

DEPARTMENT

OF

COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

IV B. Tech

COURSE STRUCTURE & SYLLABUS (R22)

B. Tech CSE (Data Science)

COURSE STRUCTURE

IV YEAR I-SEMESTER

S.No.	Course	Course Title	Cotogowy	т	т	D	Credit
	Code		Category	L	I	Г	Crean
1	22DS4111	Neural Networks and Deep Learning	PC	3	0	0	3
2	22DS4112	Web and Social Media Analytics	PC	3	0	0	3
3	Professional Elective–IV			3	0	0	3
	22DS4171	Cloud Computing	PE				
	22DS4172	Database Security	PE				
	22DS4173	Internet of Things	PE				
	22DS4174	Data Science Applications	PE				
4	Professional Elective– V				0	0	3
	22AM4175	Quantum Computing	PE				
	22DS4175	Privacy Preserving in Data Publishing	PE				
	22DS4176	Mining Massive Datasets	PE				
	22DS4177	Exploratory Data Analysis	PE				
5	Open Elective–II		OE	3	0	0	3
6	22DS4151	Deep Learning Lab	PC	0	0	2	1
7	22DS4152	Web and Social Media Analytics Lab	PC	0	0	2	1
8	22DS4181	Internship	PW	0	0	2	1
9	22DS4182	Project Stage – I	PW	0	0	4	2
Total Credits					0	10	20

IV YEAR II-SEMESTER

S. No.	Course Code	Course Title	Category	L	Т	Р	Credits
1	22MB4211	Organizational Behavior	HS	3	0	0	3
2	Professional Elective – VI			3	0	0	3
	22DS4271	Data Stream Mining	PE				
	22DS4272	Web Security	PE				
	22DS4273	Video Analytics	PE				
	22DS4274	Blockchain Technology	PE				
3		Open Elective – III	OE	3	0	0	3
4	22DS4281	Project Stage – II Including Seminar	PW	0	0	22	11
Total Credits				9	0	22	20

22DS4111: NEURAL NETWORKS AND DEEP LEARNING

B Tech IV Year I Sem

Prerequisites:

L T P C 3 - - 3

- 1. Discrete Mathematical Structures
- 2. Mathematical and Statistical Foundations
- 3. Python Programming
- 4. Machine Learning

Course Objectives:

- To introduce the foundations of Artificial Neural Networks
- To Understand concepts of Unsupervised Learning Networks
- To acquire the knowledge on Deep Learning Concepts
- To gain knowledge on various regularization methods.
- To gain knowledge to apply optimization strategies

Course Outcomes:

- To understand the concepts of Artificial Neural Networks
- To apply Unsupervised Learning Networks in modeling real world systems
- To analyze various algorithms for deep convolution networks
- To evaluate various regularization methods for deep learning
- To evaluate optimization strategies for large scale applications

UNIT-I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks. Training Algorithms for pattern Association, BAM and Hopfield Networks.

UNIT-II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks Introduction to various networks.

UNIT-III

Deep Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms Convolutional Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features.

UNIT-IV

Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier.

UNIT-V

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing.

TEXTBOOKS:

- 1. Big Data Analytics, Seema Acharya, Subhasini Chellappan, Wiley 2015.
- Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business, Michael Minelli, Michehe Chambers, 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
- 3. Hadoop: The Definitive Guide, Tom White, 3rdEdition, O''Reilly Media, 2012.
- 4. Big Data Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, 1st Edition, IBM Corporation, 2012.

- 1. Big Data and Business Analytics, JayLiebowitz, Auerbach Publications, CRC press(2013)
- 2. Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop, Tom Plunkett, Mark Hornick, McGraw-Hill/Osborne Media (2013), Oracle press.
- 3. Professional Hadoop Solutions, Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, Wiley, ISBN: 9788126551071, 2015.
- 4. Understanding Big data, Chris Eaton, Dirk deroosetal. McGraw Hill, 2012.
- 5. Intelligent Data Analysis, Michael Berthold, David J.Hand, Springer, 2007.
- 6. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Bill Franks,1stEdition.

22DS4112: WEB AND SOCIAL MEDIA ANALYTICS

B. Tech IV Year I Sem.

LTPC

3 - - 3

Prerequisites:

- 1. Mathematical and Statistical Foundations
- 2. Python Programming
- 3. Machine Learning
- 4. Data Analytics

Course Objectives: The main objective of this course is to make students comfortable with.

- 1. Exposure to various web and social media analytic techniques.
- 2. To provide an overview of common text mining and social media data analytic activities.
- 3. To understand the complexities of processing text and network data from different data sources.
- 4. To provide an overview of web mining and web analytics tools.
- 5. To enable students to solve complex real-world problems for sentiment analysis and Recommendation systems.

Course Outcomes: At the end of the course student will be able to:

- 1. Understand social media, web and social media analytics, and their potential impact.
- 2. Understand usability, user experience, and customer experience.
- 3. Understand usability metrics, web and social media metrics.
- 4. Use ready-made web analytics tools (Google Analytics).
- 5. Design the experiment and apply web analytics skills to other projects.

UNIT - I

An Overview of Business Intelligence, Analytics, and Decision Support: Analytics to Manage a Vaccine Supply Chain Effectively and Safely, Changing Business Environments and Computerized Decision Support, Information Systems Support for Decision Making, The Concept of Decision Support Systems (DSS), Business Analytics Overview, Brief Introduction to Big Data Analytics.

UNIT - II

Text Analytics and Text Mining: Machine Versus Men on Jeopardy!: The Story of Watson, Text Analytics and Text Mining Concepts and Definitions, Natural Language Processing, Text Mining Applications, Text Mining Process, Text Mining Tools.

UNIT - III

Sentiment Analysis: Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process, Sentiment Analysis and Speech Analytics.

