Quantum Machine Learning for Data Analysis 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 the era of exponential data growth and rising computational demands, Quantum Machine Learning (QML) is emerging as a powerful frontier for revolutionizing how we analyze and extract insights from massive datasets. Quantum Machine Learning for Data Analysis Training Course is designed to bridge the gap between traditional machine learning and the capabilities of quantum computing. By merging quantum mechanics with artificial intelligence, this course empowers professionals to understand, build, and deploy quantum-enhanced models that promise speedups in data-intensive tasks such as classification, regression, and clustering.

As industries across sectors increasingly seek quantum-ready data scientists, this hands-on program equips learners with essential quantum computing fundamentals, QML frameworks, and the ability to apply quantum techniques in real-world datasets using tools like Qiskit, PennyLane, and TensorFlow Quantum. This course is ideal for professionals, researchers, and students aiming to lead innovation in AI-powered quantum data analysis, predictive analytics, and advanced computational modeling.

Programme Curriculum

Quantum Machine Learning for Data Analysis Training Course

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Course Objectives

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

1. Understand the foundational principles of quantum mechanics and their relevance to machine learning.
2. Explore key differences between classical and quantum machine learning algorithms.
3. Gain hands-on experience with quantum programming using Qiskit and PennyLane.
4. Implement quantum classifiers, variational circuits, and hybrid models.
5. Analyze real-world datasets using quantum-enhanced algorithms.
6. Compare the performance of classical vs. quantum machine learning approaches.
7. Build end-to-end quantum data analysis pipelines.
8. Understand limitations and future directions of quantum computing in AI.
9. Apply quantum kernel methods and quantum support vector machines.
10. Integrate quantum neural networks into traditional data workflows.
11. Evaluate quantum circuits using cost functions and optimization strategies.
12. Deploy and test quantum ML models on simulators and real quantum devices.
13. Develop skills to contribute to quantum AI research or industry applications.

Target Audiences

1. Data Scientists seeking cutting-edge AI capabilities
2. Machine Learning Engineers aiming to explore quantum computing
3. AI Researchers focusing on algorithm optimization
4. University Students pursuing Quantum Computing or AI fields
5. IT Professionals interested in futuristic data solutions
6. Policy Makers & Analysts exploring quantum innovation
7. Tech Entrepreneurs in emerging technologies
8. Academics and Lecturers in Computer Science and Physics

Course Duration: 5 days

Course Modules

Module 1: Introduction to Quantum Computing and Machine Learning

- Basics of quantum mechanics for computing
- Overview of quantum computing models (qubits, superposition, entanglement)
- Introduction to classical vs. quantum machine learning
- Key platforms: Qiskit, TensorFlow Quantum, PennyLane
- Hands-on lab: First quantum circuit
- **Case Study:** Comparing classical and quantum models on simple classification

Module 2: Quantum Data Representation

- Encoding classical data into quantum states
- Basis encoding, amplitude encoding, angle encoding
- Feature mapping in quantum models
- Impact of encoding on quantum performance
- Hands-on: Data encoding using Qiskit

- **Case Study:** Quantum encoding of medical data for pattern detection

Module 3: Quantum Algorithms for Supervised Learning

- Quantum classification models (QNNs, QSVMs)
- Variational quantum classifiers
- Parameterized quantum circuits
- Cost functions and gradient-based optimization
- Hands-on: Build a quantum classifier
- **Case Study:** QSVM applied to financial market trend prediction

Module 4: Quantum Unsupervised Learning

- Quantum clustering techniques
- Quantum k-means and principal component analysis
- Dimensionality reduction with quantum circuits
- Hybrid models in unsupervised learning
- Hands-on: Clustering with PennyLane
- **Case Study:** Segmenting customer data using quantum PCA

Module 5: Hybrid Quantum-Classical Models

- Combining classical neural nets with quantum layers
- Quantum embeddings in deep learning models
- Transfer learning in quantum frameworks
- Tools for hybrid model development
- Hands-on: TensorFlow Quantum tutorial
- **Case Study:** Sentiment analysis using hybrid QML model

Module 6: Quantum Optimization and Variational Circuits

- Introduction to VQAs (Variational Quantum Algorithms)
- Quantum annealing and parameter tuning
- Optimization landscapes in quantum ML
- Training and evaluating variational models
- Hands-on: Building VQA for regression
- **Case Study:** Quantum portfolio optimization in investment strategies

Module 7: Implementing Quantum ML on Real Devices

- Quantum hardware vs. simulators
- IBM Q Experience, Rigetti, and IonQ access
- Running ML models on quantum processors
- Error mitigation and noise reduction
- Hands-on: Execute models on IBMQ backend
- **Case Study:** Real-time quantum prediction for COVID-19 dataset

Module 8: Future Trends and Career Opportunities in QML

- Emerging trends in quantum AI
- Quantum machine learning research frontiers
- Industry applications in finance, healthcare, defense
- Career paths in quantum data science
- Building a QML project portfolio
- **Case Study:** Roadmap to becoming a certified Quantum Data Scientist

Training Methodology

- Interactive expert-led lectures using real-world examples
- Hands-on coding labs with Qiskit, PennyLane, and TensorFlow Quantum
- Case-based learning and application on actual datasets
- Peer collaboration on mini-projects and challenges
- Continuous assessment through quizzes and simulations
- Real device deployment with industry tools

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

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com