

Blockchain & Distributed Ledger Technology

Curriculum & Learning Plan

Level	Beginner
Recommended duration	30–35 hours
Format	Concepts + demonstrations + guided hands-on activities
Prerequisites	Basic computer literacy; no blockchain programming experience required
Assessment	Module quizzes + practical exercises + final assessment
Certificate	Exam-based certificate

Module 1 — Blockchain & DLT Foundations

Estimated time: 3.5 hours

- What is a distributed ledger?
- Centralized vs decentralized vs distributed systems
- Blockchain terminology: blocks, transactions, nodes, ledgers and wallets
- Why blockchain emerged and problems it aims to solve
- Permissionless vs permissioned networks
- Real-world use cases and common misconceptions
- Activity: map a traditional database workflow to a blockchain workflow

Module 2 — How Blockchain Works

Estimated time: 4 hours

- Structure of a block and blockchain data flow
- Transactions, digital signatures and public/private keys
- Hashing and immutability
- Merkle trees and transaction verification
- Nodes, peer-to-peer networking and synchronization
- Wallets, addresses and transaction lifecycle
- Activity: trace a transaction from creation to confirmation

Module 3 — Consensus Mechanisms

Estimated time: 4 hours

- Why consensus is required
- Proof of Work (PoW)
- Proof of Stake (PoS)
- Delegated and authority-based approaches
- Practical Byzantine Fault Tolerance concepts

- Trade-offs: security, decentralization, scalability, energy and performance
- Activity: compare consensus mechanisms for different business scenarios

Module 4 — Smart Contracts & Programmable Blockchains

Estimated time: 4.5 hours

- What smart contracts are and how they execute
- Smart contract lifecycle
- State, transactions, events and contract interactions
- Introduction to Ethereum and EVM concepts
- Gas, fees and transaction costs
- Common smart contract risks and failure modes
- Hands-on: inspect and interact with a sample smart contract using a test network/explorer

Module 5 — Tokens, Digital Assets & Applications

Estimated time: 4 hours

- Fungible vs non-fungible tokens
- Token standards and practical use cases
- Stablecoins and digital asset concepts
- NFTs beyond collectibles
- Decentralized applications (dApps)
- DeFi fundamentals and associated risks
- Activity: design a token-based solution for a real business problem

Module 6 — Enterprise Blockchain & DLT

Estimated time: 3.5 hours

- Permissioned DLT architecture
- Identity, access control and governance
- Enterprise use cases: supply chain, credentials, finance and records
- Inter-organizational data sharing
- Privacy and confidential transactions
- Performance, interoperability and operational considerations
- Activity: create a high-level enterprise DLT architecture

Module 7 — Blockchain Security, Risks & Governance

Estimated time: 4 hours

- Wallet and key-management risks
- 51% attacks, Sybil attacks and double-spending concepts
- Smart contract vulnerabilities
- Phishing, malicious approvals and social engineering
- Custody, access control and recovery

- On-chain transparency vs privacy
- Governance, compliance and regulatory considerations
- Activity: perform a basic risk assessment for a blockchain solution

Module 8 — Implementation, Testing & Capstone

Estimated time: 5.5 hours

- Choosing blockchain vs conventional database technology
- Requirements for a blockchain project
- Network, data, identity and integration considerations
- Testing blockchain applications: functional, API, transaction and smart-contract testing
- Monitoring and operational considerations
- Project documentation and solution evaluation
- Capstone: design an end-to-end blockchain/DLT solution for a selected use case
- Final assessment and certificate eligibility

Capstone Project

Stage	Deliverable
1. Problem definition	Define the business problem and justify whether DLT is appropriate.
2. Architecture	Create a high-level network, identity, data and application architecture.
3. Transaction flow	Document participants, transactions, validation and settlement.
4. Risk analysis	Identify security, privacy, governance and operational risks.
5. Testing strategy	Prepare functional, integration, API and transaction-level test scenarios.
6. Final presentation	Present the proposed solution, trade-offs and expected outcomes.

Assessment Structure

- Module quizzes: 20%
- Hands-on activities: 20%
- Capstone project: 30%
- Final exam: 30%
- Recommended certificate threshold: 60% overall, subject to institutional policy

Suggested learner profile

The course is designed for students, early-career technology professionals, QA/IT professionals, business and product teams, and learners who want a practical foundation in blockchain and DLT without assuming prior blockchain development experience.