handling, exception handling, modules & packages

Foundation 2 — Excel for Data Analysis

Duration: 1–1.5 Weeks

- Excel fundamentals: formatting, sorting/filtering, conditional formatting
- Basic formulas: SUM/AVERAGE/COUNT/MAX/MIN, lookup & text functions
- Pivot Tables and Pivot Charts
- Logical functions (IF, nested IF, AND/OR/NOT) and statistical functions
- Data import/export, data validation, and formula auditing

Foundation 3 — SQL for Data

Duration: 0.5–1 Week

- Introduction to SQL: DDL, DML, DQL, DCL statements
- Constraints: PRIMARY KEY, FOREIGN KEY, UNIQUE, CHECK, DEFAULT
- SQL operators and functions: aggregate, string, and numeric functions
- WHERE, GROUP BY, ORDER BY, HAVING clauses
- Sub-queries and JOINS: inner, outer, left, right

Track 1 — Data Science with AI & ML

Builds on the Common Foundation with mathematics, statistics, classical machine learning, and Generative AI/LLM tooling for aspiring Data Scientists and ML practitioners.

Total Duration: 3.5–5 Weeks (Tentative)

Module 1 — Mathematics & Statistics for Data Science

Duration: 0.5–1 Week

- Calculus, vector algebra, and matrix algebra essentials
- Descriptive & inferential statistics
- Probability theory, random variables, discrete & continuous distributions
- Central Limit Theorem and hypothesis testing

Module 2 — Machine Learning

Duration: 1.5–2 Weeks

- Introduction to ML; supervised vs unsupervised learning
- Linear & logistic regression, bias-variance tradeoff
- Cross-validation and hyperparameter tuning
- Decision trees & ensembles, K-Nearest Neighbours, Naive Bayes, SVM
- K-Means clustering, Principal Component Analysis
- Introduction to Natural Language Processing & recommender systems
- Applied ML use cases: healthcare, fraud risk analytics

Module 3 — Generative AI & LLMs for Data Science

Duration: 0.5–1 Week

- Understanding Large Language Models (LLMs) and how they work
- Popular LLMs overview: ChatGPT, Gemini, Claude, LLaMA, and open-source models
- Prompt engineering fundamentals for data tasks
- Using AI to write SQL queries, generate visualizations, and automate report summaries

Module 4 — Critical Thinking, Ethics & Capstone Project

Duration: 1 Week

- Critical thinking with AI: evaluating AI-generated answers, checking accuracy
- Understanding AI limitations, bias, and responsible/ethical use
- Keeping data private and secure when using AI tools
- Capstone project: real-world Data Science/ML use case (assigned per latest topic)
- Resume building, mock interviews, and interview preparation

Track 2 — Data Analytics with AI

Builds on the Common Foundation with advanced Excel/Power Query, Tableau, Power BI, and practical AI tools for analysts who turn data into business insight.

Total Duration: 3.5–5 Weeks (Tentative)

Module 1 — Advanced Excel & Power Query

Duration: 1–1.5 Weeks

- VLOOKUP/HLOOKUP, INDEX & MATCH, OFFSET/INDIRECT functions
- Advanced Pivot Tables, calculated fields, and consolidation
- Advanced filters, sorting, and custom views
- Power Query: query editor, data transformation, filtering, merging & pivoting columns
- Data cleanup: removing duplicates, blanks, errors, and grouping rows

Module 2 — Tableau & Power BI

Duration: 1.5–2 Weeks

- Tableau: connecting data, building charts, calculations, dashboards & stories
- Power BI Desktop: Power Query, Power Pivot, Power View
- Building and formatting visualizations: bar, column, pie, scatter, combo, waterfall charts
- Power BI Service: publishing reports, workspaces, and dashboards
- Sharing and distributing dashboards and reports

Module 3 — AI Tools for Data Analysts

Duration: 0.5–1 Week

- Introduction to AI copilots: Microsoft Copilot, Google Gemini for Workspace
- Using chatbots to speed up Excel and SQL work
- Exploring AI add-ins in Power BI and Tableau
- Connecting AI tools with Excel, Power BI, and Tableau to clean/transform data faster
- Enhancing dashboards with AI-generated insights

Module 4 — Critical Thinking, Ethics & Capstone Project

Duration: 1 Week

- Critical thinking with AI: evaluating AI-generated answers, checking accuracy
- Understanding AI limitations, bias, and responsible/ethical use
- Keeping data private and secure when using AI tools
- Capstone project: real-world Data Analytics use case (assigned per latest topic)
- Resume building, mock interviews, and interview preparation

Program Summary

- **Common Foundation: 2.5–4 Weeks (Tentative)**
- **Track 1 (Data Science with AI & ML) or Track 2 (Data Analytics with AI): 3.5–5 Weeks (Tentative)**
- **Total Program Duration: 7–9 Weeks (Tentative)**

Program Outcomes — Both Tracks

- Strong foundation in Python, Excel, and SQL for data handling
- Practical understanding of LLMs, prompt engineering, and AI-assisted workflows
- Track 1: hands-on machine learning model building and evaluation
- Track 2: hands-on dashboarding and reporting with Tableau and Power BI
- Applied critical thinking to evaluate and responsibly use AI-generated output
- Resume building, mock interviews, and placement support

Who Should Enroll

Freshers, computer science / commerce graduates, and working professionals looking to build a career in Data Science, Machine Learning, or Data Analytics with modern AI tooling. No prior coding experience required for the Common Foundation.

