BLOCKCHAIN

IN COLLABORATION WITH ST-IIT BOMBAY

Course Curriculum

CAN AI THINK LIKE US?

Blockchain is the most secure and transparent way to transact and share data, creating a distributed ledger that cannot be altered

VENUE: IIT DELHI

13th & 14th September 2025

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2 DAY WORKSHOP BLOCKCHAIN

INTRODUCTION

The goal of this session is to offer a comprehensive educational experience. The program makes sure that participants acquire both fundamental information and practical skills by striking a balance between theoretical knowledge and practical experience. Collaborative hackathons, real life case studies and interactive workshops which will lead to successfully integrating important ideas. From fundamental ideas to sophisticated applications, the methodical flow accommodates a range of learning speeds while encouraging collaboration and problem-solving skills. All participants are guaranteed a thorough, interesting, and goal-driven learning experience using this methodology.

DAY 1: INTRODUCTION & FOUNDATION

SESSION 1: INTRODUCTION TO BLOCKCHAIN TECHNOLOGY (1.5 HRS)

- Evolution of Blockchain (Web1 → Web2 → Web3).
- What is Blockchain? Core principles: decentralization, immutability, transparency.
- Difference between Blockchain & Traditional Databases.
- Types of Blockchains: Public, Private, Consortium.
- Real-world applications: Finance, Supply Chain, Healthcare, Education.

SESSION 4: BITCOIN & CRYPTOCURRENCY FUNDAMENTALS (2 HRS)

- Bitcoin as the first use-case of blockchain
- Transaction lifecycle in Bitcoin
- Mining explained (conceptual demo)
- Wallets, addresses, and UTXOs
- Challenges: scalability, energy use

Hands-on Demo: Setting up a simple crypto wallet & making a test transaction on a testnet

SESSION 2 : BLOCKCHAIN ARCHITECTURE & MECHANISMS (2 HRS)

- Structure of a Block (Header, Hash, Timestamp, Transactions).
- How blocks are chained.
- Consensus mechanisms: Proof of Work, Proof of Stake, PoA, DPoS.
- Smart contracts overview.
- Discussion: Why consensus matters?

Hands-on Demo: Visualizing blockchain using a simple block explorer or simulation tool.

SESSION 3: CRYPTOGRAPHY IN BLOCKCHAIN (1.5 HRS)

- Hashing algorithms (SHA-256)
- Digital signatures and public-private keys.
- Merkle Trees and their role in transactions.
- Security benefits & limitations.

Activity: Hashing exercise – Participants generate and compare hashes of sample data.

WRAP UP & REFLECTION

Recap of Day 1 Concepts
Review the day's activities and key learnings.

Q&A Session
Open discussion for clarifications.

Preview of Day 2
Overview of Smart Contracts.

DAY 2: SMART CONTRACTS, ETHEREUM

SESSION 5: ETHEREUM & SMART CONTRACTS (2 HRS)

- What is Ethereum & how it differs from Bitcoin.
- Ethereum Virtual Machine (EVM).
- Introduction to Solidity (smart contract language).
- Lifecycle of a smart contract.

Hands-on Lab: Writing a simple "Hello Blockchain" contract in Solidity (using Remix IDE).

SESSION 8: CAPSTONE & GROUP ACTIVITY (2 HRS)

- Group project: Design a blockchain-based solution for a real-world problem (supply chain, voting, healthcare, finance, etc.)
- Each group presents their idea + smart contract flow
- Q&A, Feedback, Career Opportunities in Blockchain
- Certification distribution
- Participant feedback

SESSION 6: DECENTRALIZED APPLICATIONS (DAPPS) (1.5 HRS)

- DApps architecture: frontend + smart contract + blockchain.
- Use-cases: DeFi, NFTs, DAOs, Identity Management.
- Interaction with smart contracts via MetaMask & Web3.js.

- **Activity: Deploying a simple smart contract and interacting with it.**

SESSION 7: BLOCKCHAIN PLATFORMS & ECOSYSTEM (1.5 HRS)

- Hyperledger Fabric vs Ethereum
- Blockchain-as-a-Service (BaaS): IBM, Azure, AWS.
- Layer 2 solutions & scaling approaches (Lightning Network, Polygon).
- Regulatory challenges & future trends (CBDCs, Web3, AI + Blockchain).

WORKSHOP OUTCOMES

By the end of 2 days, participants will:

- Understand blockchain architecture, consensus, and cryptography.
- Set up wallets and explore blockchain transactions.
- Write & deploy simple smart contracts using Ethereum (Remix IDE).
- Explore real-world applications and design their own blockchain use-case.