

Blockchain Foundation

- What is a blockchain?
- What are transactions and blocks?
- How do P2P systems operate?
- The most prominent consensus mechanisms
- Difference between private, consortium, and public networks
- What does the data structure look like?
- How do Smart Contracts work?
- What is the Ethereum Virtual Machine?
- What is a Hash?
- How do public/private keys work?

Ethereum Basics

The window into any block chain network is the node. This course teaches students how to run a node and how to install, configure and use the most common Ethereum clients.

- The Ethereum ecosystem, DApps.
- What is Ether, an account, a Faucet?
- What is Gas, OpCode Gas Costs?
- Consensus Model: Proof of work, Proof of Stake.
- Ethereum Wallet working and Installation.
- Where to Get Ethers, Purpose of Mining
- Mining hardware and Mining pools.
- How cloud mining, Mining Incentives
- Ethereum Mining from Wallet and Sending Ethers across different accounts.
- Managing Contracts with Wallet.
- Meta Mask and Execute Contracts Using Meta Mask.
- Ethereum Networks, Clients and BlockChain Explorers.
- How to create a Genesis First Node in Network
- Setting up Private Blockchain Environment using Ethereum Platform
- Geth CLI: Configuring the geth client

- Simulation of BlockChain Network Using TestRPC.
- Configuring, running and working with the go-ethereum client
- Ethereum Client using JavaScript Console
- Geth JavaScript API: Admin, Personal, Miner, Nonces, Txpool
- Account management and mining
- Understand the different stages of a contract deployment
- How to interact with a contract once deployed?
- What does the setup process for a private network look like?
- Account management and mining
- Compile, deploy and instantiate contracts

Web3 & Truffle

The toolkit to aid development of decentralised applications is growing. This course introduces the two most currently relevant and covers everything from installation and setup to custom configuration and scripting.

- Web3 JS OverView
- Setup Web3 and Connecting to Node.
- Instantiate web3 and communicate with a contract from an JScript
- Test Web3 Version, Node Status API, Account List, balances API.
- Web3API Send Transactions and Transaction Object.
- Web3 API Smart Contract Compilation and Deployment.
- Building an interface to interact with a smart contract
- Setting up event-driven interfaces
- Adapting Truffle's default behavior
- Write functional tests for smart contracts
- How to manually test contract functionality?
- Use client side signing and remote nodes for light DApps
- Events, Logs, Filter and Watch API
- Setting Up the Truffle Project
- Developing Contracts using Truffle.

Solidity

The most prominent language used for the development of smart contracts is Solidity. The course covers all aspects from value types and inheritance to more exotic features and optimisation.

- Solidity Contract Structure.
- Solidity Basic Data Type and Conversions.
- Arrays and Special Arrays.
- Memory, Storage Key word Usage and locations.
- Time Units conversion and Global Variables.
- Introduction to Functions and Function Modifiers.
- Error Handling in Contracts.
- Hash Functions, Mappings, Enumerations and Structs.
- Contract classes and conditionals
- Events
- Inheritance & abstract contracts
- Libraries
- Types & Optimization
- Debugging
- Contract Design Patterns.

Hyperledger

- Introduction to Hyperledger
- Hyperledger architecture
- Technical Requirements
- Application model
- Introduction to Hyperledger Iroha
- Introduction to Hyperledger Sawtooth
- Introduction to Hyperledger Fabric.