

LAPT

LONDON ACADEMY OF PROFESSIONAL TRAINING

CERTIFICATE

Adv Certificate in Machine Learning & AI Implementation

Practitioner Level



LAPT — London Academy of Professional Training

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Reference IT-DSA-P • IT Centres

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AT A GLANCE

REFERENCE	IT-DSA-P
AWARD	Certificate
ASSESSMENT	445 marks — 267 to pass (60%)
PREREQUISITES	None
VALIDITY	Lifetime
AWARDING BODY	LAPT — London Academy of Professional Training

CURRICULUM

1

Advanced Topics in AI

5 chapters · 30 classes65 marks

• 1 Deep Learning Architectures — 6 classes

> 1.1 Explaining Neural Network Fundamentals

> 1.2 Constructing Convolutional Neural Networks

> 1.3 Designing Recurrent Neural Networks

> 1.4 Implementing LSTM and GRU Networks

> 1.5 Exploring Transformer Architectures

> 1.6 Applying Deep Learning Architectures to Real-world Problems

• 2 Natural Language Processing Techniques — 6 classes

> 2.1 Understanding the Basics of Natural Language Processing

> 2.2 Exploring Tokenization and Text Preprocessing

> 2.3 Analyzing Syntax with Part-of-Speech Tagging

> 2.4 Utilizing Named Entity Recognition for Data Extraction

> 2.5 Applying Sentiment Analysis Techniques

> 2.6 Implementing Language Models for Text Generation

• 3 Generative Adversarial Networks (GANs) — 6 classes

> 3.1 Understanding the Basics of GANs

> 3.2 Exploring the Architecture of Generator and Discriminator

> 3.3 Training GANs: Techniques and Challenges

> 3.4 Implementing GANs Using Popular Frameworks

> 3.5 Evaluating GAN Performance Metrics

> 3.6 Applying GANs to Real-World Scenarios

• 4 AI in Reinforcement Learning Systems — 6 classes

> 4.1 Understanding Reinforcement Learning: Fundamentals and Concepts

> 4.2 Exploring Key Algorithms in Reinforcement Learning

> 4.3 Analyzing Policy and Value Functions in RL

> 4.4 Implementing Deep Reinforcement Learning Techniques

> 4.5 Evaluating and Optimizing Reward Structures

> 4.6 Applying Reinforcement Learning to Real-World Scenarios

• 5 Ethical and Responsible AI — 6 classes

> 5.1 Understanding the Principles of Ethical AI

> 5.2 Exploring Bias and Fairness in AI Systems

> 5.3 Analyzing AI Transparency and Explainability

> 5.4 Ensuring Privacy and Data Protection in AI

> 5.5 Evaluating the Societal Impact of AI Technologies

> 5.6 Implementing Ethical Guidelines in AI Development

• 1 Understanding the Principles of AI Solution Design — 6 classes

- › 1.1 Exploring the Fundamentals of AI Solution Design
- › 1.2 Identifying Core Components of AI Systems
- › 1.3 Analyzing Data Requirements for AI Solutions
- › 1.4 Prioritizing Objectives for Effective AI Design
- › 1.5 Evaluating Ethical Considerations in AI Solutions
- › 1.6 Applying AI Design Principles to Real-World Scenarios

• 2 Data Acquisition and Preprocessing Strategies — 6 classes

- › 2.1 Understanding Data Acquisition Methods
- › 2.2 Identifying Relevant Data Sources
- › 2.3 Implementing Data Collection Techniques
- › 2.4 Cleaning and Preparing Raw Data
- › 2.5 Applying Data Transformation Techniques
- › 2.6 Evaluating Data Quality for AI Solutions

• 3 Model Selection and Evaluation Techniques — 6 classes

- › 3.1 Distinguishing Models: An Introduction to Supervised and Unsupervised Learning
- › 3.2 Exploring Model Selection: Criteria and Considerations
- › 3.3 Applying Cross-Validation Techniques for Model Assessment
- › 3.4 Evaluating Model Performance: Metrics and Interpretations
- › 3.5 Selecting Optimal Models: Understanding Bias-Variance Trade-off
- › 3.6 Implementing Model Evaluation: Techniques and Tools

• 4 Deployment and Integration of AI Models — 6 classes

- › 4.1 Exploring AI Model Deployment Environments
- › 4.2 Preparing AI Models for Deployment
- › 4.3 Implementing Continuous Integration and Continuous Deployment (CI/CD) in AI
- › 4.4 Integrating AI Models with Existing Systems
- › 4.5 Monitoring and Maintaining Deployed AI Models
- › 4.6 Evaluating the Performance of Integrated AI Solutions