UNIT - IV

Web Analytics, Web Mining: Security First Insurance Deepens Connection with Policyholders, Web Mining Overview, Web Content and Web Structure Mining, Search Engines, Search Engine Optimization, Web Usage Mining (Web Analytics), Web Analytics

Maturity Model and Web Analytics Tools.

B. Tech CSE (Data Science)

UNIT - V

Social Analytics and Social Network Analysis: Social Analytics and Social Network Analysis, Social Media Definitions and Concepts, Social Media Analytics.

Prescriptive Analytics - Optimization and Multi-Criteria Systems: Multiple Goals, Sensitivity Analysis, What-If Analysis, and Goal Seeking.

TEXT BOOK:

- 1. Ramesh Sharda, Dursun Delen, Efraim Turban, BUSINESS INTELLIGENCE AND ANALYTICS: SYSTEMS FOR DECISION SUPPORT, Pearson Education.
- 2. K. M. Shrivastava, Social Media in Business and Governance, Sterling Publishers Private Limited, 2013.

- 1. Rajiv Sabherwal, Irma Becerra-Fernandez," Business Intelligence Practice, Technologies and Management", John Wiley 2011.
- 2. Lariss T. Moss, Shaku Atre, "Business Intelligence Roadmap", Addison-Wesley IT Series.
- 3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012.

22DS4171: CLOUD COMPUTING

(Professional Elective – IV)

B.Tech IV Year I Sem.

L T P C 3 - - 3

Prerequisites:

- 1. A course on "Computer Networks"
- 2. A course on "Operating Systems"
- 3. A course on "Distributed Systems"

Course Objectives: The main objective of this course is to make students comfortable with:

- 1. This course provides an insight into cloud computing.
- 2. Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.
- 3. The fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges.
- 4. Cloud storage technologies and relevant distributed file systems.
- 5. The basic ideas and principles in data center design; cloud management techniques and cloud software deployment considerations.

Course Outcomes: At the end of this course the students will be able to

- 1. Understand various service delivery models of a cloud computing architecture.
- 2. Understand the ways in which the cloud can be programmed and deployed.
- 3. Understand cloud service providers.
- 4. Understand network and storage virtualization and outline their role in enabling the cloud computing system model.
- 5. Analyze various cloud programming models and apply them to solve problems on the cloud.

UNIT – I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT – II

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models.

UNIT - III

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud,

UNIT - IV

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Platform as a Service, Characteristics of PaaS, Pros and Cons of PaaS, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS.

UNIT V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM.

TEXT BOOK:

- 1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014
- 2. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010.

- 1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011.
- 2. Enterprise Cloud Computing Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010.

22DS4172: DATABASE SECURITY (Professional Elective – IV)

B.Tech IV Year I Sem.

L T P C 3 - - 3

Prerequisites:

- 1. A course on "Data base management systems"
- 2. A course on "Cryptography and Network Security"

Course Objectives:

- 1. To learn the security of databases.
- 2. To learn the design techniques of database security.
- 3. To learn the secure software design.
- 4. To learn different Intrusion detection systems.
- 5. To learn new generation database systems.

Course Outcomes:

- 1. Ability to carry out a risk analysis for large database.
- 2. Ability to set up, and maintain the accounts with privileges and roles.
- 3. Make students aware and experiment with database security analysis tools.
- 4. Analyze information in a database to identify information security incidents.
- 5. Ability to understand concepts of new generation database systems.

UNIT - I

Introduction: Introduction to Databases Security, Problems in Databases Security, Controls Conclusions.

Security Models -1: Introduction Access Matrix Model, Take-Grant Model ,Acten Model ,PN Model, Hartson and Hsiao's Model ,Fernandez's Model ,Bussolati and Martella's Model for Distributed databases.

UNIT - II

Security Models -2: Bell and LaPadula's Model, Biba's Model, Dion's Model, Sea View Model, Jajodia and Sandhu's Model, The Lattice Model for the Flow Control conclusion.

Security Mechanisms: Introduction User Identification/Authentication, Memory Protection, Resource Protection, Control Flow Mechanisms, Isolation Security, Functionalities in Some Operating Systems, Trusted Computer System Evaluation Criteria.

UNIT - III

Security Software Design: Introduction A Methodological Approach to Security Software Design, Secure Operating System Design, Secure DBMS Design Security Packages, Database Security Design.

B. Tech CSE (Data Science)

Statistical Database Protection & Intrusion Detection Systems: Introduction Statistics Concepts and Definitions, Types of Attacks, Inference Controls, Evaluation Criteria for Control Comparison, Introduction IDES System, RETISS System, ASES System Discovery.

UNIT - IV

Models for the Protection of New Generation Database Systems -1: Introduction A Model for the Protection of Frame Based Systems, A Model for the Protection of Object-Oriented Systems, SORION Model for the Protection of Object-Oriented Databases.

UNIT - V

Models for the Protection of New Generation Database Systems -2: A Model for the Protection of New Generation Database Systems, the Orion Model ajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions.

TEXT BOOKS:

- 1. Database Security by Castano, Pearson Edition March 2013
- 2. Database Security and Auditing: Protecting Data Integrity and Accessibility, 1st Edition, Hassan Afyouni, THOMSON Edition. 2006

- 1. Database security by Alfred basta, melissazgola, CENGAGE learning.
- 2. Bhavani Thuraisingham, Database and Applications Security: Integrating Information Security and Data Management, CRC Press, Taylor & Francis Group, 2005.

22DS4173: INTERNET OF THINGS

(Professional Elective –IV)

B.Tech. IV Year I Sem.

