

Machine Learning Speciality

Learn to prepare data and build regression, classification, clustering and deep learning models in Python.

5 Days

40 HOURS

9

MODULES

86

TOPICS

COURSE OVERVIEW

The Machine Learning Speciality course is a comprehensive program designed to equip learners with a deep understanding of data science and machine learning concepts. It is structured in various modules, starting with an Introduction to Data Science & Machine Learning, covering the essentials such as Analytics types, Project lifecycle, and required skills. The course then delves into practical skills with Python for Data Analysis & Preprocessing, teaching the use of popular libraries and data handling techniques. Subsequent modules focus on Supervised Machine Learning for both Regression and Classification, where learners gain hands-on experience with models like linear Regression, Logistic Regression, SVMs, Decision trees, and more. The course emphasizes the importance of Feature Selection and Dimensionality Reduction, Cross-Validation & Hyperparameter Tuning, and introduces Deep Learning fundamentals. Additionally, learners explore Clustering techniques to uncover patterns in data. By the end of the course, participants will have mastered the key concepts and tools necessary for a career in machine learning, including Python programming, Data preprocessing, Model evaluation, and advanced algorithms. This course offers a blend of theoretical knowledge and practical application, ensuring learners are well-prepared for real-world data science challenges.

Who Should Attend

The Machine Learning Speciality course by Koenig Solutions is designed for professionals seeking advanced knowledge in data science and machine learning techniques.

Data Scientists – Looking to deepen their expertise in machine learning algorithms and techniques

Machine Learning Engineers – Seeking to enhance their skills in building and deploying ML models

Data Analysts – Aiming to leverage ML for data-driven insights and business intelligence

Software Developers – Interested in incorporating machine learning into applications and systems

IT Professionals – Exploring a transition into data science and machine learning roles

Statisticians – Wanting to implement and optimize machine learning models in their work

Business Analysts – Seeking to understand data-driven decision-making through ML

Research Scientists – Utilizing machine learning for academic and industry research

Graduate Students – Pursuing careers in computer science, data science, and related fields

AI Enthusiasts – Passionate individuals eager to explore and apply machine learning concepts

Product Managers – Looking to leverage machine learning in product development and innovation

Technical Managers – Leading data-driven projects and managing ML implementation

LEARNING OBJECTIVES

- Explain the data science project lifecycle and analytics types
- Apply Python libraries for exploratory data analysis and pre-processing
- Build simple and multiple linear regression models
- Implement classification models such as logistic regression and SVM
- Evaluate classification models using accuracy, precision and recall
- Apply feature selection and dimensionality reduction such as PCA
- Configure cross-validation and hyperparameter tuning with grid search
- Develop clustering and deep learning models including ANNs

9 Modules, 86 Topics

01

Introduction to Data Science & Machine Learning

TOPICS

- The Need for Data Science and Machine Learning
- Types of Analytics
- The Lifecycle of a Data Science Project
- Essential Skills for a Data Scientist Role
- Types of Machine Learning

02

Python for Data Analysis & Pre-processing

TOPICS

- Python Libraries – NumPy, Pandas, Matplotlib, Seaborn, scikit-learn, TensorFlow, Keras, PyTorch

EXPLORATORY DATA ANALYSIS (EDA)

- Overview of EDA
- Data Cleaning Techniques – Handling Missing and Categorical Data
- Visualizations: 2D Scatter Plot, 3D Scatter Plot, Pair Plots
- Univariate, Bivariate, and Multivariate Analysis, Box Plots

DATA PRE-PROCESSING

- Importance of Data Pre-Processing
- Handling Missing Values
- Label Encoding for Categorical Data
- One-Hot Encoding Explained

DATA TRANSFORMATION

- The Need for Data Transformation
- Introduction to Data Normalization
- Normalization Techniques – Standard Scaler & Min-Max Scaler
- **Data Splitting:** Train, Test, and Validation

03

Supervised Machine Learning – Regression

SIMPLE LINEAR REGRESSION

- Introduction to Linear Regression
- Ordinary Least Squares and Regression Errors
- **Data Processing:** Train-Test Split
- Model Evaluation Metrics – R-Squared, RMSE, Score, and Interpretation
- Prediction Plot and Its Interpretation
- Hands-on Exercise

