

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Value Added Course on “Blockchain Mastering: Unlocking Decentralized Technology”

22.02.2022 to 26.02.2022

SYLLABUS

Objectives

- To impart a deep understanding of blockchain concepts, including decentralization, consensus mechanisms, and the benefits of trustless systems.
- To teach students how to write, deploy, and manage smart contracts using the Solidity programming language.
- To enable students to connect and interact with the Ethereum blockchain through Web3.js, including tasks like reading blockchain data, sending transactions, and calling smart contracts.
- To apply the knowledge gained through a capstone project, where students develop a full-fledged block chain application or smart contract from scratch.

UNIT1:

Introduction to DApp, Advantages of decentralized applications, Disadvantages of decentralized applications, Decentralized autonomous organization, User identity in DApps, User accounts in DApps, Accessing the centralized apps, Internal currency in DApps, Disadvantages of internal currency in DApps, Popular DApps - Bitcoin, What is ledger, Introduction to Blockchain, Is Bitcoin legal, Bitcoin usages - Ethereum, The hyper ledger project, Introduction to IPFS, How does it work?, Filecoin, Namecoin - .bit domains, Dash, Decentralized governance and budgeting, Decentralized service, BigChainDB, OpenBazaar, Ripple.

UNIT 2:

Understanding the working of Ethereum - Overview of Ethereum, Ethereum accounts, Transactions, Consensus, Timestamp, Nonce, Block Time, Forking, Genesis Block, Ether denominations, Ethereum virtual machine, Gas, Peer Discovery, Whisper, and Swarm, introduction of Geth, Installing Geth OS X - Ubuntu - Windows, JSON-RPC and Javascript console, Sub-commands and options - connecting to the mainnet network, creating a private network, Ethereum Wallet, Mist, Weaknesses, Serenity.

UNIT 3:

Smart Contract - Solidify source files, The structure of a smart contract, Data Location, What are the different data types? Arrays, Strings, Structs, Enums, Mapping, The delete operator, Conversion between elementary types, Using Var, Control Structures, Creating contracts using the new operator, Exceptions, External function calls, Features of contracts Visibility, Function modifiers, The fallback function, Inheritance.

UNIT 4:

Introduction to Web3.js, Importing web3.js, Connecting to nodes, The API Structure, BigNumber.js, Unit conversion, Retrieving gas price, balance, and transaction details, Sending ether, Working with contracts, Retrieving and listening to contract events. Building a client for an ownership contract The project structure, Building the backend, Building the frontend, testing the client.

UNIT 5:

Building a Wallet Service - Difference between online and offline wallets, hooked-web3-provider and ethereumjs-tx libraries, Hierarchical deterministic wallet, Introduction to key derivation functions, Introduction to Light Wallet HD derivation path, Building a smart contract deployment platform Calculating a transaction's nonce, Introducing solc.js - Installing solc.js, solcjs APIs, Using a different compiler version, Linking libraries, Updating the ABI.

OUTCOMES

At the end of the course, the students will be able to

CO1: Develop and deploy blockchain applications using Ethereum, MetaMask.

CO2: Develop the ability to solve complex problems related to blockchain technology.

CO3: Construct Smart Contract in blockchain development.

CO4: Under the concept of Web3.js and Working with contracts

CO5: Build Wallet Service for real time applications.