LTPC

3 - - 3

Prerequisites:

- 1. A course on "Programming fundamentals"
- 2. A course on "Computer Networks"
- 3. A course on "Cloud Computing"

Course Objectives:

- 1. To introduce the terminology, technology and its applications.
- 2. To introduce the concept of M2M (machine to machine) with necessary protocols.
- 3. To introduce the Python Scripting Language which is used in many IoT devices.
- 4. To introduce the Raspberry PI platform, that is widely used in IoT applications.
- 5. To introduce the implementation of web-based services on IoT devices.

Course Outcomes:

- 1. Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- 2. Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- 3. Appraise the role of IoT protocols for efficient network communication.
- 4. Elaborate the need for Data Analytics and Security in IoT.
- 5. Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

UNIT - I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT -IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, and Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs -Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT - II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

UNIT - III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, date/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib.

B. Tech CSE (Data Science)

UNIT - IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, and reading input from pins.

UNIT - V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework designing a Restfully web API.

TEXT BOOKS:

- 1. Internet of Things A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
- 2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD),2014, ISBN: 9789350239759

REFERENCES:

- 1. The Internet of Things in the Cloud: A Middleware Perspective Honbo Zhou CRC Press -2012.
- 2. Architecting the Internet of Things Dieter Uckelmann; Mark Harrison; Florian Michahelles-(Eds.) Springer 2011.
- 3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World DavidEasley and Jon Kleinberg, Cambridge University Press 2010.
- 4. The Internet of Things: Applications to the Smart Grid and Building Automation by OlivierHersent, Omar Elloumi and David Boswarthick Wiley -2012.
- 5. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things Key applications and Protocols", Wiley, 2012.

22DS4174: DATA SCIENCE APPLICATIONS (Professional Elective – IV)

B.Tech IV Year I Sem.

L T P C 3 - - 3

Prerequisites:

- 1. A course on "Python Programming"
- 2. Basic Knowledge on Statistics.

Course Objective:

- 1. To give deep knowledge of data science and how it can be applied in various fields to mkelife easy.
- 2. To demonstrate Time series data.
- 3. To learn Data science in Education and social media.
- 4. To learn Data science in Education, Social media.
- 5. To implement the case studies in data optimization using python.

Course Outcomes:

- 1. To correlate data science and solutions to modern problems.
- 2. To decide when to use which type of technique in data science.
- 3. Understand Data Science Applications in Education, Social Media.
- 4. Understand Data Science Application in Healthcare, Bioinformatics.
- 5. Complete the case studies in data optimization using Python.

UNIT - I

Data Science Applications in various domains, Challenges and opportunities, tools for data scientists, Recommender systems – Introduction, methods, application, challenges.

UNIT - II

Time series data – stock market index movement forecasting. Supply Chain Management Real world case study in logistics.

UNIT – III

Data Science in Education, Social media.

UNIT - IV

Data Science in Healthcare, Bioinformatics.

UNIT - V

Case studies in data optimization using Python.

TEXT BOOKS:

- 1. Aakanksha Sharaff, G.K.Sinha, "Data Science and its applications ", CRC Press, 2021.
- 2. Q. A. Menon, S. A. Khoja, "Data Science: Theory, Analysis and Applications", CRC Press, 2020.

B. Tech CSE (Data Science)

REFERENCES:

- 1. Aakanksha Sharaff, G.K.Sinha, "Data Science and its applications ", CRC Press, 2021.
- 2. Torabi, M., Hashemi, S., Saybani, M. R., Shamshirband, S., & Mosavi, A. (2019)

22AM4175: QUANTUM COMPUTING

(Professional Elective – V)

B.Tech IV Year I Sem.

Prerequisites:

1. Linear Algebra

Course Objectives: The objective of this course is to:

- 1. To introduce the fundamentals of quantum computing
- 2. To introduce problem-solving approach using finite dimensional mathematics
- 3. To learn the basic quantum logical operations and algorithms for processing quantum information.
- 4. To learn the basic knowledge about the practical use of quantum algorithms and quantum programming skills.
- 5. To learn the basic quantum logical operations and algorithms for processing quantum information.

Course Outcomes: At the end of the course, student will be able to:

- 1. To Understand basics of quantum computing
- 2. To Understand physical implementation of Qubit
- 3. To Understand Quantum algorithms and their implementation
- 4. To Understand the Impact of Quantum Computing on Cryptography
- 5. To Understand simple quantum algorithms and information channels in the quantum circuit model

UNIT – I

Introduction to Essential Linear Algebra: Some Basic Algebra, Matrix Math, Vectors and Vector Spaces, Set Theory. Complex Numbers: Definition of Complex Numbers, Algebra of Complex Numbers, Complex Numbers Graphically, Vector Representations of Complex Numbers, Pauli Matrice, Transcendental Numbers. UNIT – II

Basic Physics for Quantum Computing: The Journey to Quantum, Quantum Physics Essentials, Basic Atomic Structure, Hilbert Spaces, Uncertainty, Quantum States, Entanglement.

Basic Quantum Theory: Further with Quantum Mechanics, Quantum Decoherence, Quantum Electrodynamics, Quantum Chromodynamics, Feynman Diagram Quantum Entanglement and QKD, Quantum Entanglement, Interpretation, QKE.

UNIT – III

Quantum Architecture: Further with Qubits, Quantum Gates, More with Gates, Quantum Circuits, The D-Wave Quantum Architecture. Quantum Hardware: Qubits, How Many Qubits Are Needed? Addressing Decoherence, Topological Quantum Computing, Quantum Essentials.

$\mathbf{UNIT} - \mathbf{IV}$

Quantum Algorithms: What Is an Algorithm? Deutsch's Algorithm, Deutsch-Jozsa Algorithm, Bernstein-Vazirani Algorithm, Simon's Algorithm, Shor's Algorithm, Grover's Algorithm.

UNIT – V

Current Asymmetric Algorithms: RSA, Diffie-Hellman, Elliptic Curve.

