

Introduction to Quantum Computing (IBM Qiskit) Training

COURSE CONTENT

GET IN TOUCH



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About Multisoft

Train yourself with the best and develop valuable in-demand skills with Multisoft Systems. A leading certification training provider, Multisoft collaborates with top technologies to bring world-class one-on-one and certification trainings. With the goal to empower professionals and business across the globe, we offer more than 1500 training courses, which are delivered by Multisoft's global subject matter experts. We offer tailored corporate training; project Based Training, comprehensive learning solution with lifetime e-learning access, after training support and globally recognized training certificates.

About Course

The Introduction to Quantum Computing (IBM Qiskit) Training by Multisoft Systems is designed to help learners explore the fascinating world of quantum mechanics and computation. This course introduces the fundamental principles of quantum theory, qubits, superposition, entanglement, and quantum gates, empowering participants to understand how quantum computers differ from classical systems.

Module 1: Introduction to Quantum Computing

- ✓ What is Quantum Computing?
- ✓ Classical vs Quantum Computation
- ✓ Applications and Real-World Use Cases
- ✓ Quantum Supremacy and Modern Challenges
- ✓ IBM Quantum Ecosystem Overview

Module 2: Quantum Mechanics Fundamentals

- ✓ Qubits and Quantum States
- ✓ Superposition and Entanglement
- ✓ Quantum Measurement
- ✓ Bloch Sphere Representation
- ✓ Quantum Gates and Operators

Module 3: Introduction to IBM Qiskit

- ✓ Overview of Qiskit Framework
- ✓ Qiskit Installation and Environment Setup
- ✓ Qiskit Components: Terra, Aer, Ignis, and Aqua
- ✓ Working with Jupyter Notebook
- ✓ Exploring IBM Quantum Lab and Quantum Experience

Module 4: Building Quantum Circuits

- ✓ Creating and Visualizing Quantum Circuits
- ✓ Using Quantum and Classical Registers
- ✓ Common Quantum Gates (X, H, T, CNOT, etc.)
- ✓ Circuit Composition and Control Flow
- ✓ Simulation with Qiskit Aer Simulator

Module 5: Quantum Algorithms – Foundation

- ✓ Quantum Parallelism
- ✓ Deutsch-Josza Algorithm
- ✓ Bernstein-Vazirani Algorithm
- ✓ Grover's Search Algorithm (Introduction)
- ✓ Quantum Teleportation Experiment

Module 6: Quantum Measurement and Noise

- ✓ Measurement in Computational Basis
- ✓ Understanding Decoherence and Noise
- ✓ Quantum Error Mitigation Techniques
- ✓ Running Experiments on Real IBM Quantum Devices

Module 7: Advanced Algorithms and Applications

- ✓ Quantum Fourier Transform (QFT)
- ✓ Shor's Algorithm (Factoring Integers)
- ✓ Grover's Algorithm – Advanced Implementation
- ✓ Quantum Machine Learning Overview
- ✓ Variational Quantum Eigensolver (VQE) Concept

Module 8: Qiskit Extensions and Ecosystem Tools

- ✓ Qiskit Nature, Machine Learning, and Finance Modules
- ✓ Quantum Information and Quantum Error Correction
- ✓ Using Qiskit Runtime Services
- ✓ Integration with Cloud-Based IBM Quantum Systems