DR. D Y PATIL VIDYAPEETH
PUNE – 411018

CENTRE FOR ONLINE LEARNING
PIMPRI, PUNE

SYLLABUS FOR

MASTER OF BUSINESS ADMINISTRATION (M.B.A)

Academic Year 2025

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Semester-III Blockchain Technology Management Specialization

Semester	3	Course Credits	4	Specialization	Blockchain Technology Management
Course Code	OMBBTM301			Type	Specialization Course
Course Title	Basics of Blockchain Technology				

Course Description:

This is the first introductory course of basics of Blochchain Technology. The course is useful to acquaint students with basic elements of Blockchain Technology Management and their importance. The students would also be able to appreciate the importance and understand the modern concepts of block chain technology systematically.

Course Objectives:

1) To assess blockchain applications in a structured manner.

2) Understand and explore the working of Blockchain Technology

3) To strong technical understanding of Blockchain Technology

4) To introduce application areas, current practices, and research activity in Blockchain Technology.

Course Outline:

Unit 1: Introduction of Blockchain: What is Blockchain, History, Purpose, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions and Blocks, P2P Systems, Keys as Identity, Digital Signatures.

Unit 2: Introduction to Cryptography: What is Cryptography, types of Cryptography, what is Cryptocurrency, Public-key Cryptography, Private key Cryptography.

Unit 3: Blockchain Component: Cryptographic Hash function, Cryptographic nonce, Transactions, Asymmetric-key Cryptographic, Addresses and address Derivation, Private key storage, Ledger, Blocks, Chaining Blocks.

Unit 4: Consensus Models: Proof of Stake, Proof of Work, Proof of authority, Round Robin, Proof of Elapsed Time, Consensus Comparison Matrix, Ledger Conflicts, and Resolution.

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Unit 5: Forking and Cryptographic Changes and Forks: How does it works, Types of Forks: Soft Forks, Hard Forks.

Unit 6: Ethereum Technology Overview: What is Ethereum? Ethereum Clients, Account Management, Ether, The Ethereum network, Mining, The Ethereum Foundation, Architectural Overview, Ethereum Blockchain Platform, Analyse Ethereum blockchain.

Unit 7: Smart Contracts, Dapps, And DAOs (concepts): What are Smart Contracts?, What is Ethereum Virtual Machine (EVM)?, What are Decentralized Autonomous Organizations (DAO)?, Quick Start Overview of Remix using JavaScript VM.

Unit 8: Hyperledger: Introduction, Hyperledger Fabric, and its architecture, Hyperledger Composer

Unit 9: Solidity Programming – Basics: Layout of a Solidity Source File, Structure of a Contract, Types, Units, and Globally Available Variables, Input Parameters, and Output Parameters.

Unit 10: Emerging Trends in Blockchain: Cloud-based blockchain, Multichain, Geth, Stellar, Ripple, R3 Corda, Blockchain API, Blockchain Sandboxes.

Course Outcome:

On successful completion of the course the learner will be able to:

CO#	Cognitive Abilities	Outcomes
CO301.1	**Remember**	Learn the basics of Blockchain Technology
CO301.2	**Understand**	Able to use the Technology
CO301.3	**Apply**	Exhibit the level of growth
CO301.4	**Analyze**	Perform the task using the Technology
CO301.5	**Evaluate**	Design, build and deploy smart contracts and distributed applications

Suggested Reading:

Blockchain Basics: A Non-Technical Introduction in 25 Steps

Author : Daniel Drescher

Publication: Apress

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Semester	3	Course Credits	4	Specialization	Blockchain Technology Management
Course Code	OMBBTM302			Type	Specialization Course
Course Title	Blockchain Technology and Management				

Course Description:

The objective of this course is to familiarize the students with Blockchain Technology and Management. Students will learn what are the different tools and techniques of Blockchain Technology and Management.

