AI+ Quantum™

Duration: 40 hours

Course Overview

This comprehensive course provides a deep dive into the intersection of Artificial Intelligence (AI) and Quantum Computing, exploring fundamental concepts, advanced techniques, and ethical considerations. Participants will gain insights into Quantum Computing Gates, Circuits, and Algorithms, with a particular focus on their application in AI domains. Through discussions on Quantum Machine Learning and Quantum Deep Learning, attendees will discover how these technologies are reshaping traditional AI methodologies. Ethical implications are carefully examined throughout, alongside an exploration of current trends and future outlooks. Real-world case studies offer practical insights, while a hands-on workshop solidifies understanding, making this course essential for professionals and enthusiasts alike seeking to navigate and contribute to the transformative landscape of AI and Quantum Computing.

Course Prerequisites

- A foundational knowledge of AI concepts, no technical skills are required.
- Willingness to exploring unconventional approaches to problem-solving within the context of AI and Quantum.
- Openness to engage critically with ethical dilemmas and considerations related to AI technology in quantum practices.

Course Agenda

Module 1: Overview of Artificial Intelligence (AI) and Quantum Computing

- Artificial Intelligence Refresher
- Quantum Computing Refresher

Module 2: Quantum Computing Gates, Circuits, and Algorithms

- Quantum Gates and their Representation
- Multi Qubit Systems and Multi Qubit Gates

Module 3: Quantum Algorithms for AI

- Core Quantum Algorithms
- QFT and Variational Quantum Algorithms

Module 4: Quantum Machine Learning

- Algorithms for Regression and Classification

- Algorithms for Dimensionality and Clustering

Module 5: Quantum Deep Learning

- Algorithms for Neural Networks – Part I
- Algorithms for Neural Networks – Part II

Module 6: Ethical Considerations

- Ethics for Artificial Intelligence
- Ethics for Quantum Computing

Module 7: Trends and Outlook

- Current Trends and Tools
- Future Outlook and Investment

Module 8: Use Cases & Case Studies

- Quantum Use Cases
- QML Case Studies

Module 9: Workshop

- Project – I: QSVM for Iris Dataset
- Project – II: VQC/QNN on Iris Dataset
- Bonus: IBM Quantum Computers