

Advanced Program in Data Science, ML & Generative AI

Duration: 380 Hours

Program Objective:

Our program is designed to equip learners with comprehensive knowledge and hands-on skills across entire data science and AI life cycle. The program aims to build strong foundations in data analysis, statistics and programming, while progressively advancing into machine learning, deep learning, natural language processing and generative AI. Through real life projects, learner will gain experience in solving business problems, deploying models on cloud platforms.

Module 1: Excel for Data Science

- Excel Basics Refresher
- Formulas & Functions
- Lookup & Reference Mastery
- Data Cleaning & Transformation
- Power Query for ETL
- Statistics in Excel
- Data Modelling & Forecasting
- Data Visualization & Storytelling
- Excel Automation
- Integration with Other
- Mini Project

Module 2: Data Wrangling with SQL

- Introduction to Databases & SQL
- Basic SQL Queries
- SQL Operators
- Joins & Relationships
- Aggregation & Grouping
- Subqueries & Nested Queries
- Functions in SQL
- Views, Stored Procedures & Triggers
- Advanced SQL for Data Science
- SQL Performance Tuning
- Mini Project

Module 3: Power BI

- Introduction to Power BI & Workflow
- Connecting to Data Sources
- Data Modelling & Relationships

- Introduction to DAX (Data Analysis Expressions)
- Advanced DAX
- Data Visualization & Storytelling
- AI Features in Power BI
- Security & Deployment
- Mini Project

Module 4: Python with Data Science

- Introduction to Python & Environment Setup
- Python Basics
- Working with Data Structures
- Object-Oriented Programming (OOP)
- Working with External Files
- NumPy for Numerical Computing
- Pandas for Data Analysis
- Data Visualization
- Introduction to Statistics in Python
- Automation & APIs
- Mini Project

Module 5: Statistics and Linear Algebra

- Role of Statistics in Data Science
- Descriptive Statistics
- Probability Basics
- Inferential Statistics
- Hypothesis Testing
- Statistical Modeling
- Linear Algebra Fundamentals
- Linear Algebra in ML
- Mini Project

Module 6: Machine Learning – 24 Hrs

- Introduction to Machine Learning
- Types of Machine Learning
- ML Workflow
- Data Preprocessing & Feature Engineering
- Introduction to Regression
- Introduction to Classification
- Introduction to Clustering
- Model Evaluation & Validation
- Hyperparameter Tuning Basics
- Introduction to ML Libraries –
- Mini Project

Module 7: Supervised Learning

- Recap of ML Fundamentals
- Linear Regression Deep Dive
- Logistic Regression
- Decision Trees
- Random Forests
- Support Vector Machines
- K-Nearest Neighbors (KNN)
- Gradient Boosting (XGBoost, LightGBM, CatBoost)
- Time Series Forecasting
- Mini Project

Module 8: Unsupervised Learning

- Introduction to Unsupervised Learning
- K-Means Clustering
- Hierarchical Clustering
- DBSCAN & Density-Based Methods
- Dimensionality Reduction
- t-SNE & UMAP for Visualization
- Anomaly Detection with Isolation Forest
- Mini Project

Module 9: Deep Learning – PyTorch

- Introduction to Deep Learning
- Neural Network Architecture & Forward Propagation
- Backpropagation & Optimization
- Building Neural Networks in PyTorch
- Convolutional Neural Networks (CNNs)
- Recurrent Neural Networks (RNNs) & LSTMs
- Transformers & Attention Mechanisms
- Transfer Learning & Fine-Tuning
- Model Evaluation, Overfitting, Regularization
- TensorFlow/Keras Overview (Awareness)
- Mini Project

Module 10: Natural Language Processing – PyTorch Focussed

- Introduction to NLP
- Text Preprocessing
- Text Representation
- Sequence Modeling with RNNs & LSTMs
- Attention Mechanism
- Transformers in NLP

- Pre-trained Language Models
- NLP Project

Module 10: Generative AI

- Introduction to Generative AI
- Generative Models Overview
- Large Language Models (LLMs) Fundamentals
- Prompt Engineering
- Fine-Tuning & Adaptation of LLMs
- Generative AI for Text
- Generative AI for Images
- Responsible AI & Ethics
- Generative AI Capstone Project

Module 11: MLOps and Model Deployment

- Introduction to MLOps
- Model Packaging
- Model Deployment (Hands-On AWS)
- Cloud Alternatives
- CI/CD Basics
- Model Monitoring & Drift
- Mini Project

Module 12: Real World Projects and Case Studies

- Sales Forecasting
- Customer Churn Prediction (Telecom/Classification)
- Credit Risk Scoring (Finance/Classification)
- Recommendation System (E-commerce)
- Sentiment Analysis (Text Analytics/NLP)
- Generative AI Chatbot (HR/Healthcare domain)
- Fraud Detection (Finance/Anomaly Detection)
- Capstone Project

Career Prospects:

- ✓ Data Analyst
- ✓ Business Intelligence BI Analyst
- ✓ Data Scientist
- ✓ Machine Learning Engineer
- ✓ Data Engineer
- ✓ Applied AI Specialist
- ✓ AI/ML Engineer
- ✓ Quantitative Analyst