Course Objectives:

1) Understand and explore the working of Blockchain technology management
2) Understand BitCoin and Cryptocurrency.
3) Apply the learning of solidity and de-centralized apps on Ethereum

Course Outline:

Unit-1: Technological and Cryptographic Elements in Blockchain: Public Key & Private Key, Real-life Scenario Challenges, Transactions Processing: Modification, Maintenance, Privacy Protection, Public-key Cryptography.

Unit 2: BitCoin and Cryptocurrency: Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain And Digital Currency, Transactional Blocks, Impact Of Blockchain Technology On Cryptocurrency.

Unit-3: Introduction to Ethereum: Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Metamask Setup, Ethereum Accounts, Receiving Ether's Transaction, Smart Contracts.

Unit-4: Introduction to Hyperledger: Hyperledger Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer.

Unit-5: Solidity Programming: Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types (Int, Real, String, Bytes, Arrays, Mapping, Enum, address)

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Unit-6: Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins. Blockchain and Enterprise – A Technology of Coordination, Selection Criteria for Blockchain Applications (Decision Making)

Unit-7: Blockchain Platforms part I: Classification of Blockchain Platforms (Part 1), An Overview of the 5 Key Perspectives, Highlights of Major Blockchain Platform, Ethereum.

Unit-8: Blockchain Platforms part II: Trustlessness and Immutability of Blockchain Technology, Proof of Work and Proof of Stake, Token, Tokenizing Shares and Fund Raising, Hyperledger.

Unit-9: Emerging Trends in Blockchain: Alternative Blockchains and Next Emerging Trends Kadena, Ripple, Rootstock, Quorum, Tendermint, Scalability, Privacy, Other Challenges, Blockchain Research, Notable Projects, Miscellaneous Tools.

Unit-10: The Limitations, Opportunities, and Challenges of Blockchain: Limitations & opportunities of Blockchains, Risks, and Limitations of Blockchain: Privacy, What Are the Benefits of Blockchain in Banking, Healthcare.

Course Outcome:

On successful completion of the course the learner will be able to:

CO#	Cognitive Abilities	Outcomes
CO302.1	**Remember**	Various Blockchain Technology concepts
CO302.2	**Understand**	Understand Blockchain platform, hyperledger, benefits to different sector
CO302.3	**Apply**	Apply the skill by implementing it into practice
CO302.4	**Analyze**	Analyze various platforms of Blockchain Technology

Suggested Reading:

1. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.
2. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.

Dr. D. Y. Patil Vidyapeeth, Pune

(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)

Centre for Online Learning

Semester	3	Course Credits	4	Specialization	Blockchain Technology Management
Course Code	OMBBTM303			Type	Specialization Course
Course Title	Cryptography and Information Security				

Course Description:

This course will emphasize on principles and practice of cryptography and information security: classical Systems, symmetric block ciphers (des, aes, other contemporary symmetric ciphers), linear and Differential cryptanalysis, perfect secrecy, public-key cryptography algorithms for factoring, and Discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key Exchange, signature schemes, email and web security, viruses, firewalls, digital right management, And other topics. In this course, students will learn as aspects of information security and cryptography.

Course Objectives:

1) To understand basics of cryptography and information security
2) To be able to secure a message over insecure channel by various means
3) To learn about how to maintain the confidentiality, integrity, and availability of a data
4) To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks, and countermeasures.
5) To familiarize with cryptographic techniques for secure (confidential) communication of two parties over an insecure (public) channel; verification of the authenticity of the source of a message.
6) To familiarize digital signature standards and provide solutions for their issues.

Course Outline:

Unit 1: Introduction to Cryptography and Block Ciphers: (Introduction to Cryptography and Block Ciphers) - Security trends, The OSI Security Architecture, A model for Network security. Introduction to security attacks - services and mechanism, introduction to cryptography, Conventional Encryption: Encryption model,classical encryption techniques, substitution ciphers and transposition ciphers, cryptanalysis,steganography - stream and blockciphers. Shannon's theory of confusion and diffusion - fiestalstructure. Classical encryption techniques:symmetric cipher modes, substitute techniques.