The Impact of Quantum Computing on Cryptography:

Asymmetric Cryptography, Specific Algorithms, Specific Applications.

B. Tech CSE (Data Science)

R22 SYLLABUS

LTPC 3 - - 3

TEXT BOOKS:

- 1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press
- 2. Dr. Chuck Easttom, Quantum Computing Fundamentals, Pearson

- 1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
- 2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol.
- Basic Concepts. Vol. Basic Tools and Special Topics, World Scientific.Pittenger A. O., An Introduction to Quantum Computing Algorithms.

22DS4175: PRIVACY PRESERVING IN DATA PUBLISHING (Professional Elective – V)

B.Tech IV Year I Sem.

LTPC

3 - - 3

- **Prerequisites:**
 - 1. A course on "Data Mining".

Course Objectives:

- 1. The aim of the course is to introduce the fundamentals of Privacy Preserving Data Mining models
- 2. The course gives an overview of Anonymity and its Measures.
- 3. The course gives an overview of Multiplicative Perturbation for Privacy-PreservingData Mining techniques for Utility-based Privacy Preserving Data.
- 4. This course also discusses privacy preservation methods for real time applications.
- 5. This course also gives the overview on utility based privacy preservation methods.

Course Outcomes:

- 1. Understand the concepts of Privacy Preserving Data Mining Models and Algorithms.
- 2. Demonstrate a comprehensive understanding of different tasks associated in Inference Control Methods for Privacy-Preserving Data Mining.
- 3. Understand the concepts of Data Anonymization Methods and its Measures.
- 4. Evaluate and appraise the solution designed for Multiplicative Perturbation.
- 5. Formulate, Design and Implement the solutions for Utility-based Privacy Preserving Data.

UNIT - I

Introduction, Privacy-Preserving Data Mining Algorithms, The Randomization Method, Group Based Anonymization, Distributed Privacy-Preserving Data Mining.

UNIT - II

Interface Control Methods: Introduction, A Classification of Microdata Protection Methods, Perturbative Masking Methods, Non- Perturbative Masking Methods, Synthetic Microdata Generation, Trading off Information Loss and Disclosure Risk.

UNIT - III

Measure of Anonymity: Data Anonymization Methods, A Classification of Methods, Statistical Measure of Anonymous, Probabilistic Measure of Anonymity, Computational Measure of Anonymity, reconstruction Methods for Randomization, Application of Randomization

UNIT - IV

Multiplicative Perturbation: Definition of Multiplicative Perturbation, Transformation Invariant Data Mining Models, Privacy Evaluation for Multiplicative Perturbation, Attack Resilient Multiplicative Perturbation, Metrics for Quantifying Privacy Level, Metrics for Quantifying Hiding Failure, Metrics for Quantifying Data Quality.

UNIT - V

Utility-Based Privacy-Preserving Data: Types of Utility-Based Privacy Preserving Methods, Utility-Based Anonymization Using Local Recording, The Utility-Based Privacy Preserving Methods in Classification Problems, Anonymization Merginal: Injection Utility into Anonymization Data Sets.

TEXT BOOK:

- 1. Privacy Preserving Data Mining: Models and Algorithms Edited by Charu C.Aggarwal and S.Yu, Springer.
- 2. Privacy Preserving Data Mining by Jaideep Vaidya, Yu Michael Zhu and Chirstopher

W. Clifton, Springer

- 1. Charu C. Agarwal, Data Mining: The Textbook, 1st Edition, Springer.
- 2. J. Han and M. Kamber, Data Mining: Concepts and Techniques, 3rd Edition, Elsevier.

22DS4176: MINING MASSIVE DATASETS (Professional Elective – V)

B.Tech IV Year I Sem.

LTPC

3 - - 3

Prerequisites:

1. Students should be familiar with Data mining, algorithms, basic probability theory and discrete math.

Course Objectives:

- 1. This course will discuss the cluster computing based programming environment.
- 2. This course will cover practical algorithms for solving key problems in mining of massive datasets.
- 3. This course focuses on parallel algorithmic techniques that are used for large datasets.
- 4. This course will discuss the various recommendation systems.
- 5. This course will cover stream processing algorithms for data streams that arrive constantly, page ranking algorithms for web search, and online advertisement systems that are studied in detail.

Course Outcomes:

- 1. Able to handle massive data using Map-Reduce.
- 2. Develop and implement algorithms for massive data sets and methodologies in the context of data mining.
- 3. Build Large-scale Machine Learning algorithms for classification and clustering of the data
- 4. Design models for recommendation systems.
- 5. Gain experience in matching various algorithms for particular classes of problems.

UNIT - I

Data Mining-Introduction-Definition of Data Mining-Statistical Limits on Data Mining, **Map Reduce and the New Software Stack**-Distributed File Systems, Map Reduce, Algorithms Using Map Reduce.

UNIT - II

Similarity Search: Finding Similar Items-Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets, Distance Measures.Streaming Data: Mining Data Streams-The Stream Data Model, Sampling Data in a Stream, Filtering Streams.

UNIT - III

Link Analysis-Page Rank, Efficient Computation of Page Rank, Link Spam.

Frequent Item sets - Handling Larger Datasets in Main Memory, Limited-Pass Algorithms, Counting Frequent Items in a Stream.

Clustering-The CURE Algorithm, Clustering in Non-Euclidean Spaces, Clustering for Stream sand Parallelism.

UNIT - IV

Advertising on the Web-Issues in On-Line Advertising, On-Line Algorithms, The Matching Problem, The Ad words Problem, Ad words Implementation.

Recommendation Systems - A Model for Recommendation Systems, Content-Based Recommendations, Collaborative Filtering, Dimensionality Reduction, The NetFlix Challenge.