• 5 Monitoring and Optimizing AI Solutions — 6 classes

- › 5.1 Understanding Key Metrics for AI Monitoring
- › 5.2 Implementing Continuous Performance Tracking
- › 5.3 Analyzing AI Solution Data for Insights
- › 5.4 Utilizing Feedback Loops to Optimize AI Models
- › 5.5 Identifying and Mitigating AI Drift
- › 5.6 Deploying Tools for Automated AI System Alerts

• 1 Understanding Data Structures and Types — 6 classes

- › 1.1 Identifying Common Data Structures
- › 1.2 Exploring Data Types in Machine Learning
- › 1.3 Comparing Structured and Unstructured Data
- › 1.4 Transforming Data With Python Libraries
- › 1.5 Applying Data Types in Real-world Scenarios
- › 1.6 Evaluating Data Quality for Analysis

• 2 Data Cleaning and Preprocessing Techniques — 6 classes

- › 2.1 Understanding the Importance of Data Cleaning
- › 2.2 Identifying Common Data Quality Issues
- › 2.3 Techniques for Handling Missing Data
- › 2.4 Implementing Data Normalization and Standardization
- › 2.5 Detecting and Managing Outliers in Data Sets
- › 2.6 Applying Data Transformation and Encoding Techniques

• 3 Exploratory Data Analysis and Visualization — 6 classes

- › 3.1 Introduction to Exploratory Data Analysis: Key Concepts and Goals
- › 3.2 Understanding and Cleaning the Data: Techniques and Strategies
- › 3.3 Identifying Patterns and Trends: Using Statistical Summaries
- › 3.4 Visualizing Data with Graphs: Choosing the Right Plot
- › 3.5 Exploring Relationships: Correlation and Causation Analysis
- › 3.6 Communicating Insights: Crafting a Data-Driven Story

• 4 Advanced Data Transformation and Feature Engineering — 6 classes

- › 4.1 Understanding Advanced Data Transformations
- › 4.2 Exploring Techniques for Feature Creation
- › 4.3 Implementing Feature Selection Methods
- › 4.4 Applying Dimensionality Reduction Techniques
- › 4.5 Utilizing Feature Scaling and Normalization
- › 4.6 Engineering Features for Improved Model Performance

• 5 Efficient Data Manipulation with Pandas and NumPy — 6 classes

- › 5.1 Introduction to Pandas and NumPy: Setting Up Your Environment
- › 5.2 Exploring Data Structures in Pandas and NumPy
- › 5.3 Performing Data Import and Export Operations
- › 5.4 Manipulating Data with Pandas: Filtering and Sorting Techniques
- › 5.5 Executing Matrix Operations with NumPy for Data Analysis
- › 5.6 Combining Pandas and NumPy for Efficient Large-scale Data Handling

• 1 Understanding Ethical Principles in AI — 6 classes

- › 1.1 Exploring the Foundations of AI Ethics
- › 1.2 Identifying Key Ethical Challenges in AI
- › 1.3 Analyzing Case Studies on AI Ethical Dilemmas
- › 1.4 Understanding Bias and Fairness in AI Systems
- › 1.5 Evaluating Data Privacy and Consent in AI
- › 1.6 Implementing Ethical Guidelines in AI Practice

• 2 Bias and Fairness in Machine Learning — 6 classes

- › 2.1 Understanding Bias in Machine Learning
- › 2.2 Identifying Sources of Bias in AI Models
- › 2.3 Examining the Impact of Bias on Model Fairness
- › 2.4 Strategies for Mitigating Bias in Machine Learning
- › 2.5 Assessing Fairness in AI Systems
- › 2.6 Implementing Fairness-Aware AI Models

• 3 Privacy and Data Protection in AI Systems — 6 classes

- › 3.1 Understanding the Fundamentals of Privacy in AI Systems
- › 3.2 Exploring Data Protection Laws and Regulations
- › 3.3 Identifying Privacy Risks in AI Deployments
- › 3.4 Implementing Data Minimization and Anonymization Techniques
- › 3.5 Evaluating Transparency and Consent in Data Collection
- › 3.6 Applying Best Practices for Privacy-Preserving AI Systems

• 4 Transparency and Accountability in AI — 6 classes

- › 4.1 Understanding Transparency in AI Systems
- › 4.2 Exploring Accountability Mechanisms in AI
- › 4.3 Identifying Ethical Challenges in AI Transparency
- › 4.4 Evaluating Case Studies on AI Accountability
- › 4.5 Implementing Best Practices for Transparency in AI
- › 4.6 Designing Accountability Frameworks for AI Solutions

