

# BLOCKCHAIN AND DISTRIBUTED LEDGER TECHNOLOGY SYLLABUS

## Module 1: Blockchain and Distributed Ledger Fundamentals

- Blockchain
- Distributed Ledger
- Cryptographic Basics for Cryptocurrency
  - Signature Schemes
  - Encryption Schemes
  - Elliptic Curve Cryptography
- CAP Theorem
- Categories of Blockchain
  - Public Blockchain
  - Private Blockchain
  - Permissioned Ledger
  - Tokenized Blockchain
  - Tokenless Blockchain
  - Sidechains

## Module 2: Blockchain Functionality

- Distributed Identity
  - Public and Private Keys
  - Digital Identification and Wallets
- Decentralized Network
- Permissioned Distributed Ledger
- Blockchain Data Structure
- Double Spending
- Network Consensus
- Sybil Attacks
- Block Rewards and Miners
- Forks and Consensus Chain
- Finality in Blockchain Consensus

- Limitation of Proof-of-Work
- Alternatives to Proof of Work

### **Module 3: Blockchain Implementation**

- Bitcoin and Merkle Root
- Eventual Consistency and Bitcoin
- Byzantine Fault Tolerance
- Bitcoin and Secure Hashing
- Bitcoin Block-Size
- Bitcoin Mining
- Blockchain Collaborative Implementations
  - Hyperledger
  - Corda
- Ethereum's ERC-20 and Token Explosion

### **Module 4: Decentralization using Blockchain**

- Blockchain and Full Ecosystem Decentralization
  - Smart Contract
  - Decentralized Autonomous Organization (DAO)
  - Decentralized Applications
- Platforms for Decentralization

### **Module 5: Zero Knowledge Proofs and Protocols in Blockchain**

- Pseudo-Anonymity vs. Anonymity
- Succinct Non-Interactive Argument for Knowledge (SNARK)
- Pairing on Elliptic Curves
- Zcash
- Zk-SNARKs for Anonymity Preservation

## Module 6: Blockchain Challenges

- Blockchain Governance Challenges
  - Bitcoin Blocksize Debate
  - The Ethereum DAO Fork
  - Ethereum's Move to PoS and Scaling Challenges
- Blockchain Technical Challenges
  - Denial-of-Service Attacks
  - Security in Smart Contracts
  - Scaling
  - Sharding

## Module 7: Distributed Ledger Technology in Alternative Blockchain

- Kadena
- Ripple
- Stellar
- Rootstock
- Drivechain
- Quorum
- Decentralized Network Manager
  - Tezos
  - Maidsafe
  - BigChainDB
- Decentralized Cloud Storage
  - Storj

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