UNIT - V

Mining Social-Network Graphs-Social Networks as Graphs, Clustering of Social-Network Graphs, Partitioning of Graphs, Sim rank, Counting Triangles.

TEXT BOOKS:

- 1. Jure Leskovec, Anand Rajaraman, Jeff Ullman, Mining of Massive Datasets, 3rd Edition.
- 2. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann.

- 1. Jiawei Han & Micheline Kamber, Data Mining Concepts and Techniques 3rd Edition Elsevier.
- 2. Margaret H Dunham, Data Mining Introductory and Advanced topics, PEA.

22DS4177: EXPLORATORY DATA ANALYSIS

(Professional Elective – V)

B.Tech IV Year I Sem.

L T P C 3 - - 3

Prerequisites:

- 1. Introduction to Information Systems.
- 2. Applied Statistics.

Course Objectives:

- 1. This course introduces the methods for data preparation and data understanding.
- 2. It covers essential exploratory techniques for understanding multivariate data by summarizing it through statistical methods and graphical methods.
- 3. Supports to summarize the insurers use of predictive analytics, data science and Data Visualization.
- 4. To Introduce cluster analysis techniques to locate patterns in data
- 5. To summarizing and visualizing the important characteristics of a data set.

Course Outcomes:

- 1. Handle missing data in the real-world data sets by choosing appropriate methods.
- 2. Summarize the data using basic statistics. Visualize the data using basic graphs and plots.
- 3. Identify the outliers if any in the data set.
- 4. Choose appropriate feature selection and dimensionality reduction.
- 5. Techniques for handling multi-dimensional data.

UNIT - I:

Introduction to Exploratory Data Analysis: Data Analytics lifecycle, Exploratory Data Analysis (EDA)– Definition, Motivation, Steps in data exploration, The basic data types Data Type Portability.

UNIT - II:

Preprocessing - Traditional Methods and Maximum Likelihood Estimation: Introduction to Missing data, Traditional methods for dealing with missing data, Maximum Likelihood Estimation – Basics, Missing data handling, Improving the accuracy of analysis. **Preprocessing Bayesian Estimation:** Introduction to Bayesian Estimation, Multiple Imputation-Imputation Phase, Analysis and Pooling Phase, Practical Issues in Multiple Imputation, Models for Missing Notation Random Data.

UNIT - III:

Data Summarization & Visualization: Statistical data elaboration, 1-D Statistical data analysis, 2-D Statistical data Analysis, N-D Statistical data analysis.

UNIT - IV:

Outlier Analysis: Introduction, Extreme Value Analysis, Clustering based, Distance Based

B. Tech CSE (Data Science)

and Density Based outlier analysis, Outlier Detection in Categorical Data.

Feature Subset Selection: Feature selection algorithms: filter methods, wrapper methods and embedded methods, Forward selection backward elimination, Relief, greedy selection, genetic algorithms for features selection.

UNIT - V

Dimensionality Reduction: Introduction, Principal Component Analysis (PCA), Kernel PCA, Canonical Correlation Analysis, Factor Analysis, Multidimensional scaling, Correspondence Analysis.

TEXT BOOKS:

- 1. Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt.
- 2. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC press, 2015.

- 1. Charu C. Aggarwal, "Data Mining The Text book", Springer, 2015.
- 2. Craig K. Enders, "Applied Missing Data Analysis", The Guilford Press, 2010.
- 3. Inge Koch, "Analysis of Multivariate and High dimensional data", Cambridge University Press,2014.
- 4. Michael Jambu, "Exploratory and multivariate data analysis", Academic Press Inc., 1990.

OPEN ELECTIVE-II

B. Tech CSE (Data Science)

22DS4151: DEEP LEARNING LAB

B.Tech IV Year I Sem.

LTPC

- -2 1

Prerequisites:

- 1. Machine Learning
- 2. Programming in Python

Course Objectives: The course will explain in depth:

- 1. The Foundation of Deep Learning.
- 2. How to Build the Neural Network.
- 3. How to develop successful machine learning concepts.
- 4. How to use Open CV and python libraries
- 5. How to apply different algorithms on datasets

Course Outcomes: At the end of the course student will be able to:

- 1. Learn the Fundamental Principles of Deep Learning.
- 2. Learn the Artificial and Convolution Neural Networks
- 3. Identify the Deep Learning Algorithms for Various Types of Learning Tasks in various domains.
- 4. Implement Deep Learning Algorithms and Solve Real-world problems.
- 5. Understand various python libraries.

LIST OF EXPERIMENTS:

- 1. Setting up the Spyder IDE Environment and Executing a Python Program.
- 2. Installing Keras, Tensorflow and Pytorch libraries and making use of them.
- 3. Applying the Convolution Neural Network on computer vision problems.
- 4. Image classification on MNIST dataset (CNN model with Fully connected layer).
- 5. Applying the Deep Learning Models in the field of Natural Language Processing.
- 6. Train a sentiment analysis model on IMDB dataset, use RNN layers with LSTM/GRU notes.
- 7. Applying the Autoencoder algorithms for encoding the real-world data.

8. Applying Generative Adversarial Networks (GANs) for image generation and unsupervised tasks. **TEXT BOOKS:**

- 1. Deep Learning by Ian Good fellow, Yoshua Bengio and Aaron Courville, MIT Press.
- 2. The Elements of Statistical Learning by T. Hastie, R. Tibshirani, and J. Friedman, Springer.
- 3. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.

REFERENCES:

- 1. Bishop, C.M., Pattern Recognition and Machine Learning, Springer, 2006.
- 2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
- 3. Golub, G.H., and Van Loan, C.F., Matrix Computations, JHU Press, 2013.
- 4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw Hill Education, 2004.

