KOLHAPUR INSTITUTE OF TECHNOLOGY'S

COLLEGE OF ENGINEERING

(AUTONOMOUS)

Gokul Shirgaon, Kolhapur

KOLHAPUR INSTITUTE OF TECHNOLOGY'S
COLLEGE OF ENGINEERING
(AUTONOMOUS),
KOLHAPUR

Curriculum Structure

For

B.Tech (Honors)

Computer Science and Business Systems

With specialization in (Blockchain Technologies)

(Undergraduate Programme)

Academic Year 2023-24

Kolhapur Institute of Technology's College of Engineering
Computer Science Business Systems
(Autonomous) Kolhapur

Teaching and Evaluation Scheme								
Course Code	**Course**	**Teaching Scheme**				**Evaluation Scheme**		
		L	**T**	**P**	**Credits**	**Components**	**Max**	**Min for Pass (%)**
UCBH0301	Fundamentals of Blockchain	3	1	0	4	ESE	100	40
UCBH0401	Blockchain Platforms and Use cases	3	1	0	4	ESE	100	40
UCBH0501	Blockchain Security and Performance	3	1	0	4	ESE	100	40
UCBH0601	Blockchain and FinTech	3	1	0	4	ESE	100	40
UCBH0701	Mini Project-I	0	0	4	2	ESE(POE)	100	40
		-	-	-	-	-	-	-
	Total	**12**	**4**	**4**	**18**	**Total**	**500**	
Total Contact Hours =20, Total Credits =18								

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Course Code:	UCBH0301	L	T	P	Credit
Course Name:	Fundamentals of Blockchain	3	1	-	4

Course Prerequsites:	Computer Networks, Network Security

Course Description:

Blockchain, the distributed ledger technology that powers Bitcoin and other digital currencies, has a wide range of other uses as well. It is a decentralised, impenetrable method for storing data and transactions. Blockchain technology, which continues to attract enormous attention and innovation, has the potential to completely transform a number of sectors by offering a safe and transparent mechanism to record and verify data and transactions.

Course Objectives:

1. The students should be able to understand a broad overview of the essential concepts of blockchain technology

2. To familiarize students with Bitcoin protocol followed by the Ethereum protocol – to lay the foundation necessary for developing applications and programming.

3. Students should be able to learn about different types of blockchain and consensus algorithms

Course Outcomes:

COs	After completion of the course, students shall have ability to	Blooms Level	Descriptor
CO1	explain the basic notion of distributed systems	2	Understand
CO2	use the working of an immutable distributed ledger and trust model that defines	2	Understand
CO3	illustrate the essential components of a blockchain platform	3	Apply

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		1	1		1				1	2	
CO2	3	2	2		1	1		2				1	2	
CO3	3	2	2		1	1		1				1	2	

Assessment Scheme:

End Semester Examination (ESE) 100% weightage respectively.

Assessment Component	Marks
ESE	**100**

ESE is based on 100% course content

Course Contents:		
Unit 1	**Basics**	**6 Hours**
The Double-Spend Problem, Byzantine Generals' Computing Problems, Public-Key Cryptography, Hashing, Distributed Systems, Distributed Consensus		
Unit 2	**Technology Stack & Bitcoin Blockchain**	**6 Hours**
Blockchain, Protocol, Currency Structure, Operations, Features, Consensus Model, Incentive Model.		
Unit 3	**Ethereum Blockchain**	**5 Hours**
Smart Contracts, Ethereum Structure, Operations, Consensus Model, Incentive Model		
Unit 4	**Tiers of Blockchain Technology**	**6 Hours**
Blockchain 1.0, Blockchain 2.0, Blockchain 3.0, Types of Blockchain: Public Blockchain, Private Blockchain, Semi-Private Blockchain, Sidechains.		
Unit 5	**Types of Consensus Algorithms-I**	**5 Hours**
Proof of Stake, Proof of Work, Delegated Proof of Stake, Proof Elapsed Time, Deposite-Based Consensus		
Unit 6	**Types of Consensus Algorithms-II**	**5 Hours**
Proof of Importance, Federated Consensus or Federated Byzantine Consensus, Practical Byzantine Fault Tolerance. Blockchain Use Case: Supply Chain Management		

