# ACE

# Engineering College

**Ankushapur, Ghatkesar, Medchal, Hyderabad - 501301, T. S.**

**(An Autonomous Institution)**

## Department of CSE (Data Science)

**COURSE STRUCTURE & SYLLABUS**

**Applicable from AY 2022-23 Batch (ACE-R22)**

**IV YEAR II SEMESTER**

| S. No. | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | DS801PC | Organizational Behavior | 3 | 0 | 0 | 3 |
| 2 | | Professional Elective – VI | 3 | 0 | 0 | 3 |
| 3 | | Open Elective – III | 3 | 0 | 0 | 3 |
| 4 | DS802PC | Project Stage – II including Seminar | 0 | 0 | 22 | 11 |
| | | **Total Credits** | **9** | **0** | **22** | **20** |

**Professional Elective - VI**

| | |
|---|---|
| DS861PE | Data Stream Mining |
| DS862PE | Web Security |
| DS863PE | Video Analytics |
| DS864PE | Blockchain Technology |
| DS865PE | Parallel and Distributed Computing |

**Open Elective - III**

1. DS831OE: Introduction to social media mining
2. DS832OE: Data Visualization using Python

**DS801PC: ORGANIZATIONAL BEHAVIOUR**

**B.Tech. IV Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- This course demonstrates individual, group behavior aspects: The dynamics of organizational climate, structure and its impact on Organizations.

**Course Outcomes:**

- Students understand their personality, perception and attitudes for overall development and further learn the importance of group behavior in the organizations.

**UNIT - I Organizational Behaviour**

Definition, need and importance of organizational behaviour – Nature and scope – Frame work – Organizational behaviour models.

**UNIT - II Individual Behaviour**

Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behaviour modification, Misbehaviour – Types – Management Intervention. Emotions - Emotional Labour – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values. Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behavior.

**UNIT - III Group Behaviour**

Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building - Interpersonal relations – Communication – Control.

**UNIT - IV Leadership and Power**

Meaning – Importance – Leadership styles – Theories of leadership – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

**UNIT - V Dynamics of Organizational Behaviour**

Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives –. Organizational effectiveness

**TEXT BOOKS:**


1. Stephen P. Robins, Organisational Behavior, PHI Learning / Pearson Education, 11th edition, 2008.
2. Fred Luthans, Organisational Behavior, McGraw Hill, 11th Edition, 2001.


**REFERENCE BOOKS:**


1. Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley, 9th Edition, 2008.
2. Udai Pareek, Understanding Organisational Behaviour, 2nd Edition, Oxford Higher Education, 2004.

**DS861PE: DATA STREAM MINING (Professional Elective – VI)**

**B.Tech. IV Year I Sem.** **L T P C**
**3 0 0 3**

**Prerequisites**

- A basic knowledge of "Data Mining"

**Course Objectives**

- The aim of the course is to introduce the fundamentals of Data Stream Mining.
- The course gives an overview of – Mining Strategies, methods and algorithms for data stream mining.

**Course Outcomes**

- Understand how to formulate a knowledge extraction problem from data streams.
- Ability to apply methods / algorithms to new data stream analysis problems.
- Evaluate the results and understand the functioning of the methods studied.
- Demonstrate decision tree and adaptive Hoeffding Tree concepts

**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.

**UNIT- II**

Hoeffding Trees, The Hoeffding 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.

**REFERENCE BOOKS:**

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

**DS862PE: WEB SECURITY (Professional Elective –VI)**

**B.Tech. IV Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

1. Give an Overview of information security
2. Give an overview of Access control of relational databases

**Course Outcomes:** Students should 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

**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

**UNIT - V**

Future Trends 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

**DS863PE: VIDEO ANALYTICS (Professional Elective –VI)**

**B.Tech. IV Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To know the fundamental concepts of big data and analytics
- To learn various techniques for mining data streams
- To acquire the knowledge of extracting information from surveillance videos.
- To learn Event Modelling for different applications.
- To understand the models used for recognition of objects in videos.

**Course Outcomes:**

- Understand the basics of video- signals and systems.
- Estimate motion in a video
- Detect the objects and track them
- Recognize activity and analyze behavior
- Evaluate face recognition technologies

**UNIT - I**

**Introduction**

**Multi-dimensional 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**

**Behavioural Analysis & Activity Recognition**

Event Modelling- Behavioural 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

**TEXT BOOKS:**


1. A. 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.


**REFERENCE BOOKS:**


1. Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer, 2011.
2. Yao Wang, Jorn Ostermann and Ya-Qin Zhang, “Video Processing and Communications”, Prentice Hall, 2001.
3. Thierry Bouwmans, Fatih Porikli, Benjamin Höferlin and Antoine Vacavant, “Background Modeling and Foreground Detection for Video Surveillance: Traditional and Recent Approaches, Implementations, Benchmarking and Evaluation”, CRC Press, Taylor and Francis Group, 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.