EXTENSIVE READING:

- 1. http://www.deeplearning.net
- 2. https://www.deeplearningbook.org/
- 3. https://developers.google.com/machine-learning/crash-course/ml-intro
- 4. www.cs.toronto.edu/~fritz/absps/imagenet.pdf

22DS4152: WEB AND SOCIAL MEDIA ANALYTICS LAB

B.Tech IV Year I Sem.

LTPC

- - 21

Prerequisites:

1. Programming in Python

Course Objectives:

- 1. To provide exposure on various analytics tools and python.
- 2. To serve as a business metric for promoting specific products to customers.
- 3. To provide knowledge on various analytics tools.
- 4. To provide knowledge on optimizing web usage.
- 5. To learn decision making by analyzing web and social media data.

Course Outcomes:

- 1. To implement search engine optimization
- 2. To analyze customer reviews on products.
- 3. To implement data preprocessing and create datasets.
- 4. Identify high-value features for a product or service.
- 5. To analyze data gathered from social channels to support business decisions.

List of Experiments

- 1. Preprocessing text document using NLTK of Python
 - a. Stop word elimination
 - b. Stemming
 - c. Lemmatization
 - d. POS tagging
 - e. Lexical analysis
- 2. Sentiment analysis on customer review on products
- 3. Web analytics
 - a. Web usage data (web server log data, clickstream analysis)
 - b. Hyperlink data
- 4. Search engine optimization- implement spamdexing
- 5. Use Google analytics tools to implement the following
 - a. Conversion Statistics
 - b. Visitor Profiles
- 6. Use Google analytics tools to implement the Traffic Sources.

Resources:

- 1. Stanford core NLP package
- 2. GOOGLE.COM/ANALYTICS

B. Tech CSE (Data Science)

TEXT BOOKS:

1 Ramesh Sharda, Dursun Delen, Efraim Turban, BUSINESS INTELLIGENCE ANALYTICS: SYSTEMS FOR DECISION SUPPORT, Pearson Education.

- 1. Rajiv Sabherwal, Irma Becerra- Fernandez," Business Intelligence Practice, Technologies and Management", John Wiley 2011.
- 2. Lariss T. Moss, Shaku Atre, "Business Intelligence Roadmap", Addison-Wesley IT Series.
- 3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012.

22DS4181: INTERNSHIP

B.Tech IV Year I Sem.L T P C- - 2 1

22DS4182: PROJECT STAGE-1

B.Tech IV Year I Sem.

LTPC

- - 4 2

B. Tech CSE (Data Science)

22MB4211: ORGANIZATIONAL BEHAVIOUR

B Tech IV Year II Sem

L T P C 3 - - 3

Course Objective:

- 1) To analyse the behaviour of individuals and groups in organizations in terms of the key factors that influence organizational behaviour.
- 2) To understand the potential effects of organizational level factors (such as structure, culture and change) on organizational behaviour.
- 3) To evaluate the potential effects of important developments in the external environment (such as globalization and advances in technology) on organizational behavior.
- 4)To analyse organizational behavioural issues in the context of organizational behavior theories, models and concepts
- 5) To understand the concepts of leadership and behavioural Performance Management.

Course Outcomes:

1) The Students able to analyse the behaviour of individuals and groups in organizations in terms of the

key factors that influence organizational behaviour.

- 2) He Students able to understand the potential effects of organizational level factors (such as structure, culture and change) on organizational behaviour.
- 3) The Students able to evaluate the potential effects of important developments in the external environment (such as globalization and advances in technology) on organizational behaviour.
- 4) The Students able to analyse organizational behavioural issues in the context of organizational

behaviour theories, models and concepts

5) The Students able to understand the concepts of leadership and Behavioural Performance Management.

UNIT – I

Introduction to OB - Definition, Nature and Scope –Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organisational Behaviour.Cognitive Processes-I : Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization -Social perception – Attribution Theories – Locus of control – Attribution Errors –Impression Management.

UNIT – II

Cognitive Processes-II: Personality and Attitudes - Personality as a continuum – Meaning of personality - Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organisational commitment-Motivational needs and processes- Work-Motivation Approaches Theories

of Motivation-Motivation across cultures-Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy.

UNIT – III

Dynamics of OB-I: Communication – types - interactive communication in organizations –barriers to communication and strategies to improve the follow of communication – Decision Making: Participative decision making techniques – creativity and group decision making .Dynamics of OB –II Stress and Conflict: Meaning and types of stress – Meaning and types of conflict - Effect of stress and intra-individual conflict - strategies to cope with stress and conflict.

$\mathbf{UNIT} - \mathbf{IV}$

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment -Groups Vs. Teams – Nature of groups –dynamics of informal groups – dysfunctions of groups and teams – teams in modern work place.

UNIT – V

Leading High performance: Job design and Goal setting for High performance- Quality of Work Life-Socio technical Design and High performance work practices – Behavioural Performance management: reinforcement and punishment as principles of Learning –Processof Behavioural modification - Leadership theories - Styles, Activities and skills of Great Leaders.

TEXT BOOKS:

- 1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
- 2. Mc Shane: Organizational Behaviour, 3e, TMH, 2008
- 3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
- 4. New strom W. John& Davis Keith, Organisational Behaviour-- Human Behaviour atWork, 12/e, TMH, New Delhi, 2009.
- 5. Pierce and Gardner: Management and Organisational Behaviour: An Integratedperspective, Thomson, 2009.
- 6. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e, PHI/Pearson, New Delhi, 2009.
- 7. PareekUdai: Behavioural Process at Work:, Oxford & IBH, New Delhi, 2009.

REFERENCE BOOKS:

- 1. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
- 2. Hitt: Organizational Behaviour, Wiley, 2008
- 3. Aswathappa: Organisational Behaviour, Himalaya, 2009
- 4. Mullins: Management and Organisational Behaviour, Pearson, 2008.
- 5. McShane, Glinow: Organisational Behaviour--Essentials, TMH, 2009.
- 6. Ivancevich: Organisational Behaviour and Management, 7/e, TMH, 2008.
- B. Tech CSE (Data Science)

22DS4271: DATA STREAM MINING (Professional Elective – VI)

B.Tech IV Year II Sem.

