Model Evaluation and Validation Training Course

Professional Development Training Course Outline

Category	Research and Data Analysis	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In today’s data-driven world, the accuracy and reliability of machine learning models are critical for business success and innovation. Model Evaluation and Validation Training Course equips participants with the advanced skills required to assess, validate, and optimize predictive models. Leveraging cutting-edge evaluation metrics, cross-validation techniques, and bias-variance analysis, this course ensures that professionals can deliver high-performance models with measurable impact. Participants will learn to identify pitfalls, improve generalization, and enhance decision-making across diverse domains such as finance, healthcare, marketing, and artificial intelligence.

Through a combination of hands-on projects, real-world case studies, and interactive learning, this course empowers participants to confidently evaluate model performance under various scenarios. Emphasis is placed on robust statistical analysis, automated testing pipelines, and reproducible validation frameworks, enabling data scientists and ML engineers to deploy models that are both accurate and reliable. By mastering model evaluation and validation, participants become proficient in optimizing algorithms, reducing errors, and driving business outcomes with actionable insights.

Programme Curriculum

Model Evaluation and Validation Training Course

Introduction

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Course Objectives

By the end of this training, participants will be able to:

1. Understand and apply advanced model evaluation techniques.
2. Perform cross-validation and bootstrap sampling to improve model reliability.
3. Implement performance metrics for regression, classification, and clustering.
4. Analyze bias-variance trade-offs to optimize model accuracy.
5. Detect overfitting and underfitting in machine learning models.
6. Conduct feature importance and sensitivity analysis for better model insights.
7. Apply hyperparameter tuning and model optimization strategies.
8. Leverage automated evaluation pipelines and reproducible workflows.
9. Utilize confusion matrices, ROC, AUC, and precision-recall curves for performance assessment.
10. Evaluate models in imbalanced datasets and real-world scenarios.
11. Perform model validation using time series and sequential data.
12. Interpret results with explainable AI and model interpretability tools.
13. Implement case studies and industry best practices for robust decision-making.

Target Audience

1. Data Scientists
2. Machine Learning Engineers
3. AI Practitioners
4. Business Analysts with ML exposure
5. Software Developers in AI/ML
6. Data Engineers
7. Research Scholars in AI/ML
8. Decision-makers leveraging predictive analytics

Course Modules

Module 1: Introduction to Model Evaluation

- Overview of model evaluation concepts
- Importance of validation in machine learning pipelines
- Common pitfalls in model assessment
- Metrics for supervised vs unsupervised learning
- **Case Study:** Evaluating a predictive model for retail sales forecasting

Module 2: Performance Metrics for Classification

- Accuracy, Precision, Recall, and F1-score
- ROC curve, AUC, and confusion matrix interpretation
- Handling imbalanced datasets
- Multi-class classification metrics
- **Case Study:** Fraud detection in banking transactions

Module 3: Performance Metrics for Regression

- Mean Absolute Error (MAE), Mean Squared Error (MSE), RMSE
- R-squared and Adjusted R-squared
- Residual analysis for model improvement
- Error distribution and outlier detection
- **Case Study:** Predicting house prices using regression models

Module 4: Cross-Validation and Resampling Techniques

- K-Fold and Stratified K-Fold cross-validation
- Leave-One-Out Cross-Validation
- Bootstrap sampling for robust estimation
- Avoiding data leakage
- **Case Study:** Customer churn prediction model evaluation

Module 5: Overfitting, Underfitting, and Bias-Variance Tradeoff

- Identifying overfitting and underfitting
- Understanding bias and variance in ML models
- Regularization techniques
- Model complexity analysis
- **Case Study:** Sentiment analysis model optimization

Module 6: Hyperparameter Tuning and Model Optimization

- Grid search and random search
- Bayesian optimization
- Automated hyperparameter tuning pipelines
- Trade-offs between speed and accuracy
- **Case Study:** Optimizing a recommendation engine

Module 7: Model Validation in Real-World Scenarios

- Time series validation and rolling forecasting
- Handling missing and noisy data
- Validation for imbalanced datasets
- Scenario-based model testing
- **Case Study:** Stock price prediction and evaluation

Module 8: Explainable AI and Model Interpretability

- Feature importance and SHAP values
- LIME and interpretability tools

- Model transparency in regulated industries
- Communicating model performance to stakeholders
- **Case Study:** Healthcare risk prediction model interpretability

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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