Course Title: Blockchain

Course Description

Course Title	Duration	
Blockchain	**Total Classes**: 54 **Total Hours** : 162 Hours	3 Days per week 3 Hours per day

Course Module Outline

Topic Name	Class No:	Session Coverage/Description
	Introduction of Blockchain: Basic Blockchain	
Blockchain Technology	Class 1	• Basics of Blockchain • History and Evolution • Key Features
	Class 2	• Blockchain High-Level Architecture • Consensus Mechanism Categories
	Class 3	• Blockchain Decentralization • Bitcoin Introduction • Bitcoin Whitepaper
	Class 4	• The Bitcoin network • Bitcoin Wallet • Bitcoin Transaction
	Class 5	• Bitcoin Consensus (Nakamoto Consensus) • Alternative Coins/tokens • Decentralized Oracle Networks
	Class 6	• Blockchain Application Reading and Analysis with reference to whitepapers • Blockchain Types
	Class 7	• Tokenized Blockchains (Native and Non-Native Tokens)
	Class 8	• Public and Private Keys in Blockchain Transactions • Cryptographic Application in Blockchain Core
	Class 9	• Block Hashing • Merkle Tree
	Class 10	• Blockchain Mining • Consensus Requirements and Categories
	Class 11	• Blockchain Consensus with respect CAP Theorem • Competitive consensus mechanisms
	Class 12	• Proof of Work (PoW) • Incentive Mechanisms
	Class 13	• Variations of Pow and Requirements • Capability-based consensus algorithms • Coin age selection
	Class 14	• Randomized Block Selection • Block Difficulty Calculation • Block Target Calculation

Topic Name	Class No:	Session Coverage/Description
	Class 15	• Delegated Proof of Stake • Proof of Stake Velocity
	Class 16	• Proof of Burn • Proof of Importance
	Class 17	• Proof of Authority • Proof of Reputation
	Class 18	• Proof of Elapsed Time • Voting-based consensus mechanisms
Python Programming		
Introduction to Python	Class 19	• What is Python? History and features • Installing Python and setting up the environment (IDLE, VSCode, PyCharm) • Writing your first Python program
Syntax and Variables	Class 20	• Python syntax and indentation • Variables, data types (integers, floats, strings, booleans) • Basic I/O: input(), print()
Conditional Statements	Class 21	• if, elif, else statements • Boolean logic and comparison operators
Loops in Python	Class 22	• for loops, while loops • Loop control: break, continue, pass
OOP	Class 23	• Basic of Object Oriented
Functions and Modular Code	Class 24	• Defining and calling functions • Function parameters, return values • Default arguments and keyword arguments
File Handling	Class 25	• Reading from and writing to files • Working with CSV files
Error Handling and Exceptions	Class 26	• Try-except blocks • Raising and handling exceptions
Standard Library Overview	Class 27	• Overview of the most commonly used modules • Exploring datetime, os, and sys
Computer Networking		
Computer Networking	Class 28	• Communication Components • Data communication and Representation • Basics of networking
	Class 29	• Networking Topologies • Physical Structures • Types of Networks
	Class 30	• Logic Operations • Networking components • Communication Protocols (TCP/IP and OSI Model)
	Class 31	• Network security protocols • Network Analysis (focused on P2P networks) • Network Protocols
	Class 32	• Network Standards • Networking Addresses (IP, MAC, SOCKET ADDRESSES)

Topic Name	Class No:	Session Coverage/Description
	Class 33	• Networking Layers, • Peer-to-Peer Networks • Security Attack Types
Cryptography and Data Security		
Cryptography and Data Security	Class 34	• Basics of Probability • Permutation and Combinations • Dependent and Independent Events
	Class 35	• Caesar Cypher • Substitution Cypher • Rot 13
	Class 36	• Double Transposition Matrix • Exhaustive Key Search • One time Pad
	Class 37	• Hamming Distance Calculation (number of mismatched bits) • Types of Symmetric Encryption (Block and Stream Cypher) • AES and DES Algorithms
	Class 38	• Encryption and Decryption • Hashing functions • Salting
	Class 39	• Private Key Cryptography • Public Key Cryptography • MAC Computation
	Class 40	• Modular arithmetic (modulus functions, inverse modulus) • Digital Signature Algorithm/Digital Signature Standard • PKC (Public Key Cryptosystem)
	Class 41	• PKCà RSA algorithm • Deffie Hellman Key Exchange Algorithm • Zero Knowledge Proof
	Class 42	• Fiat Shamir Protocol • Cryptography application in Blockchain(Research Paper review) • Elliptic Curves
	Class 43	• ECC (Elliptic Curve Cryptosystem) • Elliptic Curve Deffie Hellman Exchange • Elliptic Curve Digital Signature Algorithm
	Class 44	• Authentication • Authorization • Real World Protocols (KERBEROS)
	Class 45	• Public Key Infrastructure • Cryptanalysis • Hashing in Blockchain
	Class 46	• Blockchain block structure • Merkle root structure • Timestamp and nonce in blocks

Topic Name	Class No:	Session Coverage/Description
	Class 47	• Merkle tree • Digital signatures in blockchain • Blockchain address-generation schemes
Distributed Systems Introduction		
Distributed Systems Introduction	Class 48	• Distributed systems philosophy • The Client-Server Model and limitations • Introduction to Distributed systems
	Class 49	• Distributed systems Advanced Design • Decentralized Systems
Solidity		
Solidity	Class 50	• Basics of Solidity • Data types • Conditionals
	Class 51	• Loop • While statements • Arithmetic and logical operations
	Class 52	• Functions • Constructors • Visibility types • Sorting algorithms
	Class 53	• Access controls • Contract development • Enums • Ether transfer and addresses
	Class 54	• Structs • Arrays • Transactions • Searching algorithms