VIVEKANAND EDUCATION SOCIETY'S
Institute of Technology

(An Autonomous Institute Affiliated to University of Mumbai, Approved by A.I.C.T.E & Recognized by Govt. of Maharashtra)

Department of Computer Engineering

COURSE NAME: CRYPTOCURRENCY AND BLOCKCHAIN DEVELOPMENT

Course Code	Course Name	Teaching Scheme (Teaching Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	TW/PR	Tut	Total
NCMPC62	Cryptocurrency & Blockchain Development	3	2	-	3	1	-	4

Course Code	Course Name	Teaching Scheme (Teaching Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	TW/PR	Tut	Total
NCMPC62	Cryptocurrency & Blockchain Development	3	-	-	3	-	-	3

Course Code	Course Name	Examination Scheme						
		Theory			Exam Duration (in Hrs)	Term Work	Practical & Oral	Total
		Internal Assessment		End Sem Exam				
		Mid-Term Test	Continuous Assessment					
NCMPC62	Cryptocurrency & Blockchain Development	20	20	60	2	-	-	100

Prerequisite: Knowledge on number systems.	
Course Objectives	
1	To provide an in-depth understanding of blockchain technology and cryptocurrency ecosystems, including their applications and limitations.
2	To equip students with the skills needed to design, develop, and deploy secure blockchain solutions and smart contracts.
3	To explore the ecosystem of decentralized applications, focusing on their architecture, development, and integration with blockchain networks.
4	To introduce advanced topics like DeFi, NFTs, scalability, and blockchain's role in emerging technologies for industry-oriented learning.
Course Outcomes: Students will be able	
1	Understand the principles, architecture, and applications of blockchain and cryptocurrencies.
2	Analyze and evaluate the features of major blockchain platforms and their use cases.
3	Design and implement secure cryptocurrency wallets and manage transactions effectively.

4	Develop and deploy smart contracts using Solidity and integrate them with blockchain networks.
5	Build and optimize decentralized applications (DApps) with cryptocurrency payment integration.
6	Assess and implement advanced blockchain solutions like DeFi, NFTs, and layer-2 scalability techniques.

Module	Content		CO	Hours
1	**Introduction to Cryptocurrency and Blockchain**		CO1	07
	1.1	History and Evolution of Money and Digital Currencies, Understanding Cryptocurrencies: Concepts, Types, and Benefits, Blockchain Technology Fundamentals: Distributed Ledgers and Immutability,		
	1.2	Consensus Mechanisms: Proof of Work (PoW), Proof of Stake (PoS), and Alternatives, Key Components of Blockchain: Cryptography, Hashing, and Mining, Applications of Blockchain Beyond Cryptocurrencies (Supply Chain, Healthcare, etc.), Blockchain's Role in Decentralization and the Future of Web3		
2	**Blockchain Architecture and Platforms**		CO2	06
	2.1	Anatomy of a Blockchain: Blocks, Transactions, and Nodes, Types of Blockchains: Public, Private, Consortium, and Hybrid, Exploring Key Blockchain Platforms: Bitcoin, Ethereum, Hyperledger, and Binance Smart Chain.		
	2.2	Smart Contracts: Concept, Structure, and Applications, Overview of Decentralized Applications (DApps) and Token Standards (ERC-20, ERC-721, etc.), Security Aspects of Blockchain: Attacks, Challenges, and Mitigation Techniques		
3	Cryptocurrency Ecosystem and Wallets		CO3	06
	3.1	Popular Cryptocurrencies: Bitcoin, Ethereum, Ripple, and Altcoins, Cryptocurrency Mining: Mechanisms, Challenges, and Rewards, Cryptocurrency Wallets: Hot vs. Cold Wallets, Multi-Signature Wallets.		
	3.2	Securing Wallets: Threats, Recovery Methods, and Best Practices, Cryptocurrency Exchanges: Types, Trading Mechanisms, and Risks, Regulatory and Legal Frameworks for Cryptocurrencies Globally		
4	Smart Contracts and Development		CO4	07
	4.1	Introduction to Solidity Programming Language, Setting Up Development Environments: Truffle, Ganache, and Remix IDE, Writing and Deploying Basic Smart Contracts, Smart Contract Lifecycle, Gas Optimization, and Fees		

VIVEKANAND EDUCATION SOCIETY'S
Institute of Technology
(An Autonomous Institute Affiliated to University of Mumbai, Approved by A.I.C.T.E & Recognized by Govt. of Maharashtra)

