LAPT

LONDON ACADEMY OF PROFESSIONAL TRAINING

CERTIFICATE

Adv Certificate in Machine Learning & AI Implementation

Practitioner Level

LAPT — London Academy of Professional Training

Address 85 Great Portland Street, W1W 7LT, London, United Kingdom

Email info@lapt.org

Telephone +44 7513 283044

Web lapt.org

Reference IT-DSA-P • IT Centres

UKPRN 10067351 • Registered in England and Wales, company 4984798

6	30	180	445	60%	Lifetime
SUBJECTS	CHAPTERS	CLASSES	TOTAL MARKS	PASS MARK	VALIDITY

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 classes · **65 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

2 AI Solution Design

5 chapters · 30 classes **90 marks**

- **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

3 Data Manipulation and Analysis

5 chapters · 30 classes **65 marks**

- **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

4 Ethics and Governance in AI

5 chapters · 30 classes **45 marks**

- **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

5 Fundamentals of Machine Learning

5 chapters · 30 classes **90 marks**

- **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

6 Model Evaluation and Deployment

5 chapters · 30 classes **90 marks**

- **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