Textbooks:

Sr.No.	Title	Edition	Author/s	Publisher
1	Essentials of Bitcoin and Blockchain	1st edition	Kirankalyan Kulkarni	Packt Publishing
2	Block Chain & Crypto Currencies	1st edition	Anshul Kaushik	Khanna Publishing
3	Blockchain for Dummies	2nd Edition	Tiana Laurence	John Wiley & Sons
4	Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks	1st edition	Imran Bashir	Packt Publishing
5	Blockchain: Blueprint for a New Economy	1st edition	Melanie Swan	Shroff Publisher O'Reilly Publisher Media
6	Mastering Bitcoin: Programming the Open Blockchain	1st edition	Andreas Antonopoulos	Shroff/O'Reilly

Reference Books:

Sr.No.	Title	Edition	Author/s	Publisher
1	The Basics of Bitcoins and Blockchains	1st edition	Antony Lewis	Two Rivers Distribution
2	The Bitcoin Standard: The Decentralized Alternative to Central Banking	1st edition	Saifedean Ammous	Wiley

Course Code:	UCBH0401	L	T	P	Credit
Course Name:	Smart Contracts and Solidity	3	1	-	4

Course Prerequsites: Fundamentals of Block Chain Technologies

Course Description: This course gives knowledge of Blockchain tools

Course Objectives:

1.Students should be able to understand the concept of smart contracts related to blockchain

2.Students should be able to understand the smart contract higher-level language Solidity and apply it to create smart contracts

3. Students should be able to learn Truffle IDE for creating and deploying a Dapp

Course Outcomes:

COs	After completion of the course, students shall have ability to	Blooms Level	Descriptor
CO1	To understand the working and importance of smart contracts	II	Understand
CO2	To learn the solidity language required for coding Ethereum smart contracts	III	Analyze
CO3	To create and deploy a DApp on a Ethereum test network.	IV	Apply

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1					2						1	2	1	2
CO2					2						2	2	1	1
CO3					2						1	2	2	

Assessment Scheme:

End Semester Examination (ESE) having 100% weightage respectively.

Assessment Component	Marks
ESE	100

ESE is based on 100% course content

Course Contents:

Unit 1 Smart Contracts — **6 Hours**

Definition and Need, Features of Smart Contracts, Life Cycle of a Smart Contract, Introduction to Ethereum Higher-Level Languages.

Unit 2 Development Environment — **7 Hours**

Building A Simple Smart Contract with Solidity, Solc-Compiler, Ethereum Contract ABI, Remix-IDE for Smart Contract Development

Unit 3	**Introduction to Solidity**	**5 Hours**
Contracts, Constructors & Functions, Variables, Getters & Setters, Arrays, Memory vs Storage, Mappings in Solidity		
Unit 4	**Advanced of solidity**	**6 Hours**
Advanced Solidity: Structs, Error Handling & Restrictions, Libraries, Global Variables in Solidity, Abstract Contracts, Inheritance, And Interfaces, Events		
Unit 5	**Truffle Framework & Ganache**	**6 Hours**
Environment Setup for Truffle & Ganache, Truffle Project Creation, Truffle Compile, Migrate and Create Commands		
Unit 6	**Decentralized App Creation**	**6 Hours**
Smart Contract Creation, Front-End Creation, Connecting Smart Contract with Front-End Application, Deploying Dapp, Validation, And Testing of Dapp.		

Textbooks:

Sr.No.	Title	Edition	Author/s	Publisher
1	Blockchain for Dummies	2nd Edition	Tiana Laurence	John Wiley & Son
2	Block Chain & Crypto Currencies		Anshul Kaushik	Khanna Publishing House

Reference Books:

Sr.No.	Title	Edition	Author/s	Publisher
1	Building Blockchain Projects		Narayan Prusty	Packt Publishing
2	Mastering Ethereum: Building Smart		Andreas	Shroff

Course Code:	UCBH0501	L	T	P	Credit
Course Name:	Blockchain Platforms and Use cases	3	1	-	4

Course Prerequsites: Fundamentals of Block chain Technologies and Security Concepts

Course Description: This course gives knowledge about various blockchain platforms and use cases.

