

data_analytics_using_genai

Data Analysis Curriculum

MODULE 1: Python for Data Analysis

Core Programming

- Python setup (Jupyter, VS Code)
- Variables, data types
- Control flow (if, loops, match)
- Functions & modular coding
- Data structures (list, tuple, dict, set)
- List & dict comprehensions
- File handling (CSV, JSON)
- Exception handling
- OOP fundamentals

Using AI with Python

- Generate starter code
 - Debug errors
 - Refactor messy scripts
 - Explain stack traces
 - Validate AI-generated code
 - Write structured prompts for coding tasks
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MODULE 2: Statistics for Data Analysis

Statistical Foundations

- Types of data
- Descriptive statistics
- Probability rules
- Distributions (Normal, Binomial, Poisson)
- Sampling & Central Limit Theorem (CLT)
- Confidence intervals
- Hypothesis testing (t-test, chi-square, ANOVA)
- Correlation analysis

Using AI in Statistics

- Interpret statistical output
 - Convert hypothesis test results into business language
 - Ask for alternate statistical approaches
 - Detect hallucinated interpretations
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MODULE 3: NumPy

Core Concepts

- Array creation & attributes
- Indexing & slicing
- Broadcasting
- Aggregations
- Reshaping
- Linear algebra basics

Using AI with NumPy

- Generate vectorized solutions
 - Compare manual vs AI-optimized operations
 - Debug dimension errors
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MODULE 4: Pandas for Data Analysis

Core Data Manipulation

- Series & DataFrame
- Data inspection
- Handling missing values
- Filtering (loc, iloc, query)
- String operations
- GroupBy & aggregation
- Pivot tables & crosstab
- Merge & join
- Reshaping (melt, pivot)
- Time series basics

Using AI with Pandas

- AI-assisted EDA (Exploratory Data Analysis)
 - Ask for:
 - Cleaning strategies
 - Feature suggestions
 - Outlier detection approaches
 - Auto-generate exploratory summaries
 - Validate AI recommendations
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MODULE 5: Data Visualization

Matplotlib & Seaborn

- Line, bar, scatter, histogram plots
 - Heatmaps
 - Regression plots
 - Customization & styling
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MODULE 6: SQL for Data Analysts + AI

Core SQL

- DBMS fundamentals
- Creating databases & tables
- Constraints
- CRUD operations
- Filtering (WHERE, IN, BETWEEN)
- Aggregations & GROUP BY
- Joins
- Subqueries
- Window functions
- Views & indexing basics

Using AI with SQL

- Convert business questions → SQL
 - Optimize slow queries
 - Validate AI-generated SQL
 - Explain execution logic
 - Debug errors using AI
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MODULE 7: Excel + Power Pivot + AI

Excel Analytics

- Advanced formulas
- Data cleaning
- Pivot tables
- Conditional formatting
- Lookup engineering
- Financial modeling basics

Using AI with Excel

- Generate formulas
 - Debug nested formulas
 - Create business summaries
 - Use Excel Analyze Data
 - AI-powered forecasting tools
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MODULE 8: Power BI + AI Analytics

Core BI Skills

- Power BI workflow
- Data modeling (relationships, star schema)
- Power Query
- Visualizations
- DAX (basic to advanced)

- Time intelligence
- Interactive dashboards

AI in Power BI

- AI visuals (Key Influencers, Q&A, Decomposition Tree)
 - AI-driven insight explanations
 - Copilot concepts
 - Auto trend detection
 - Generate dashboard narratives
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MODULE 9: Applied AI for Data Analysts

AI Foundations

- How LLMs work (high-level)
- Limitations & hallucinations
- Bias in AI outputs

Prompt Engineering for Analysts

- Structured prompting
- Constraint-based prompts
- Analytical prompt templates
- Output validation frameworks

AI Workflow Automation

- Python + AI + SQL workflows
- Automated reporting pipelines
- AI-driven documentation generation

AI Ethics

- Data privacy
 - Responsible AI usage
 - Model risk awareness
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