Department of Computer Engineering

	4.2	Advanced Solidity Concepts: Libraries, Modifiers, and Events, Debugging, Testing, and Security Best Practices for Smart Contracts, Integration of Smart Contracts with Blockchain Networks		
5		Building Decentralized Applications (DApps)	CO5	07
	5.1	Architecture of Decentralized Applications, Interaction Between Smart Contracts and Frontend Using Web3.js, Tools for DApp Development: Web3.js, Ethers.js, and Metamask		
	5.2	Building and Deploying a Simple DApp on Ethereum Testnet, Integrating Cryptocurrency Payments in DApps Using Payment Gateways, Performance Optimization and Scaling Solutions for DApps, Testing and Deploying DApps to Production Environments		
6		Advanced Topics and Trends in Blockchain	CO6	06
	6.1	Layer-2 Scaling Solutions: Polygon, Lightning Network, and Optimistic Rollups, Decentralized Finance (DeFi): Protocols, Platforms, and Applications, Non-Fungible Tokens (NFTs): Standards, Creation, and Marketplace Integration		
		Blockchain Interoperability: Bridging Between Different Networks, Blockchain's Role in Emerging Technologies: AI, IoT, and Metaverse		
	6.2	Case Study: End-to-End Development and Deployment of a Blockchain-Based Solution for any domain		
		Total		**39**

	Textbooks
1	"Mastering Blockchain: Unlocking the Power of Cryptocurrencies, Smart Contracts, and Decentralized Applications" by Imran Bashir
2	"Blockchain Basics: A Non-Technical Introduction in 25 Steps" by Daniel Drescher
3	"Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Blockchain" by Ritesh Modi
	References
1	"Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies is Changing the World" by Don Tapscott and Alex Tapscott
2	"Cryptocurrency: How Bitcoin and Digital Money are Challenging the Global Economic Order" by Paul Vigna and Michael J. Casey
3	"The Basics of Bitcoins and Blockchains" by Antony Lewis

4	"Building Ethereum DApps: Decentralized Applications on the Ethereum Blockchain" by Roberto Infante

Useful Links

Resources

1	https://github.com/frankiefab100/Blockchain-Development-Resources
2	https://tech.seas.harvard.edu/free-blockchain

AI Tools

1	https://www.chaingpt.org
2	https://www.anchain.ai/ciso
3	https://workik.com/blockchain-code-generator

Industry articles

1	https://www.ft.com/content/5acb33a2-4690-4f56-add3-7e2b01530a21

Case Studies

1	https://www.wired.com/story/user-owned-ai-illia-polosukhin-open-source-web3
2	https://coingeek.com/blockchain101/a-guide-to-ai-driven-solutions-for-strengthening-blockchain-security/?utm_source=chatgpt.com

---

Internal Assessment

Assessment consists of one Mid Term Test of 20 marks and Continuous Assessment of 20 marks. The Mid Term test is to be conducted when approximately 50% syllabus is completed and its duration will be one hour.

Continuous Assessment

Continuous Assessment is of **20 marks.** The rubrics for assessment will be considered on approval by the subject teachers. It should be minimum 2 or maximum 4 from the following table.

Sr. No	Rubrics	Marks
1	Multiple Choice Questions (Quiz)	5 Marks
2	Literature review of papers/journals	5 Marks
3	Participation in event/ workshop/ talk / competition followed by small report and certificate of participation relevant to the subject	5 Marks

VIVEKANAND EDUCATION SOCIETY'S
Institute of Technology
(An Autonomous Institute Affiliated to University of Mumbai, Approved by A.I.C.T.E & Recognized by Govt. of Maharashtra)

Department of Computer Engineering

4	Wins in the event/competition/hackathon pertaining to the course	10 Marks
5	Case study, Presentation, group discussion, technical debate on recent trends in the said course	10 Marks
6	Project based Learning and evaluation / Extra assignment / Question paper solution	10 Marks
7	NPTEL/ Coursera/ Udemy/any MOOC Certificate course for 4 weeks or more	10 Marks
8	Content beyond syllabus presentation	10 Marks
9	Creating Proof of Concept	10 Marks
10	Mini Project / Extra Experiments/ Virtual Lab	10 Marks
11	Peer Review and participation	5/10 Marks

*For sr.no.7, the date of certification exam should be within the term and in case a student is unable to complete the certification, the grading has to be done accordingly.

Indirect Assessment

1	Mock Viva/Practical
2	Skill Enhancement Lecture
3	Extra Assignments/lab/lecture

End Semester Theory Examination:

1	Question paper will be of 60 marks
2	Question paper will have a total of five questions
3	All questions have equal weightage and carry 20 marks each
4	Any three questions out of five need to be solved.