Course Objectives:

1.Students should be able to learn different types of blockchain platforms

2.Students should be able to understand different types of Decentralized applications developed using blockchain technology

3.Students should be able to understand several types of blockchain use cases.

Course Outcomes:

COs	After completion of the course, students shall have ability to	Blooms Level	Descriptor
CO1	To distinguish between different types of blockchain platforms	II	Understand
CO2	To understand different types of uses of blockchain and apply it to some real-life	II	Understand
CO3	To learn about the shortcomings of blockchain technology and their corresponding solutions.	III	Analyze

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			1		2			1			1		2	2
CO2		2			2				1			2		
CO3		2		1	2			1					2	

Assessment Scheme:

End Semester Examination (ESE) having 100% weightage respectively.

Assessment Component	Marks
ESE	100

ESE is based on 100% course content

Course Contents:		
Unit 1	**Permissioned Blockchains-I**	**7 Hours**
Hyperledger Fabric Services, Model and Functions,Hyperledger Composer		
Unit 2	**Permissioned Blockchains-II**	**7 Hours**
Microsoft Azure Blockchain Platform and Services,Other Platforms: IOTA, TRON, Ziliqa, Cosmos, Ripple		
Unit 3	**Decentralized Application Platforms**	**05 Hours**
Augur-Decentralised Prediction Market Platform, Grid+-Energy Ecosystem Platform.		
Unit 4	**Challenges and Solutions Related to Blockchain**	**05 Hours**
Consensus, Scalability, Privacy and Confidentiality, Escrow, and Multi signature.		
Unit 5	**Alternative Decentralized Solutions**	**08 Hours**
Interplanetary File System (IPFS) Working and Uses, Hashgrapgh- Working, Benefits, And Use-Cases.		
Unit 6	**Blockchain Use Cases**	**10 Hours**
Financial Services Related Use Cases, Revolutionization of Global Trade, Digital Identity, Auditing Services, Supply Chain Management, HealthcareRelated Services, Blockchain and IOT, Blockchain and AI.		

Textbooks:

Sr.No.	Title	Edition	Author/s	Publisher
1	Blockchain for Dummies	2nd Edition	Tiana Laurence	John Wiley & Sons
2	Block Chain & Crypto Currencies		Anshul Kaushik	Khanna Publishing House
3	Building Blockchain Projects		Narayan Prusty	Packt Publishing

Reference Books:

Sr.No.	Title	Edition	Author/s	Publisher
1	Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks		Imran Bashir	Packt Publishing
2	Blockchain: Blueprint for a New Economy	1st edition	Melanie Swan	shroff Publisher publisher/O'Reilly Publisher Media;

Course Code:	UCBH0601	L	T	P	Credit
Course Name:	Blockchain Security and Performance	3	1	-	4

Course Prerequsites:	Fundamentals of Blockchain Technologies
Course Description:	This course gives insights of performance metrics measured in blockchain security

Course Objectives:

1.Students should be able to understand the security and performance-related issues of blockchain

2.Students should be able to learn techniques and tools to tackle the security related issues of blockchain

3.Students should be able to learn new approaches required for enhancing blockchain performance.

Course Outcomes:

COs	After completion of the course, students shall have ability to	Blooms Level	Descriptor
CO1	To understand the security and performance perspective of blockchain technology.	II	Understand
CO2	To learn and apply security analysis and performance-enhancing techniques related	III	Analyze
CO3	To understand the real-life applications of blockchain technology and apply it to provide solutions to some real-life problems.	IV	Apply

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								1			1			2
CO2	2			3								2	2	
CO3			2		2						1			2

Assessment Scheme:

End Semester Examination (ESE) having 100% weightage respectively.