Unit 2: Block Cipher and Data Encryption Standards: Block Cipher Principles, Data Encryption Standards, the Strength of DES & AES, Differential

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

and Linear Crypt Analysis, Block Cipher Design Principles.(Advanced Encryption Standards) :Evaluation Criteria for AES, the AES Cipher. (More On Symmetric Ciphers): Multiple Encryption, Triple DES, Block Cipher Modes of Operation, Stream Cipher and RC4.(Introduction To Number Theory): Prime Numbers, Fermat's and Euler's Theorem, Testing for Primality, The Chinese Remainder

Theorem, Discrete logarithms,

Unit 3: Public Key Cryptography and RSA: Principles Public key crypto Systems, Diffie Hellman Key Exchange, the RSA algorithm, Key Management, , Elliptic Curve Arithmetic, Elliptic Curve Cryptography.(Message Authentication And Hash Functions): Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACs.(Hash And Mac Algorithm) : Secure Hash Algorithm, Whirlpool, HMAC, CMAC.(Digital Signature) : Digital Signature, Authentication Protocol, Digital Signature Standard.

Unit 4: Authentication Application: Kerberos, X.509 Authentication Service, Public Key Infrastructure.(Email Security): Pretty Good Privacy (PGP) and S/MIME.(IP Security): Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Unit 5: Integrity Checks and Authentication Algorithms: MD5 message digest algorithm - Secure hash algorithm (SHA) Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm - Authentication Applications: Kerberos and X.509 - directory authentication service - electronic mail security-pretty good privacy (PGP) - S/MIME.

Unit 6: Program Security: Nonmalicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels.

Unit 7: Security in Networks: Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP,S/MIME.

Unit 8: Web Security: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats.(Firewall: Firewall Design principles, Trusted Systems.)

Unit 9: Security Issues on Cryptography and Network Security: Cryptanalysis, Steganography, Classical Encryption Techniques. Transposition Techniques.

Dr. D. Y. Patil Vidyapeeth, Pune

(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)

Centre for Online Learning

Unit 10: Firewall and Intrusion Detection System: Firewall : need of firewall,types of firewall-packet filters,stateful packet filters, application gateways,circuit gateways, Intrusion detection system,vulnerability assessment,Anomaly detection,network based IDS, host-based IDS.

Course Outcome:

On successful completion of the course the learner will be able to:

CO#	Cognitive Abilities	Outcomes
CO303.1	**Remember**	Identify basic security attacks and services.
CO303.2	**Understand**	Understand & use symmetric and asymmetric key algorithms for cryptography.
CO303.3	**Apply**	Perform all the required calculations through relevant numerical problems.
CO303.4	**Analyze**	Implement the tools and techniques by learning financial practices.
CO303.5	**Evaluate**	Evaluate the impact of business decisions on Financial Statements, Working Capital, Capital Structure, and Capital Budgeting of the firm.

Suggested Reading:

1. Charlie Kaufman (2002), Network Security: Private Communication in a Public World, 2nd edition, Prentice Hall of India, New Delhi.

2. Atul Kahate (2008), Cryptography and Network Security, 2nd edition, Tata Mc Graw hill, India.

3. William Stallings, "Cryptography and Network Security Principles and Practices", Pearson/PHI.

4. W. Mao, "Modern Cryptography – Theory and Practice", Pearson Education.

5. Network Security Essentials: Applications and Standards, by William Stallings. Prentice-Hall.

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Semester	3	Course Credits	4	Specialization	Blockchain Technology Management
Course Code	OMBBTM304			Type	Specialization Course
Course Title	Cloud Infrastructure and Services				

Course Description:

Cloud computing is an interesting domain, it helps businesses meet their need for software, hardware, and the right type of infrastructure that can keep projects going. The course gives you a top-down view of cloud computing, from applications and administration to programming, infrastructure, billing, and security. The topics include an overview of cloud computing, cloud systems, Load balancing in AWS, distributed storage systems, virtualization, security in AWS, and management services and Billing.

Course Objectives:

1) To develop an understanding of Cloud Computing and its benefits
2) Learners will understand the main principles of Cloud Computing and how they are implemented in Microsoft Azure, AWS, and Google Cloud Platform.

