

Branch Name:	Bachelor of Technology (Computer Engineering / Information Technology)
Program Code:	ET103/ET105
Course Title:	Open Elective - Blockchain Technology
Course Code:	2ET1030881T
Prerequisite Course:	

Course Objectives: This course introduces the concepts, architecture, and applications of blockchain technology. Students will understand cryptographic principles, distributed ledger systems, consensus mechanisms, smart contracts, and blockchain-based application development.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topics	Total Hours	Weightage (%)
1	Introduction to Blockchain: Evolution of Digital Currency, Problems with Traditional Systems, Distributed Ledger Technology (DLT), Blockchain Concepts, Features and Characteristics, Types of Blockchain (Public, Private, Consortium), Blockchain Architecture, Blocks, Hash Functions, Merkle Trees, Blockchain Lifecycle and Applications	6	15%
2	Cryptography and Security Fundamentals: Fundamentals of Cryptography, Symmetric and Asymmetric Encryption, Hashing Techniques, Digital Signatures, Public Key Infrastructure (PKI), Cryptographic Wallets, Key Management, Security Principles in Blockchain	5	15%
3	Blockchain Networks and Consensus Mechanisms: Peer-to-Peer Networks, Nodes and Network Architecture, Mining Concepts, Transactions, Consensus Algorithms, Proof of Work (PoW), Proof of Stake (PoS), Delegated PoS, Practical Byzantine Fault Tolerance (PBFT), Blockchain Scalability Challenges	6	20%
4	Bitcoin and Ethereum Technologies: Bitcoin Architecture, Bitcoin Transactions, UTXO Model, Bitcoin Mining, Ethereum Architecture, Accounts, Gas, Ethereum Virtual Machine (EVM), Tokens, Introduction to ERC Standards	5	15%
5	Smart Contracts and DApp Development: Smart Contract Concepts, Solidity Programming Basics, Variables, Functions, Modifiers, Events, Contract Deployment, Decentralized Applications (DApps), Web3 Concepts, Wallet Integration	6	20%
6	Blockchain Applications, Challenges and Future Trends: Blockchain in Finance, Supply Chain, Healthcare, IoT, Government and Education, Blockchain Security Issues, Privacy Techniques, Regulatory and Ethical Issues, Scalability Solutions, Emerging Trends (DeFi, NFTs, Web3)	6	15%

Reference Books:

1. Mastering Blockchain by Imran Bashir, Packt Publishing
2. Blockchain Basics: A Non-Technical Introduction in 25 Steps by Daniel Drescher, Apress
3. Mastering Bitcoin by Andreas M. Antonopoulos, O'Reilly Media
4. Mastering Ethereum by Andreas M. Antonopoulos, Gavin Wood, O'Reilly Media
5. Blockchain Technology: Concepts and Applications by Kumar Saurabh, Ashutosh Saxena, Wiley

List of open-source software/learning websites:

1. <https://ethereum.org/developers/>
2. <https://docs.soliditylang.org/>
3. <https://www.hyperledger.org/learn>
4. <https://web3js.readthedocs.io/>
5. <https://developer.bitcoin.org/>

Course Outcomes (CO):

Course Outcomes	Description	Bloom's Taxonomy Level
CO1	Explain blockchain fundamentals, distributed ledger concepts, and cryptographic techniques.	Understand (2)
CO2	Analyze blockchain architecture, consensus mechanisms, and transaction processing.	Analyze (4)
CO3	Explain the architecture and working principles of Bitcoin and Ethereum platforms.	Understand (2)
CO4	Develop smart contracts and decentralized applications using blockchain platforms.	Create (6)
CO5	Evaluate blockchain security, privacy issues, and suitable applications in different domains.	Evaluate (5)
CO6	Design blockchain-based solutions for real-world engineering and business problems.	Create (6)

Mapping of CO with PO and PSO

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	M	–	–	L	–	–	–	–	–	–	M	H	M	–	–
CO2	M	H	M	M	M	–	–	–	–	–	–	M	H	M	L	–
CO3	M	M	L	–	M	–	–	–	–	–	–	M	M	H	L	–
CO4	M	M	H	M	H	–	–	–	L	L	–	M	M	H	H	L
CO5	M	H	M	M	M	L	L	M	–	–	L	H	M	M	H	M
CO6	M	H	H	M	H	M	L	M	M	M	M	H	H	H	H	M

H: High, M: Medium, L: Low