**DS864PE: BLOCKCHAIN TECHNOLOGY (Professional Elective –VI)**

**B.Tech. IV Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Prerequisites**

1. Knowledge in information security and applied cryptography.
2. Knowledge in Computer Networks.

**Course Objectives:**

- To learn the fundamentals of Blockchain and various types of block chain and consensus mechanisms.
- To understand the public block chain system, Private block chain system and consortium blockchain.
- Able to know the security issues of blockchain technology.

**Course Outcomes:**

- Understanding concepts behind crypto currency
- Applications of smart contracts in decentralized application development
- Understand frameworks related to public, private and hybrid blockchain
- Create blockchain for different application case studies

**UNIT - I**

**Fundamentals of Blockchain:** Introduction, Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future.

Blockchain Types and Consensus Mechanism: Introduction, Decentralization and Distribution, Types of Blockchain, Consensus Protocol.

Cryptocurrency – Bitcoin, Altcoin and Token: Introduction, Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrencies, Cryptocurrency Usage.

**UNIT - II**

**Public Blockchain System:** Introduction, Public Blockchain, Popular Public Blockchains, The Bitcoin Blockchain, Ethereum Blockchain.

**Smart Contracts:** Introduction, Smart Contract, Characteristics of a Smart Contract, Types of Smart Contracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry.

**UNIT - III**

**Private Blockchain System:** Introduction, Key Characteristics of Private Blockchain, Need of Private Blockchain, Private Blockchain Examples, Private Blockchain and Open Source, E- commerce Site Example, Various Commands (Instructions) in E-commerce Blockchain, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, Byzantine Fault, Multichain.

**Consortium Blockchain:** Introduction, Key Characteristics of Consortium Blockchain, Need of Consortium Blockchain, Hyperledger Platform, Overview of Ripple, Overview of Corda.

Initial Coin Offering: Introduction, Blockchain Fundraising Methods, Launching an ICO, Investing in an ICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms.

**UNIT - IV**

**Security in Blockchain:** Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric.

**Applications of Blockchain:** Introduction, Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real-estate, Blockchain In Supply Chain, The Blockchain and IoT. Limitations and Challenges of Blockchain.

**UNIT - V**

**Blockchain Case Studies:** Case Study 1 – Retail, Case Study 2 – Banking and Financial Services, Case Study 3 – Healthcare, Case Study 4 – Energy and Utilities.

**Blockchain Platform using Python:** Introduction, Learn How to Use Python Online Editor, Basic Programming Using Python, Python Packages for Blockchain.

**Blockchain platform using Hyperledger Fabric:** Introduction, Components of Hyper ledger Fabric Network, Chain codes from Developer.ibm.com, Blockchain Application Using Fabric Java SDK.

**TEXT BOOK:**

1. Blockchain Technology, Chandramouli Subramanian, Asha A. George, Abhilasj K A and Meena Karthikeyan, Universities Press.

**REFERENCE BOOKS:**

1. Michael Juntao Yuan, Building Blockchain Apps, Pearson, India.
2. Blockchain Blueprint for Economy, Melanie Swan, SPD O'reilly.
3. Blockchain for Business, Jai Singh Arun, Jerry Cuomo, Nitin Gaur, Pearson.

**DS865PE: PARALLEL AND DISTRIBUTED COMPUTING (Professional Elective –VI)**

**B.Tech. IV Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To learn core ideas behind parallel and distributed computing.
- To explore the methodologies adopted for parallel and distributed environments.
- To understand the networking aspects of parallel and distributed computing.
- To provide an overview of the computational aspects of parallel and distributed computing.
- To learn parallel and distributed computing models.

**Course Outcomes:**

- Explore the methodologies adopted for parallel and distributed environments.
- Analyze the networking aspects of Distributed and Parallel Computing.
- Explore the different performance issues and tasks in parallel and distributed computing.
- Tools usage for parallel and distributed computing.
- Understand high performance computing techniques.

**UNIT - I**

Parallel and Distributed Computing— Introduction- Benefits and Needs- Parallel and Distributed Systems- Programming Environment- Theoretical Foundations- Parallel Algorithms— Introduction- Parallel Models and Algorithms- Sorting- Matrix Multiplication

**UNIT - II**

Architecture of Parallel and Distributed Systems, Parallel Operating Systems.

**UNIT - III**

Management of Resources in Parallel Systems- Parallel Database Systems and Multimedia Object Servers.

**UNIT - IV**

Networking Aspects of Distributed and Parallel Computing- Process- Parallel and Distributed Scientific Computing.

**UNIT - V**

Multimedia Applications for Parallel and Distributed Systems

**TEXT BOOK:**

1. Jacek Błażewicz, et al., “Handbook on parallel and distributed processing”, Springer Science & Business Media, 2013.

**REFERENCE BOOKS:**

1. George F. Coulouris, Jean Dollimore, and Tim Kindberg, “Distributed systems: concepts and design”, Pearson Education, 2005.
2. Gregor Kosec and Roman Trobec, “Parallel Scientific Computing: Theory, Algorithms, and Applications of Mesh Based and Meshless Methods”, Springer, 2015.
3. Andrew S. Tanenbaum, and Maarten Van Steen, “Distributed Systems: Principles and Paradigms”. Prentice-Hall, 2007.