Course Outline:

Unit–1: Introduction to Cloud Technologies: Introduction to Cloud Technologies Introduction to Cloud Computing, History of cloud computing, cloud service options, Cloud Deployment models, Business concerns in the cloud.

Unit-2: Virtualization and Cloud Platforms: Virtualization and Cloud Platforms Exploring virtualization, Load balancing, Hypervisors, Machine imaging, Cloud marketplace overview, Comparison of Cloud providers.

Unit-3: Introduction to AWS: Introduction to AWS AWS history, AWS Infrastructure, AWS services, AWS ecosystem.

Unit-4: Programming, management console and storage on AWS: Programming, management console, and storage on AWS Basic Understanding APIs, AWS programming interfaces, Web services, AWS URL naming, Matching interfaces and services, Elastic block store, Simple storage service, Glacier, Content delivery platforms.

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Unit-5: AWS identity services, security and compliance: Users, groups, and roles, Understanding credentials, Security policies, IAM abilities and limitations, AWS physical security, AWS compliance initiatives, Understanding public/private keys, and Other AWS security capabilities.

Unit-6: AWS computing and marketplace: Elastic cloud computes - Introduction to servers, Imaging computers, Auto scaling, Elastic load balancing, Cataloging the marketplace, AMIs, Selling on the marketplace.

Unit-7: AWS networking and databases; Virtual private clouds, Cloud models, Private DNS servers (Route 53), Relational database service, DynamoDB, ElastiCache, Redshift.

Unit-8: Other AWS Services and Management Services: Analytics services, Application services, Cloud security, CloudWatch, CloudFormation, CloudTrail, OpsWorks.

Unit-9: AWS billing and Dealing with disaster: Managing costs, Utilization and tracking, Bottom line impact, Geographic and other concerns, Failure plans, and Examining logs.

Unit-10: Deployment of Software Solutions and Web Applications: Deployment models, implementation of web services: SOAP, and REST,0

Course Outcome:

On successful completion of the course, the learner will be able to

CO#	Cognitive Abilities	Outcomes
CO304.1	**Remember**	Define the basic terms and concepts related to Cloud Computing
CO304.2	**Understand**	learners will understand the main principles of Cloud Computing and Services
CO304.3	**Apply**	Apply their knowledge in implementing cloud in Microsoft Azure, AWS, and Google Cloud Platform.
CO304.4	**Analyze**	Demonstrate their knowledge to implement use cases and configuration options for Azure App Services and AWS Application Services environments.

Suggested Reading:

1. Amazon Web Services For Dummies. Bernard Golden. For Dummies. ISBN-13: 978- 1118571835

2. Rajkumar Buyya, Cloud Computing: Principles and Paradigms, John Wiley & Sons, First Edition1.

Dr. D. Y. Patil Vidyapeeth, Pune

(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)

Centre for Online Learning

Semester	3	Course Credits	4	Specialization	Artificial Intelligence & Machine Learning
Course Code	OMBBTM305			Type	Specialization Course
Course Title	Statistics & Quantitative Techniques (SQT)				

Course Description:

Resources are always critical in any organization. They are unavailable in an unlimited manner and there are always constraints. Operation research is helpful in the situation of such constraints on resources. Managers have to manage limited available resources in such a way that neither production nor other activities get disturbed in the business. Facility design is a fascinating area for OR. The excitement of operation research lays in the application of quantitative techniques to real-world problems.

Course Objectives:

1) To impart knowledge in concepts and tools of OR and QT; and
2) To help students apply these tools in managerial decision-making.

Course Outlines:

Unit 1: Arranging Data to Convey Meaning: Presenting Data in Tables & Charts: Application Areas for Statistics, Statistical Methods, Understand Data, Organize and Classify Data, Graphical Representation of Data, Good & Bad Data Presentation.

Unit 2: Measures of Central Tendency – Mean, Median, Mode: Numerical Data Properties, Frequency, and Frequency Table, Summary Measures– Central Tendency.

Unit 3: Measures of Dispersion: Summary Measures– Variation.