MULTIPLE LINEAR REGRESSION

- Concept of Multiple Linear Regression
- Degrees of Freedom and Adjusted R-Squared
- Assumptions of Multiple Linear Regression – Linearity, Multicollinearity, Autocorrelation, Endogeneity, Normality of Residuals, Homoscedasticity
- Understanding Time-Lag Data in Autocorrelation
- The Dummy Variable Trap
- Hands-on Exercise

04

Supervised Machine Learning – Classification

LOGISTIC REGRESSION

- Introduction to Logistic Regression
- Understanding Stratification
- The Confusion Matrix Explained
- Hands-on Exercise

SUPPORT VECTOR MACHINE (SVM)

- Intuitive Understanding of SVM
- Mathematical Explanation of SVM
- Types of SVM Kernel Functions
- Hands-on Exercise (IRIS Classification Problem)

DECISION TREE CLASSIFIER

- Introduction to Decision Trees
- Optimal Model Selection Criteria for Decision Trees
- Hands-on Exercise

RANDOM FOREST CLASSIFIER

- Introduction to Ensemble Learning and Random Forests
- Bagging vs Boosting Techniques
- Hands-on Exercise

EVALUATION METRICS FOR CLASSIFICATION MODELS

- Importance of Model Evaluation and the Accuracy Paradox
- Key Metrics – Accuracy, Precision, Recall, F1 Score
- Adjusting Threshold Values
- AUC-ROC Curve Analysis
- Hands-on Exercise

05

Feature Selection and Dimensionality Reduction

UNIVARIATE FEATURE SELECTION

- Importance of Feature Selection
- Overview of Univariate Feature Selection
- F-Test for Regression and Classification
- Hands-on F-Test (P-value Analysis)
- Chi-Square Test for Classification
- Feature Selection Techniques – SelectKBest, SelectPercentile & Generic Univariate Select
- Hands-on Chi-Square Test (P-value Analysis)

RECURSIVE FEATURE ELIMINATION (RFE)

- Introduction to RFE
- Feature Importance Scores and Ranking
- Hands-on RFE

PRINCIPAL COMPONENT ANALYSIS (PCA)

- The Need for Dimensionality Reduction and Importance of PCA
- Mathematical Concepts and Steps to Perform PCA
- Hands-on PCA (Comparing Models With and Without PCA)

06

Cross-Validation & Hyperparameter Tuning

CROSS-VALIDATION

- Importance of Cross-Validation
- Parameters and Implementation of Cross-Validation
- Hands-on Exercise and Result Interpretation

HYPERPARAMETER TUNING

- Introduction to Hyperparameter Tuning
- Grid Search vs Randomized Search
- Hands-on GridSearchCV (Analyzing Results)

07

Supervised Machine Learning – Natural Language Processing (NLP)

TOPICS

- Introduction to NLP
- Core Concepts – Tokenization, Stop Words, Stemming, Lemmatization
- TF-IDF Vectorization and Its Mathematical Intuition
- Building a Recommendation System Using NLP

08

Unsupervised Machine Learning – Clustering

TOPICS

- Introduction to Clustering
- Mathematical Intuition Behind Clustering
- The Elbow Method and Its Mathematical Explanation
- K-Means Clustering Implementation (Numerical Data)
- K-Means Clustering Implementation (Text Data Processing)

09

Introduction to Deep Learning

TOPICS

- The Need for Deep Learning and Its Applications
- Working of Artificial Neural Networks (ANNs)
- Understanding Backend (TensorFlow) and Frontend (Keras)
- Concept of Tensors
- Overview of Keras Model Building – Construct, Compile & Evaluate
- Activation Functions Explained
- Loss Functions Overview
- Optimization Techniques in Deep Learning
- Evaluation Metrics for Deep Learning Models

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

FLEXIBLE DELIVERY

Learn the Way That Suits You

Classroom Training

Live Online Classes (ILO)

Fly-Me-A-Trainer (FMAT)

Flexi (Self-Paced)

1-on-1 Training

Ready to Get Started?

Talk to a learning advisor about schedules, group training and customised delivery.

Visit koenig-solutions.com

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