Assessment Component	Marks
ESE	100

ESE is based on 100% course content

Course Contents:		
Unit 1	**Security Issues**	**8 Hours**
Blockchain Related Issues, Higher-Level Language (Solidity) Related Issues, EVM Bytecode Related Issues,		
Unit 2	**Real Time Applications**	**7 Hours**
Real-Life Attacks on Blockchain Applications/ Smart Contracts, Trusted Execution Environments		
Unit 3	**Security Tools for Smart Contracts**	**6 Hours**
Working, Advantages, And Disadvantages of Tools- Oyente, Securify, Maian, Manticore, Mythril, SmartCheck, Verx. Secure Key Management, Quantum Resilience Keys.		
Unit 4	**Performance Related Issues**	**05 Hours**
Transaction Speed, Transaction Fees, Network Size, Complexity, Interoperability Problems, Lack of Standardization. Lack of Supportive Regulations Related to Blockchain Applications.		
Unit 5	**Performance Improvements**	**7 Hours**
Off-Chain State Channels, Sidechains, Parallels Chains,Concurrent Smart Contract Transactions, Sharding Technique and Its Benefits, AtomicSwaps Between Smart Contracts.		
Unit 6	**Blockchain Applications**	**07 Hours**
Decentralized Cryptocurrency, Distributed Cloud Storage, EVoting,Insurance Claims, Cross-Border Payments, Asset Management, SmartAppliances.		

Textbooks:

Sr.No.	Title	Edition	Author/s	Publisher
1	Mastering Ethereum: Building Smart Contracts and Dapps Book	2nd Edition	Andreas Antonopoulos and Gavin Wood	Shroff Publisher/O′Reilly Publisher.

Reference Books:

Sr.No.	Title	Edition	Author/s	Publisher
1	Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks	1st edition	Imran Bashir	Packt Publishing
2	Blockchain: Blueprint for a New Economy	1st edition	Melanie Swan	shroff Publisher publisher/O'Reilly Publisher Media;

Course Code:	UCBH0701	L	T	P	Credit
Course Name:	MiniProject	-	-	4	2

Course Prerequsites: Knowledge of basics and advanced in block chain courses

Course Description:

This course gives practical and application oriented knowledge by implimenting real time problems in block chain security domain.

Course Objectives:

1.Students should be able to understand the benefits of using blockchain

2.Students should demonstarte blockchain implementation in various applications

3.Students should exhibit knowledge of blockchain through solving a pplication problem.

Course Outcomes:

COs	After completion of the course, students shall have ability to	Blooms Level	Descriptor
CO1	To able to understand the benefits of using blockchain	VI	Create
CO2	To demonstarte blockchain implementation in various applications	VI	Create
CO3	To exhibit knowledge of blockchain through solving a pplication problem.	VI	Create

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1					3							2	
CO2		2	3	2										2
CO3				1	3						1		2	2

Assessment Scheme:

Two components of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 25% and 75% weightage respectively.

Assessment Component	Marks
ISE	25
ESE	75

ISE Assessment is based on presentation given by student groups afterevery 2 weeks.

ESE Assessment is based on completion of mini project and presentation given by student groups.

Course Contents:	
Mini projects shall consist of followings (but not limited to):	
Minor experimental work of various techno-social issues, computer based analysis and design, structural audit of various civil engineering works, health monitoring of structures, Innovative civil engineering materials, Environmental impact assessment, design of small water supply schemes, irrigation schemes, water harvesting, sewerage system, waste management system, transportation engineering etc. related to civil engineering.	
Guidelines:	
1 Mini-project is a group activity; each group should be of minimum 2 students and maximum 3 students. 2 Each batch shall consist of 2 to 3 groups. Not more than one batch should be assigned to a single faculty. 3 After interactions with course coordinator and based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of mini-project. 4 Student is expected to detail out methodology, software required, critical issues involved in analysis /design and implementation and submit the proposal within one week of the semester. 5 Use of relevant software is preferred. 6 Completed mini project and documentation in the form of report and is to be submitted before the end of semester assessment. 7 Schedule for Presentation: 1 Synopsis Presentation 2 Presentation given by student groups after every 2 weeks – ISE Assessment 3 Final presentation – ESE Assessment	