Unit 4: Correlation Analysis: Correlation Analysis– Scatter Plots, Some Misconceptions About Correlation, Correlation Terminologies.

Unit 5: Simple And Multiple Regressions: Regression Analysis, Simple Regression, Multiple Regressions.

Unit 6: Association of Attributes: Notations, Classes and Class Frequencies, Relationship Between the Class Frequencies, Consistency of the Data, Independence of Attributes, Association of Attributes, Yules' Co-efficient of Association.

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Unit 7: Probability & Probability Distribution: Notation and Terminology from Set Theory, Addition Theory of Probability, Conditional Probability, Multiplication Theory of Probability, Applications of Bayes' Theorem, Binomial Distribution, Poisson Distribution, Normal Distribution.

Unit 8: Linear Programming: Formulation & Graphical Solutions to LPP: Variables, Constraints, Objective, Phases of an Operations Research Project, Linear Programming– Formulation Graphical Solutions to LPP.

Unit 9: Transportation: Mathematical Formulation of Transportation Problem, North-West Corner Rule, Lowest Cost Entry Method, Vogel's Approximation Method, Test for Optimization.

Unit 10: Assignment Problems: Mathematical Statement of Assignment Problem, Solution Method for Assignment Problem, Travelling Salesman Problem.

Unit 11: Queuing Theory: Single Server & Multi-Server: Analysing Queuing Process, Constituents of Queuing System, Service Facility, Queuing Discipline, Kendall Notations, Single Server Models, Multi-Server Models

Unit 12: Markov Chain: Monte Carle Simulation: Simulation Procedure, Application of Simulation.

Unit 13: Games Theory: Zero-Sum Games, Fundamental Principles of Game Theory, Reducing by Dominance, Saddle Point, Strictly Determined Game, Mixing Strategies, Flow of Solution, Assumptions for Games Theory.

Unit 14: Decision Theory: Criteria for Decision Making: Decision Tables, Decision Making Process, Decision Criteria for Certainty, Decision Criteria for Uncertainty [5 Criteria], Decision Criteria for Risk.

Course Outcomes:

On successful completion of the course the learner will be able to:

CO#	Cognitive Abilities	Outcomes
CO 304.1	**Remember**	Learn the basic concepts of operational research.
CO 304.2	**Apply**	Easily apply the tools in managerial decision-making.
CO 304.3	**Analyze**	Grab the opportunities in operation as a career.
CO 304.4	**Creating**	Easily do operational research for better growth.

Suggested Reading:

1. Taylor III. Bernard W., Introduction to Management Science, Dorling Kindersley (India) Pvt. Ltd., licenses of Pearson Education in South Asia, 9th Edition, 2008.

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

2. Vohra N. D., Quantitative Techniques in Management, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 3rd Edition, 2007.

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Semester	3	**Course Credits**	4	Specialization	Blockchain Technology Management
Course Code	OMBBTM306			**Type**	Specialization Course
Course Title	Blockchain and FinTech				

Course Description:

Blockchain is a core technology in FinTech. The original design of blockchain-focused on the cryptocurrency "Bitcoin". Due to its specific characteristics, many companies and users now find blockchain very useful for applications in many areas, not limited to cyber currencies, including finance, logistics, insurance, medicine, and even music. However, the design of blockchain involves cryptographic technology, which cannot be easily understood by those who are not professionals in the area of IT and security. In order to better understand what kinds of applications best fit blockchain and other forms of distributed ledger technology and the potential of these emerging technologies, it is important to understand the design rationale, the basic technology, the underlying cryptographic fundamentals, and its limitations.

Financial technology (FinTech) is revolutionary and rapidly changing the financial services industry. Fintech (financial technology) is the umbrella term used for innovations in the financial technology space and includes the organizations and services that provide financial services to consumers using these technologies The program will impart a strong understanding of the Blockchain and FinTech technologies involved along with their applications/business as is being seen in the world today.

