Machine Learning & AI Engineering Mastery Course

(Job-Ready AI/ML + NLP + MLOps + Deployment Program)

Based on the curriculum structure and topics from the Udemy course
Complete Machine Learning, NLP Bootcamp, MLOps & Deployment

Machine Learning & AI Engineering (Job-Ready Course)

SECTION 1: Introduction to Artificial Intelligence & Machine Learning

What You Will Learn:

- Introduction to Artificial Intelligence (AI)
- Understanding Machine Learning vs Deep Learning
- Real-world applications of AI & ML
- Types of Machine Learning
    - Supervised Learning
    - Unsupervised Learning
    - Reinforcement Learning
- AI project workflow
- Industry use cases and career opportunities
- Setting up development environment

Tools Covered:

- Python
- Jupyter Notebook
- Google Colab
- VS Code
- Git & GitHub

SECTION 2: Python for Machine Learning

What You Will Learn:

- Python fundamentals for Data Science
- Variables, loops, functions & OOP
- File handling and exception handling
- NumPy for numerical computing
- Pandas for data analysis
- Data visualization using Matplotlib & Seaborn
- Working with datasets
- Data preprocessing basics

Minor Projects:

- Student Data Analysis
- Sales Data Visualization
- Data Cleaning Project

SECTION 3: Statistics & Mathematics for Machine Learning

What You Will Learn:

- Descriptive statistics
- Probability fundamentals
- Distributions and sampling
- Hypothesis testing
- Linear Algebra basics
- Calculus concepts for ML
- Correlation and covariance
- Feature scaling and normalization

Practical Exercises:

- Statistical Analysis using Python
- Data Distribution Visualization
- Correlation Matrix Analysis

SECTION 4: Exploratory Data Analysis (EDA)

What You Will Learn:

- Data cleaning techniques
- Handling missing values
- Outlier detection
- Feature engineering
- Data visualization techniques
- EDA workflow for real-world datasets
- Business insights extraction
- Data storytelling

Minor Projects:

- Titanic Dataset Analysis
- Customer Churn Analysis
- Netflix Dataset EDA

SECTION 5: Machine Learning Fundamentals

What You Will Learn:

- ML model development lifecycle
- Training and testing datasets
- Bias-variance tradeoff
- Model evaluation metrics
- Cross validation techniques
- Hyperparameter tuning
- Feature selection methods
- Pipelines in ML

Algorithms Covered:

- Linear Regression
- Logistic Regression
- Decision Trees
- Random Forest
- K-Nearest Neighbors (KNN)
- Support Vector Machine (SVM)
- Naive Bayes

Minor Projects:

- House Price Prediction
- Student Performance Prediction
- Loan Approval Prediction

SECTION 6: Advanced Machine Learning

What You Will Learn:

- Ensemble learning techniques
- Boosting and bagging
- Dimensionality reduction
- Clustering algorithms
- Recommendation systems
- Time series forecasting
- Model optimization techniques

Algorithms Covered:

- XGBoost
- AdaBoost
- Gradient Boosting
- K-Means Clustering
- PCA (Principal Component Analysis)

Minor Projects:

- Customer Segmentation
- Movie Recommendation System
- Sales Forecasting

SECTION 7: Natural Language Processing (NLP)

What You Will Learn:

- Introduction to NLP
- Text preprocessing techniques
- Tokenization and stemming
- Lemmatization
- TF-IDF & Bag of Words

- Word embeddings
- Sentiment analysis
- Text classification
- Named Entity Recognition (NER)
- Spam detection systems

Libraries Covered:

- NLTK
- SpaCy
- TextBlob
- Transformers

Minor Projects:

- Spam Email Classifier
- Sentiment Analysis System
- Chatbot Development

SECTION 8: Deep Learning Fundamentals

What You Will Learn:

- Introduction to Neural Networks
- Activation functions
- Forward & backward propagation
- Artificial Neural Networks (ANN)
- Convolutional Neural Networks (CNN)
- Recurrent Neural Networks (RNN)
- Transfer Learning
- Model training and optimization

Frameworks Covered:

- TensorFlow
- Keras
- PyTorch

Minor Projects:

- Image Classification Model
- Handwritten Digit Recognition
- Face Mask Detection

SECTION 9: MLOps & Model Deployment

What You Will Learn:

- Introduction to MLOps
- Model versioning
- CI/CD for ML projects
- Docker fundamentals
- API development using Flask/FastAPI
- Deploying ML models
- Cloud deployment basics
- Monitoring ML models in production

Tools Covered:

- Docker
- MLflow
- FastAPI
- Flask
- Render / Railway / AWS Basics

Minor Projects:

- ML Model API Deployment
- Dockerized ML Application
- End-to-End ML Pipeline

SECTION 10: Real World AI Projects

Major Projects:

- Fake News Detection System
- Resume Screening AI
- Movie Recommendation Engine
- Customer Churn Prediction
- AI Chatbot
- Stock Price Prediction
- NLP-based Text Summarizer
- End-to-End ML Deployment Project

What You Will Learn:

- Real-world AI workflow
- Production-ready AI systems
- Problem-solving with ML
- Scalable AI project architecture
- Team collaboration workflow

SECTION 11: Portfolio, Freelancing & Career Preparation

What You Will Learn:

- Building a Machine Learning portfolio
- GitHub project management
- Resume building for AI/ML roles
- Interview preparation
- Freelancing in AI & Data Science
- Kaggle project workflow
- Research paper guidance
- Personal branding in AI

Bonus Topics:

- Generative AI Introduction
- Large Language Models (LLMs)
- Prompt Engineering Basics
- AI Trends & Industry Insights

SECTION 12: Certification & Placement Opportunity

Included:

- Course Completion Certificate
- Real-world project evaluation
- Internship opportunity guidance
- Placement assistance
- Portfolio review
- Career mentorship support

Software & Tools Covered

- Python
- Jupyter Notebook
- Google Colab
- VS Code
- NumPy
- Pandas
- Scikit-learn
- TensorFlow
- PyTorch
- Docker
- FastAPI
- MLflow
- Git & GitHub

Course Duration

- 3 to 6 Months
- Beginner to Advanced Level
- 100% Practical Learning Approach

Who This Course Is For

- Beginners interested in AI & Machine Learning
- Computer Science Students
- Data Science Aspirants
- Software Developers
- Researchers
- Freelancers
- Working Professionals
- Startup Enthusiasts

Learning Outcome

After completing this course, students will be able to:

- Build Machine Learning models from scratch
- Perform advanced data analysis and visualization
- Develop NLP and Deep Learning applications
- Deploy ML models to production
- Build end-to-end AI systems
- Work professionally as an AI/ML Engineer
- Apply for Data Science and AI-related jobs
- Start freelancing in AI and Machine Learning