• 5 Governance Frameworks and Ethical AI Implementation — 6 classes

- › 5.1 Understanding AI Governance: Key Principles and Frameworks
- › 5.2 Exploring the Role of Regulations and Standards in AI
- › 5.3 Identifying and Mitigating Risks in AI Implementation
- › 5.4 Applying Ethical Principles to AI Design and Deployment
- › 5.5 Evaluating AI Systems for Compliance and Accountability
- › 5.6 Developing Strategies for Transparent and Fair AI Practices

• 1 Understanding the Basics of Machine Learning — 6 classes

- › 1.1 Defining Machine Learning: Concepts and Scope
- › 1.2 Exploring Types of Machine Learning: Supervised, Unsupervised, and Reinforcement
- › 1.3 Understanding Data: Inputs, Outputs, and Importance
- › 1.4 Recognizing Patterns: How Algorithms Learn
- › 1.5 Evaluating Models: Accuracy, Precision, and Recall
- › 1.6 Applying Ethical Considerations in Machine Learning

• 2 Data Preprocessing Techniques for Machine Learning — 6 classes

- › 2.1 Understanding the Importance of Data Preprocessing
- › 2.2 Exploring Data Cleaning Methods
- › 2.3 Handling Missing Data Effectively
- › 2.4 Normalizing and Scaling Data for Consistency
- › 2.5 Encoding Categorical Variables for Model Readiness
- › 2.6 Implementing Feature Engineering Techniques

• 3 Exploring Supervised Learning Algorithms — 6 classes

- › 3.1 Understanding Supervised Learning Concepts
- › 3.2 Exploring Linear Regression Techniques
- › 3.3 Implementing Decision Trees for Classification
- › 3.4 Analyzing Support Vector Machines
- › 3.5 Evaluating Model Performance Metrics
- › 3.6 Applying Ensemble Methods in Supervised Learning

• 4 Unsupervised Learning and Clustering Techniques — 6 classes

- › 4.1 Understanding Unsupervised Learning
- › 4.2 Exploring Clustering Techniques
- › 4.3 Implementing K-Means Clustering
- › 4.4 Analyzing Hierarchical Clustering
- › 4.5 Applying DBSCAN for Density-Based Clustering
- › 4.6 Evaluating Clustering Performance

• 5 Model Evaluation and Performance Metrics — 6 classes

- › 5.1 Understanding the Importance of Model Evaluation
- › 5.2 Exploring Common Performance Metrics in Machine Learning
- › 5.3 Comparing Different Model Evaluation Techniques
- › 5.4 Interpreting Confusion Matrix for Classification Models
- › 5.5 Calculating Precision, Recall, and F1-Score
- › 5.6 Assessing Model Performance Through ROC Curves and AUC

• 1 Understanding Model Evaluation Metrics — 6 classes

- › 1.1 Exploring the Importance of Model Evaluation in AI
- › 1.2 Understanding Accuracy, Precision, and Recall Metrics
- › 1.3 Interpreting F1 Score and Its Application
- › 1.4 Analyzing ROC Curves and AUC in Model Assessment
- › 1.5 Evaluating Confusion Matrix Insights for Model Improvement
- › 1.6 Implementing Cross-Validation for Robust Model Evaluation

• 2 Advanced Techniques for Model Validation — 6 classes

- › 2.1 Understanding Cross-Validation Techniques
- › 2.2 Implementing k-Fold Cross-Validation
- › 2.3 Applying Leave-One-Out Cross-Validation
- › 2.4 Utilizing Stratified Sampling in Validation
- › 2.5 Analyzing Model Validation Metrics
- › 2.6 Comparing Validation Approaches for Robust Models

• 3 Hyperparameter Tuning and Optimization — 6 classes

- › 3.1 Understanding Hyperparameters in Machine Learning Models
- › 3.2 Analyzing the Impact of Hyperparameter Values
- › 3.3 Exploring Methods for Hyperparameter Tuning
- › 3.4 Implementing Grid Search for Hyperparameter Optimization
- › 3.5 Applying Random Search for Enhanced Model Performance
- › 3.6 Comparing Hyperparameter Optimization Techniques

• 4 Model Deployment Strategies — 6 classes

- › 4.1 Understanding Model Deployment Environments
- › 4.2 Preparing Models for Deployment
- › 4.3 Containerizing Machine Learning Models
- › 4.4 Implementing Deployment Pipelines
- › 4.5 Monitoring and Managing Deployed Models
- › 4.6 Scaling Model Deployments Across Platforms

• 5 Monitoring and Maintaining Deployed Models — 6 classes

- › 5.1 Understanding the Importance of Model Monitoring
- › 5.2 Setting Up Monitoring Tools and Pipelines
- › 5.3 Analyzing Model Performance Metrics
- › 5.4 Identifying and Responding to Model Drift
- › 5.5 Implementing Automated Alerts and Notifications
- › 5.6 Ensuring Model Robustness and Reliability Over Time