Course Objectives:

1) To have a conceptual understanding of foundational concepts and architecture of Blockchain and Fintech.
2) Be well familiar with the trending concepts of FinTech such as Blockchain, Artificial Intelligence/Machine Learning, Bitcoin/ Crypto currency Ecosystem, etc., and be able to improve existing business models and financial solutions using them.
3) To develop a different way of thinking about available data and how it can be used to impact managerial decision-making.
4) Be at the cutting edge of FinTech innovation as is happening today in the world and be able to undertake related innovations in business projects.
5) Understand recent FinTech developments and analyze their impact on the financial services industries

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Course Outline:

Unit 1: Fintech Basics: What is Fin Tech: History of Fin Tech Evolution and the Fin Tech Landscape, FinTech Architecture, FinTech Technologies, Latest Trends and future of FinTech, Applications of FinTech, Use cases of FinTech in banks, Fintech startups, Fintech unicorns, and business models.

Unit 2: Machine Learning & AI: Introduction to Machine Learning, ML Algorithms and applications, AI and applications, AI/ML –changing business landscape, AI/ML –in practice, Use cases and applications.

Unit 3: Blockchain Technology and Infrastructure: Blockchain Foundations, Blocks and Blockchain, the Chain, Nodes and Network, Blockchain in Use, Trust Framework and Consensus Mechanisms, Public, Consortium, Private Blockchains, Blockchain Interoperability.

Unit 4: Blockchain and Cryptography: Cryptography, Application to Blockchain, Hash Functions, Public Key Cryptography, and Signing, Use cases and applications.

Unit 5: Smart Contracts and Hyperledgers: Understand smart contracts Computational model of Smart contracts, Ethereum and Working with Smart Contracts, Hyperledger Architecture, Hyperledger Blockchain Technology, Use cases of Smart contracts

Unit 6: Crypto-Currencies: Cryptocurrencies Primer, Bitcoin and Applications, Cryptocurrencies and Digital Crypto Wallets, Types of Cryptocurrencies, Cryptocurrencies and Applications, Regulations for Cryptos and tokens

Unit 7: Payments -Architecture and Technologies: Global Payment Ecosystem, Payments Architecture and Setup, Innovation in Consumer and Retail payments, Popular Payments Technology, Blockchain and Cryptocurrencies in Payments, Payment Stacks in India, B2B & B2B2C solutions, Innovative Products in Mobile based, Credit Cards, POS-based ecosystem.

Unit 8: Alternative Lending, P2P Lending, Crowd-Funding, And Infrastructure: Concept of P2P Lending, P2P and Marketplace Lending, P2P Infrastructure and technologies, Concept of Crowdfunding, Crowdfunding Architecture and Technology, P2P and Crowdfunding unicorns and business models, SME/MSME Lending: Unique opportunities and Challenges, Solutions and Innovations.

Unit 9: FinTech in Financial Services (FS of BFSI): Use cases of Wealth Management, Robo Advisory, Sentiment Analysis, etc. FinTech in Insurance (I of BFSI): Use cases on Insurance, Fraud Detection, etc.

Unit 10: FinTech Regulation and RegTech: FinTech Regulations, Evolution of RegTech, RegTech Ecosystem: Financial Institutions RegTech Ecosystem: Startups, RegTech Startups: Challenges, RegTech Ecosystem: Regulators, Industry Showcase: Use Case of AI in Smart Regulation and Fraud Detection, Regulatory Sandboxes, Smart Regulation

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Course Outcome:

On successful completion of the course the learner will be able to:

CO#	Cognitive Abilities	Outcomes
CO306.1	**Remember**	Learn and will explore the major areas of FinTech
CO306.2	**Understand**	Understand recent FinTech developments and analyze their impact on the financial services industries and the fundamental role of Data and Security in data-driven finance
CO306.3	**Apply**	Apply machine learning in robo-advising and FinTech
CO306.4	**Analyze**	Analyze alternative lending, and P2P technologies, and assess their impact on traditional banking and payment industries

Suggested Reading:

1. Fintech in a Flash: Financial Technology Made Easy by Agustin Rubini

2. FinTech Future: The Digital DNA of Finance by Sanjay Phadke

3. Blockchain & Fintech: A Comprehensive Blueprint to Understanding Blockchain & Financial Technology. Author: by Richard Hayen.

