BLOCKCHAIN AND SMART CONTRACT DEVELOPMENT



GENTEX®
TRAINING CENTER

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Introduction

Blockchain and Smart Contract Development Training Course delivers a structured path into distributed ledger technology and the programs that run on it. Participants examine how blocks are chained, validated and secured across a peer-to-peer network, and how consensus keeps every copy of the ledger in agreement. The course then moves to smart contracts: self-executing code that enforces rules without a middleman. Furthermore, learners write, test and deploy contracts on live test networks, and study token standards, decentralised applications and security practices. As a result, they leave able to connect technical design choices to real business outcomes in finance, supply chains and public services.

Blockchain and Smart Contract Development Training Course Objectives

- Explain how distributed ledgers, hashing and digital signatures protect data integrity.
- Compare consensus mechanisms, including Proof of Work, Proof of Stake and Practical Byzantine Fault Tolerance.
- Distinguish public, private and consortium blockchain architectures and select the right one for a use case.
- Write, compile and deploy Solidity smart contracts on Ethereum-compatible networks.
- Apply ERC-20 and ERC-721 token standards to build fungible and non-fungible assets.
- Test contracts with Hardhat and Truffle, and manage local nodes through Ganache.
- Identify common vulnerabilities such as reentrancy and integer overflow, and apply mitigation patterns.
- Connect smart contracts to web front ends using Web3.js, Ethers.js and wallet providers.
- Evaluate gas costs, scalability options and Layer 2 solutions.
- Assess legal, governance and data-privacy considerations for blockchain projects.

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Course Methodology

- Instructor-led sessions that move from concepts to live coding.
- Guided lab work on test networks, with each participant deploying working contracts.
- Case studies of blockchain platforms in banking, logistics and public records.
- Group design exercises where teams map a business problem to a blockchain architecture.
- Code review and peer feedback on security and efficiency.
- Templates, checklists and reference code that participants keep after the course.

Who Should Take This Course

- Software developers and engineers moving into blockchain work.
- IT architects and technical leads designing distributed systems.
- Fintech, banking and payments professionals exploring digital assets.
- Product managers and consultants scoping blockchain use cases.
- Data and security specialists extending skills into decentralised systems.
- Technology managers who oversee digital innovation programmes.

Blockchain and Smart Contract Development Training Course Outlines

Day 1: Foundations of Blockchain Technology

- The history of distributed ledgers and the Bitcoin white paper.
- How blocks, chains and Merkle trees store and verify data.
- Cryptographic hashing and public-key cryptography in practice.
- Digital signatures, wallets and key management basics.

- Peer-to-peer network topology and node roles.
- Consensus mechanisms: Proof of Work, Proof of Stake and Practical Byzantine Fault Tolerance.
- Public, private and consortium networks compared.

Day 2: Ethereum and the Smart Contract Model

- The Ethereum Virtual Machine and how it executes code.
- Accounts, addresses, transactions and gas fees.
- Setting up development tools: Remix, Hardhat and Ganache.
- Solidity syntax, data types and functions.
- Contract state, storage and memory.
- Events, modifiers and error handling.
- Deploying a first contract to a test network.

Day 3: Building and Testing Smart Contracts

- Structuring a project with Hardhat and Truffle.
- Writing unit tests in JavaScript and Solidity.
- Local node deployment and debugging workflows.
- Interacting with contracts through Web3.js and Ethers.js.
- Reading and writing contract state from a front end.
- Using oracles such as Chainlink for external data.
- Version control and reproducible build practices.

Day 4: Tokens, DApps and Security

- ERC-20 fungible tokens and ERC-721 non-fungible tokens.

- Minting, transferring and burning tokens safely.
- Building a decentralised application end to end.
- Wallet integration and transaction signing.
- Common vulnerabilities: reentrancy, overflow and access control gaps.
- Secure coding patterns and third-party audit basics.
- Gas optimisation techniques.

Day 5: Architecture, Governance and Delivery

- Selecting a platform: Ethereum, Hyperledger Fabric or Polygon.
- Layer 2 scaling and interoperability approaches.
- Privacy, compliance and data protection obligations.
- Governance models for consortium networks.
- Cost modelling and return on investment for blockchain projects.
- Designing a pilot and roadmap for adoption.
- Final project presentation and peer review.

Conclusion

By successfully completing Blockchain and Smart Contract Development, participants will gain a working command of distributed ledger design, Solidity development, token standards and contract security. They will also have acquired the judgement to choose suitable platforms, estimate costs and govern blockchain initiatives responsibly. Gentex Training Center structures the programme so that each idea is practised in code before learners apply it in their own organisations.

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FAQs for the Blockchain and Smart Contract Development course

Q1 What is the "Blockchain and Smart Contract Development" course about?

It covers distributed ledger technology and the self-executing contracts that run on it. You learn how networks reach consensus, how Solidity contracts are written and deployed, and how tokens and decentralised applications are built.

Q2 What are the key benefits of the "Blockchain and Smart Contract Development" course?

You gain practical development skills that apply across finance, logistics and public services. The course builds confidence in deploying live contracts, spotting security flaws early, and explaining blockchain value to business stakeholders.

Q3 What skills will I gain from the "Blockchain and Smart Contract Development" course?

Smart contract development in Solidity, distributed ledger architecture design, token standards implementation, and smart contract security auditing.

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Q4 What tools, methods, or standards are covered in the "Blockchain and Smart Contract Development" course?

Remix, Hardhat, Truffle, Ganache, Web3.js, Ethers.js, Chainlink oracles, the Ethereum Virtual Machine, ERC-20 and ERC-721 token standards, and consensus methods such as Proof of Stake and Practical Byzantine Fault Tolerance.

Q5 How is the "Blockchain and Smart Contract Development" course applied in real-world practice?

Teams use it to build payment rails, tokenised assets, traceable supply chains and shared record systems. Participants take a use case from design through testing to a pilot deployment on a live test network.