L T P C 3 - - 3

Prerequisites

1. A basic knowledge of "Data Mining"

Course Objectives: The main objective of this course is to make students comfortable with:

- 1. Passing on knowledge about advanced data mining algorithms and working with complex datarepresentations at various stages of the knowledge discovery process.
- 2. Developing problem solving skills related to complex data preprocessing.
- 3. Developing practical skills through laboratories involving supervised classification tasks, unsupervised learning, time series analysis, or exploring social network data.
- 4. Acquiring knowledge about techniques and algorithms of knowledge discovery and patternrecognition, with special focus on relational and text data.
- 5. Promoting reproducible research related to the above-mentioned topics by using the R andpython programming languages.

Course Outcomes: At the end of the course student will be able to:

- 1. Learn advanced knowledge regarding data mining, especially with respect to complex data representations.
- 2. Learn organized theoretically-grounded knowledge of data mining.
- 3. Learn visual data analysis, natural language processing, distributed data mining, classification methods for evolving and streaming data.
- 4. Learn data preprocessing techniques, continuous target predictions (regression methods, neural networks), classifier selection, parameter tuning, evaluation methods and metrics for classification and clustering.
- 5. Learn the basic methods, techniques, and tools that can be used to solve complex data mining problems, natural language processing and text mining, and they know how to deploy the developed data mining models as part of an IT system.

UNIT - I

MOA Stream Mining, Assumptions, Requirements, Mining Strategies, Change Detection Strategies, MOA Experimental Settings, Previous Evaluation Practices, Evaluation Procedures for Data Streams, Testing Framework, Environments, Data Sources, Generation Speed and Data Size, Evolving Stream Experimental Setting.

B. Tech CSE (Data Science)

UNIT - II

Ho effding Trees, The Ho effding Bound for Tree Induction, The Basic Algorithm, Memory Management, Numeric Attributes, Batch Setting Approaches, Data Stream Approaches.

UNIT - III

Prediction Strategies, Majority Class, Naïve Bayes Leaves, Adaptive Hybrid, Hoeffding Tree Ensembles, Data Stream Setting, Realistic Ensemble Sizes.

UNIT - IV

Evolving Data Streams, Algorithms for Mining with Change, A Methodology for Adaptive Stream Mining, Optimal Change Detector and Predictor, Adaptive Sliding Windows, Introduction, Maintaining Updated Windows of Varying Length.

UNIT - V

Adaptive Hoeffding Trees, Introduction, Decision Trees on Sliding Windows, Hoeffding Adaptive Trees, Adaptive Ensemble Methods, New methods of Bagging using trees of different size, New method of bagging using ADWIN, Adaptive Hoeffding Option Trees, Method performance.

TEXT BOOK:

- 1. DATA STREAM MINING: A Practical Approach by Albert Bifet and Richard Kirkby.
- 2. Data Streams Mining, by Kapil Wankhade_(Author), Snehlata Dongre_(Author), LAPLambert Academic Publishing
- 3. Data Stream Mining & Processing, by Springer, 1st ed. 2020

- 1. Knowledge discovery from data streams by Gama João. ISBN: 978-1-4398-2611-9.
- 2. Machine Learning for Data Streams by Albert Bifet, Ricard Gavalda; MIT Press, 2017.
- 3. Streaming Systems, by Shroff/O'Reilly, First, 2018
- 4. Stream Data Mining: Algorithms and Their Probabilistic Properties by Leszek Rutkowski,Piotr Duda, Maciej Jaworski, Springer Cham

22DS4272: WEB SECURITY (Professional Elective – VI)

B.Tech IV Year II Sem.

L T P C 3 - - 3

Prerequisites:

- 1. Information Security
- 2. Data Base management system

Course Objectives:

- 1. To Give an Overview of information security.
- 2. To Give an view of Access control of relational databases.
- 3. To learn the Recent Advances in Database Security.
- 4. To learn concepts and techniques of Security Re-engineering for Databases.
- 5. To learn Privacy-enhanced Location-based Access Control and privacy policies in Mobile environment.

Course Outcomes: At the end of the course student will be able to

- 1. Understand the Web architecture and applications.
- 2. Understand client side and service side programming.
- 3. Understand how common mistakes can be bypassed and exploit the application.
- 4. Identify common application vulnerabilities.
- 5. Understand how to Privacy in Database Publishing.

UNIT - I

The Web Security, The Web Security Problem, Risk Analysis and Best Practices. **Cryptography and the Web:** Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification.

UNIT - II

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications.

UNIT - III

Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems.

UNIT - IV

Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and Future Trends.

B. Tech CSE (Data Science)

UNIT - V:

Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location-based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment.

TEXT BOOKS:

- 1. Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O'Reilly.
- 2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia. Web Application Security, Andrew Hoffman, O'Reilly Media

REFERENCE BOOKS:

- 1. Web Application Security: Exploitation and Countermeasures for Modern Web Applications
- by Andrew Hoffman | Feb 27, 2024.
- 2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia.

Web Application Security, Andrew Hoffman, O'Reilly Media

22DS4273: VIDEO ANALYTICS (Professional Elective – VI)

B.Tech IV Year II Sem.

L T P C 3 - - 3

Prerequisites: Computer Graphics

Course Objectives:

- 1. To Teach The Fundamentals Of And Video Analysis.
- 2. To Understand The Real Time Use Of Image And Video Analytics.
- 3. To Understand Models Used To Recognition Of Objects.
- 4. To Demonstrate Real Time Video Analytics Applications And Others.
- 5. To Acquire Knowledge To Perform Gait Analysis.