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Semester-IV Blockchain Technology Management Specialization

Semester	4	Course Credits	4	Specialization	Blockchain Technology Management
Course Code	OMBBTM401			Type	Specialization Course
Course Title	Enterprise Blockchain Applications & Hyperledger				

Course Description:

Blockchain solves a core problem: many organizations want to share data in a distributed database, but no single owner will be trusted by every user. Blockchain technologies enable direct transactions in a secure, transparent way, baking trust into systems that operate with the efficiency of a peer-to-peer network. Hyperledger technologies are open source code bases built with collaborative design and overnance, enterprises have embraced them as trusted infrastructure for building blockchain solutions. Students will gain an understanding of how to build blockchain applications using Hyperledger thereby adding value for their business. Learner's will gain knowledge of the frameworks.

Course Objectives:

1. Understand Hyperledger, its various technologies, and business use.
2. To understand necessary frameworks, standards, guidelines, and tools to build open-source blockchains and related applications for use across various industries.

Course Outline:

Unit 1: Consensus Models: Proof of Stake, Proof of Work, Proof of authority, Round Robin, Proof of Elapsed Time, Consensus Comparison Matrix, Ledger Conflicts, and Resolution.

Unit 2 : Forking: Soft Forks, Hard Forks, Cryptographic Changes, and Forks

Unit 3: Ethereum Technology Overview: Ethereum, Ethereum Clients, Account Management, Ether, The Ethereum network, Mining, The Ethereum Foundation, Architectural Overview, Ethereum Blockchain Platform, Analyse Ethereum blockchain.

Unit 4 : Hyperledger: Distributed ledger frameworks and domain-specific blockchains Hyperledger: Domain-specific blockchain technologies, Hyperledger frameworks, Hyperledger Fabric and its architecture, Hyperledger Composer.

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Unit 5: Hyperledger tools: Hyperledger Caliper. Hyperledger Cello. Cello is a Blockchain module toolkit., Hyperledger Explorer.Hyperledger Composer. Hyperledger Quilt. ...Hyperledger Ursa.

Unit 6: Hyperledger libraries: Hyperledger Indy, Hyperledger Fabric, Hyperledger Iroha, Hyperledger Sawtooth Hyperledger Besu.

Unit 7: Enterprise Blockchain: Hyperledger, Assisted Practise: Setup Sawtooth Network and Create Basic Transactions, Hyperledger Iroha, Assisted Practise: Setup Iroha Network and Create Basic Transaction, Hyperledger Fabric, Hyperledger Fabric Transaction, Fabric Network Types.

Unit 8: Solidity Programming Basics: The layout of a Solidity Source File, Structure of a Contract, Types, Units, and Globally Available Variables, Input Parameters, and Output Parameters.

Unit 9: Smart Contracts and Network: What are smart contracts, How smart contracts works, Benefits of smart contracts, Applications of smart contracts, and How it can be used in Supply chain management.

Unit 10: The promise of business blockchain technologies: Introduction, When to use or not to use blockchain technologies, Existing Hyperledger blockchain use cases.

Unit 11: Emerging Trends in Blockchain: Cloud-based blockchain, Multichain, Geth, Stellar, Ripple, R3 Corda, Blockchain API, Blockchain Sandboxes.

Course Outcome:

On successful completion of the course the learner will be able to:

CO#	Cognitive Abilities	Outcomes
CO401.1	**Remember**	Learn the Hyperledger Framework
CO401.2	**Understand**	Tools & libraries of Hyperledger Framework
CO401.3	**Apply**	How to build blockchain applications
CO401.4	**Analyze**	Analyze the Hyperledger applications in a structured manner.

