

Branch Name:	Artificial Intelligence And Data Science
Program Code:	ET108
Semester/Year:	Semester VIII/Fourth Year
Course Name:	Blockchain and Its Applications
Course Code:	1ET1080801
Pre-requisite Course:	Knowledge in distributed databases

Course Objective:

- To understand conceptual elements for blockchain and distributed Ledger Technologies.
- Familiarize the learners with the functional/operational aspects of cryptocurrency eco-system, understand consensus mechanism.
- To understand Ethereum and emerging abstract models for Blockchain Technology
- To summarize the major developments related to blockchain and cryptocurrencies.
- To identify alternative techniques to proof of work for blockchain protocols.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
04	-	02	05	70	30	30	20	150

Subject Contents:

Sr. NO	Topic	Total Hours	Weightage
1	Introduction: Introduction to Blockchain, Types of Blockchain - Public Blockchains, Consortium Blockchains, Private Blockchains. Blockchain Implementations - Bitcoin, Namecoin, Ripple, Ethereum, Working of Blockchain, Components of Blockchain	06	10
2	Blockchain and Cryptocurrency: Cryptocurrency, Cryptocurrency Examples and Features, Traditional currencies vs. cryptocurrencies, Cryptocurrency Storage Method, Pros and Cons of Cryptocurrency, Blockchain Architecture, Working of Blockchain Protocol, Types of Blockchain Protocols	08	10
3	Ethereum: Ethereum Features, Smart Contracts, Ethereum Virtual Machine, Decentralized Applications (Dapps), Decentralized Autonomous Organizations (DAOs), Real-World Applications of Ethereum, Advantages and Disadvantages of Ethereum, comparing Bitcoin scripting vs. Ethereum Smart Contracts, The Turing Completeness of Smart Contract Languages and	15	25

	verification challenges, Using smart contracts to enforce legal contracts		
4	Blockchain Applications: Applications of Blockchain in Data Management, Blockchain Technology in Cloud Computing, Integration of Artificial Intelligence and Blockchain, Benefits of Blockchain in Healthcare, Decentralized Voting System using Blockchain	10	25
5	Consensus Algorithms: Proof of Work (PoW), Proof of Burn, Proof of Stake (PoS), Delegated Proof Of Stake (DPoS), Practical Byzantine Fault Tolerance (pBFT), Proof of Capacity, Proof of Elapsed Time (PoET)	07	20
6	Case Studies: Block chain in Financial Service, Supply Chain Management and Government Services, Medical Record Management System, Domain Name Service and Future of Blockchain	03	10

List of Reference Books:

1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.
2. Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions by Joseph J. Bambara and Paul R. Allen, McGraw-Hill Education.
3. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies
4. A Comprehensive Introduction" Princeton University Press, 2016
3. Antonopoulos, Mastering Bitcoin, O'Reilly Publishing, 2014.
5. Antonopoulos and G. Wood, "Mastering Ethereum: Building Smart Contracts and Dapps", O'Reilly Publishing, 2018.
6. D. Drescher, Blockchain Basics. Apress, 2017.

List of Suggested titles of Experiments:

1. Setup Metamask in the System and Create a wallet in the Metamask with Test Network.
2. Study about Consensus Algorithms
3. Study about Blockchain implementation using Merkle Trees Accounts and describe the transaction specifications
4. Setup the Ganache Tool in the system
5. Create a custom RPC network in Metamask and connect it with Ganache tool and transfer the ether between ganache accounts
6. Study about IoT Application development using blockchain
7. Study about E-Voting application development using blockchain
8. Study about Inventory management application using blockchain
9. Create multiple accounts in metamask for employee
10. Perform the balance transfer between the employee in Metamask

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the concept of block chain technology	1 Remembering 2 Understanding
CLO2	Understand the concept of Cryptocurrency	1 Remembering 2 Understanding
CLO3	Learners will be able to analyze the Smart contract	4 Analyze
CLO4	Learners will be able to block chain based solutions and write smart contract using Ethereum Framework.	3 Applying
CLO5	Learners will be able to create Decentralized Application	3 Applying

Mapping of CLOs with POs & PSOs

Course Learning 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	PO1 2	PS O1	PS O2	PS O3	PS O4
CLO1					M	L						H	H	M	L	
CLO2	M		H	M	L					M		M		L	H	
CLO3		L	M		M									H		L
CLO4	M	M			L			M					L		M	H
CLO5					L									M		

H: High, M: Medium, L: Low