**DS831OE: INTRODUCTION TO SOCIAL MEDIA MINING (Open Elective –III)**

**B.Tech. IV Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Prerequisites**

1. Data Analytics.

**Course Objectives**

- The purpose of this course is to provide the students with knowledge of social media mining principles and techniques.
- This course is also designed to give an exposure of the frontiers of social media mining (Facebook, twitter)
- To introduce new technology for data analytics and introduce community Analysis
- To introduce various Recommendation algorithms

**Course Outcomes**

- Understand social media and its data.
- Apply mining technologies on twitter, Facebook, LinkedIn and Google.
- Learn about community
- Apply various Recommendation Algorithms
- Analyze the Behavior of people

**UNIT - I**

**Introduction**

Social Media Mining, New Challenges for Mining

**Graph Essentials**

Graph Basics, Graph Representation, Types of Graphs, Connectivity in Graphs, Special Graphs, Graph Algorithms

**UNIT - II**

**Network Measures**

Centrality, Transitivity and Reciprocity, Balance and Status, Similarity.

**Network Models**

Properties of Real-World Networks, Random Graphs, Small-World Model, Preferential Attachment Model

**UNIT - III**

**Data Mining Essentials**

Data, Data Preprocessing, Data Mining Algorithms, Supervised Learning, Unsupervised Learning

**Community Analysis**

Community Detection, Community Evaluation, Community Evaluation

**UNIT - IV**

**Information Diffusion in Social Media**

Herd Behavior, Information Cascades, Diffusion of innovations, Epidemics

**Influence and Homophily**

Measuring Assortativity, Influence, Homophily, Distinguishing Influence and Homophily

**UNIT - V**

**Recommendation in Social Media**

Challenges, Classical Recommendation Algorithms, Recommendation Using Social Context, Evaluating Recommendations

**Behavior Analytics**

Individual Behavior, Collective Behavior.

**TEXT BOOK:**

1. Social Media Mining (An Introduction), Reza Zafarani, Mohammad Ali Abbasi, Huan Liu, Cambridge University Press, Draft Version: April 20, 2014

**REFERENCE BOOKS:**

1. Mining the Social Web, 2nd Edition Data Mining Face book, Twitter, LinkedIn, Google+, GitHub, and More By Matthew A. Russell Publisher: O'Reilly Media.
2. Social Media Mining with R [Kindle Edition] NATHAN DANNEMAN RICHARD HEIMANN

**DS832OE: DATA VISUALIZATION USING PYTHON (Open Elective –III)**

**B.Tech. IV Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Learn data wrangling techniques
- Introduce visual perception and core skills for visual analysis

**Course Outcomes:**

- Perform data wrangling
- Explain principles of visual perception
- Apply core skills for visual analysis
- Apply visualization techniques for various data analysis tasks
- Evaluate visualization techniques

**UNIT - I**

An Introduction to Data Visualization in Python, Types of Plots- statistical plots, Images, Networks/ Graphs, Geographical, 3D and Interactive, Grids and Meshes

**UNIT - II**

Manipulating and visualizing data with Pandas: defining data frames, Creating and manipulating data frames, visualization with pandas

**Matplotlib:** Features of matplotlib, Anatomy and Customization of matplotlib plot, Plotting and plot customization, Customizing a plot, Visualization examples,

**UNIT - III**

**Seaborn:** Features of seaborn, Creating plots with seaborn, Visualization examples

**Altair:** Altair's declarative API, creating an Altair Chart and Plot, Changing mark/PlotTypes, Global Configuration, Encoding arguments, Altair Datatypes, CreatingTitles, Properties, Tooltips, Saving Altair Charts, Making Plots Interactive, Visualization Examples,

**UNIT - IV**

Plotly: Plotly and JSON, Online and Offline plotting, Structure of Plotly Plot, Graph Objectives VS Dictionaries, Plotly Express, updating plots- Adding and Updating Traces, Creating Subplots, Drop-Down Menus, Dash Interactivity, Example Plots

**UNIT - V**

**CGPlot2/Plotnine:** The Gammar of Graphics, Creating Plots, Changing Geoms, Stats, Faceting, Coordinates, Annotations, Scaling, Themes, Legends, and Palettes, Visualization Examples.

**TEXT BOOKS:**


1. Daniel Nelson, Data Visualization in Python
2. Ward, Grinstein Keim, Interactive Data Visualization: Foundations, Techniques, and Applications. Natick A K Peters, Ltd.


**REFERENCE BOOKS:**


1. Jacqueline Kazil and Katharine Jarmul, Data Wrangling with Python: Tips and Tools to Make Your Life Easier, O'Reilly.
2. E. Tufte, The Visual Display of Quantitative Information, Graphics Press.