Suggested Reading:

1. Blockchain Development with Hyperledger: Build decentralized applications with Hyperledger Fabric and Composer, Author: Salman A. Baset (Author), Luc Desrosiers (Author), Nitin Gaur (Author)

2. Enterprise Blockchain Development: With Hyperledger Fabric and Composer Author: Sudip Ghosh Ernesto Lee.

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Semester	4	**Course Credits**	4	**Specialization**	Blockchain Technology Management
Course Code	OMBBTM402			**Type**	Specialization Course
Course Title	Design and Development of Blockchain Applications				

Course Description:

This program caters to graduates in any discipline and working professionals from diverse backgrounds and basic programming knowledge is good to have. The Blockchain market is expected to reach USD 39.7 billion by 2025, at a growth rate of 67.3 percent. This program prepares both new and experienced professionals — with a passion for blockchain and technical background — for a thriving career in blockchain.

Course Objectives:

1) Become proficient in AWS and Microsoft Azure
2) Understand the different architecture and deployment models of cloud
3) Understand Decentralised Financial Application

Course Outline:

Unit 1: Application Architecture and Deployment: Building an application on Health care management for Covid patients. Create user stories, selecting a blockchain framework to use, di¬erent tools to create the whole project. coding and deploying the application using smart contracts. Understanding how the whole project works as a unit and deploy the solution on cloud. Baas on AWS

Unit 2: Architecting A Decentralised Finance (Defi) Application: DeFi with a use cases: how to create solution for the use case on Ethereum network. Network interoperability, ZKP, Light weight clients, etc.

Unit 3: Other Blockchain Frameworks And Their Use Cases: Blockchain frameworks other than Ethereum and Hyperledger. Introduction to networks like R3 Corda, Ripple, Iota, etc.

Unit 4: Cloud Computing on AWS: Compute, Load Balancing, Autoscaling, Storage, Replication and Life Cycle Management, AWS Organization and Identity, Networking, and Data migration.

Unit 5: Managed Services on AWS: Databases (RDS, DynamoDB), Web Application Firewall, SNS, SQS, Cloudwatch, Athena, Quicksight and Kinesis, Serverless (Lambda).

Unit 6: Azure Infrastructure: Introduction to Azure & its services, Azure Virtual Machines (Networking components, Configuring high availability, Scale sets, Autoscaling, etc.), Storage (Blob Storage, Azure

Dr. D. Y. Patil Vidyapeeth, Pune
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.64 on a four-point scale at 'A++' Grade)
(An ISO 9001: 2015 Certified University)
Centre for Online Learning

Files), Virtual Networking (Networking Options, VNet Peering, VNet to VNet setup), Azure Resource Manager (Building ARM template, Powershell, CLI, Cloud shell usage).

Unit 7: Azure Data Platforms: Cosmos DB, SQL Database, Data Services Introduction.

Unit 8: Google Cloud Platform: Regions, Resources and Services Overview, Google Compute Engine, Instance Groups, Load Balancing, and Autoscaling, Storage and Networking, GCloud and Cloud SDK, Google App Engine, Google Kubernetes Engine.

Unit 9: Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.

Unit 10: Capstone Project: A set of projects that allows you to apply your learnings to industry-inspired use cases and add it to your portfolio for potential employers.

Experiments:

1. Create a Simple Blockchain in any suitable programming language.
2. Build Hyperledger Fabric Client Application.
3. Build Hyperledger Fabric with Smart Contract.
4. Create Case study of BlockChain being used in illegal activities in the real world.
5. Using Python Libraries to develop BlockChain Application.

Course Outcome:

On successful completion of the course the learner will be able to:

CO#	Cognitive Abilities	Outcomes
CO402.1	Remember	How to design and develop Blockchain Applications
CO402.2	Understand	Understand the AWS, Azure, Google Cloud, AWS Technology
CO402.3	Apply	Apply the knowledge and skill for the development project.
CO402.4	Analyze	Analyze different tools and techniques of Blockchain

Suggested Reading:

1. Learning AWS by Amit Shah, Aurobindo Sarkar
2. Learn Microsoft Azure for Beginners by Henry Stromm

Supplementary Resources:

- NPTEL online course: https://nptel.ac.in/courses/106/104/106104220/#
- Udemy: https://www.udemy.com/course/build-your-blockchain-az/