Course Outcomes: At the end of the course student will be able to

- 1. Understand the basics of video- signals and systems.
- 2. Able to estimate motion in a video.
- 3. Able to detect the objects and track them.
- 4. Recognize activity and analyze behaviour.
- 5. Evaluate face recognition technologies.

UNIT - I

Introduction: Multidimensional signals and systems: signals, transforms, systems, sampling theorem. Digital Images and Video: human visual system and color, digital video, 3D video, digital-video applications, image and video quality.

UNIT - II

Motion Estimation: Image formation, motion models, 2D apparent motion estimation, differential methods, matching methods, non-linear optimization methods, transform domain methods, 3D motion and structure estimation.

UNIT - III

Video Analytics: Introduction- Video Basics - Fundamentals for Video Surveillance- Scene Artifacts- Object Detection and Tracking: Adaptive Background Modelling and Subtraction-Pedestrian Detection and Tracking Vehicle Detection and Tracking- Articulated Human Motion Tracking in Low- Dimensional Latent Spaces.

UNIT - IV

Behavioral Analysis & Activity Recognition: Event Modelling- Behavioral Analysis-Human Activity Recognition-Complex Activity Recognition Activity modelling using 3D shape, Video summarization, shape-based activity models- Suspicious Activity Detection.

UNIT - V

Human Face Recognition & Gait Analysis: Introduction: Overview of Recognition algorithms – Human Recognition using Face: Face Recognition from still images, Face Recognition from video, Evaluation of Face Recognition Technologies- Human Recognition using gait: HMM Framework for Gait Recognition, View Invariant Gait Recognition, Role of Shape and Dynamics in Gait Recognition.

B. Tech CSE (Data Science)

TEXT BOOKS:

- 1. Murat Tekalp, "Digital Video Processing", second edition, Pearson, 2015
- 2. Rama Chellappa, Amit K. Roy-Chowdhury, Kevin Zhou. S, "Recognition of Humans and their Activities using Video", Morgan & Claypool Publishers, 2005.
- 3. Yunqian Ma, Gang Qian, "Intelligent Video Surveillance: Systems and Technology", CRC Press (Taylor and Francis Group), 2009.

- 1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer, 2011.
- 2. Yao Wang, JornOstermann and Ya-Qin Zhang, "Video Processing and Communications", Prentice Hall, 2001.
- 3. Thierry Bouwmans, FatihPorikli, Benjamin Höferlin and Antoine Vacavant, "Background Modeling and Foreground Detection for Video Surveillance: Traditionaland Recent Approaches, Implementations, Benchmarking and Evaluation", CRC Press, Taylor and FrancisGroup, 2014.
- 4. Md. Atiqur Rahman Ahad, "Computer Vision and Action Recognition-A Guide for Image Processing and Computer Vision Community for Action Understanding", Atlantis Press, 2011.

22DS4274: BLOCKCHAIN TECHNOLOGY

(Professional Elective – VI)

B.Tech IV Year II Sem.

LTPC

3 - - 3

Prerequisites:

- 1. Knowledge in security and applied cryptography.
- 2. Knowledge in distributed databases.

Course Objectives:

- 1. To Introduce block chain technology.
- 2. Understand how Cryptocurrency Regulation works
- 3. Understand how blockchain systems (mainly Bitcoin and Ethereum) work.
- 4. Focusing on the basic concepts of tokenization.
- 5. To learn about the technical challenges.

Course Outcomes: At the end of the course student will be able to

- 1. Learn about research advances related to one of the most popular technological areas today.
- 2. Understand Extensibility of Blockchain concepts.
- 3. Understand and Analyze Blockchain Science.
- 4. Understand tokenizing techniques
- 5. Understand Technical challenges, Business model challenges.

UNIT - I

Introduction: Block chain or distributed trust, Protocol, Currency, Cryptocurrency, Elements of Blockchain, Impacts of blockchain, Key Ingredients of blockchain, Blockchain Issues, How a Cryptocurrency works, Crowd funding.

UNIT - II

Extensibility of Blockchain concepts, Tokenizing Monograph Digital Identity verification, Block chain Neutrality, Digital art, Blockchain Environment. Blockchian attestation services, Hashing plus timestamping, Proof of existence,

UNIT - III

Blockchain Science: Grid coin, Folding coin, Learn coin, Blockchain Genomics, genome and genome sequencing, digitalization of genetic information, DNA nexus, learning contract exchanges, Bitcoin MOOCs.

UNIT - IV

Currency, Token, Tokenizing, Campus coin, Community coin, Counterparty, Coin drop as a strategy for Public adoption, LTB Coin, Hayek's private currencies, Currency Multiplicity, Demurrage currency, Extensibility of demurrage Currency.

B. Tech CSE (Data Science)

UNIT - V

Technical challenges, Hyper ledger as a protocol, History of smart contract, Smart Contract, Ethereum Network, Business model challenges, Block header-Clients and Wallets, Precompiled contracts, Scandals and Public perception,Government Regulations.

TEXT BOOK

1. Melanie Swan, Blockchain Blueprint for Economy, O'reilly.

2.Bradley Lakeman, Blockchain Revolution: Understanding the Crypto Economy of theFuture. ANon-Technical Guide to the Basics of Cryptocurrency Trading and Investing, ISBN: 1393889158

- 1. Building Blockchain Apps, Michael Juntao Yuan, Pearson Education
- 2. Daniel Drescher, Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition

OPEN ELECTIVE-III

B.Tech IV Year II Sem.

L T P C 3 - - 3

B. Tech CSE (Data Science)

22DS4281: Project Stage – II Including Seminar

B.Tech IV Year II Sem.

L T P C - - 22 11

B. Tech CSE (Data Science)