PGDDA Semester: I 2025-26

Discipline Centric Core Course (DCC)

FDACC27001T: Fundamentals of Data Analytics

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- Understand key concepts of data analytics and its lifecycle.
- Perform basic data cleaning and preprocessing tasks.
- Apply statistical tools to analyze datasets.
- Visualize data effectively using modern tools.
- Use Python/Excel/Power BI for real-world analytics problems.

SYLLABUS

Unit-I: Introduction to Data Analytics What is Data Analytics? Types of Data Analytics: Descriptive, Diagnostic, Predictive, Prescriptive Data Science vs. Data Analytics Applications of Data Analytics in various fields (Business, Health, Education, etc.) Analytics Process Life Cycle

Unit-II: Data Collection and Preparation Types and Sources of Data: Structured, Semi-structured, Unstructured Data Collection Methods Data Cleaning, Data Transformation, Data Integration Handling Missing Data, Outliers

Unit-III: Basic Statistics for Analytics Measures of Central Tendency (Mean, Median, Mode) Measures of Dispersion (Range, Variance, Standard Deviation) Correlation and Regression Probability Basics and Distributions (Normal, Binomial)

Unit-IV: Data Visualization Importance and Principles of Data Visualization Types of Charts: Bar, Pie, Line, Histogram, Heatmap Introduction to tools: MS Excel, Tableau, Power BI, Python (Matplotlib, Seaborn)

Unit-V: Tools and Technologies Excel for Data Analysis (Functions, Pivot Tables, Charts) Python (Intro to Pandas, Numpy, Matplotlib) Power BI / Tableau: Data Import, Visual Analytics Introduction to R (optional)

SUGGESTED BOOKS

1. Data Analytics Made Accessible – A. Maheshwari
2. Python for Data Analysis – Wes McKinney
3. Data Science for Business – F. Provost and T. Fawcett
4. Practical Statistics for Data Scientists – Peter Bruce

Discipline Centric Core Course (DCC)

SDSCC27001T: Statistics for Data Science

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- Apply descriptive statistics to summarize and visualize datasets.
- Understand and use probability theory in data analysis.
- Apply sampling techniques and statistical inference for decision-making.
- Perform hypothesis testing and interpret the results.
- Use correlation and regression for modeling relationships.

SYLLABUS

Unit-I: Introduction to Statistics Types of Data: Qualitative vs Quantitative Scales of Measurement: Nominal, Ordinal, Interval, Ratio Population vs Sample Applications in Data Science

Unit-II: Descriptive Statistics Measures of Central Tendency: Mean, Median, Mode Measures of Dispersion: Range, Variance, Standard Deviation, IQR Data Visualization: Histograms, Boxplots, Bar Charts, Pie Charts

Unit-III: Probability and Distributions Basic Probability Concepts Conditional Probability and Bayes' Theorem Discrete and Continuous Distributions: Binomial, Poisson, Normal Central Limit Theorem

Unit-IV: Sampling and Estimation Types of Sampling: Random, Stratified, Cluster Sampling Distribution Point Estimation and Confidence Intervals

Unit-V: Hypothesis Testing Null and Alternative Hypothesis Type I and Type II Errors t-test, z-test, chi-square test, ANOVA p-values and significance levels

SUGGESTED BOOKS

1. Statistics for Data Science – James D. Miller
2. Practical Statistics for Data Scientists – Peter Bruce, Andrew Bruce
3. Fundamentals of Statistics – S.C. Gupta
4. Introductory Statistics with R – Peter Dalgaard

Discipline Centric Core Course (DCC)

PDACC27001T: Python Programming for Data Analysis

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- To develop proficiency in Python programming.
- To understand basics of NumPy and associated mathematical and statistical functions
- To understand fundamentals of Pandas library of python
- To recognise basic implementation of data visualization through Matplotlib and Seaborn
- To introduce data science workflows including data wrangling, EDA, and visualization.

SYLLABUS

Unit-I: Introduction to Python and Data Structures Introduction to Python and its role in data analysis Variables, Data Types, Input/Output Control Structures (if, loops) Functions, Modules, and Packages Data structures: List, Tuple, Set, Dictionary

Unit-II: Working with NumPy Introduction to NumPy arrays Array creation, indexing, slicing Array operations and broadcasting Mathematical and statistical operations using NumPy

Unit-III: Data Handling with Pandas Introduction to Pandas: Series and DataFrame Reading and writing data (CSV, Excel, JSON) Data selection, filtering, sorting Handling missing data and duplicates Data aggregation and grouping

Unit-IV: Data Visualization using Matplotlib and Seaborn Introduction to Data Visualization Line plot, Bar plot, Histogram, Pie chart Scatter plot, Box plot, Heatmaps Customizing plots: Labels, Legends, Titles Introduction to Seaborn for advanced visualization

Unit-V: Exploratory Data Analysis (EDA) Descriptive statistics and summary functions Correlation and outliers detection Introduction to real-world datasets (Iris, Titanic, etc.)

SUGGESTED BOOKS

1. Wes McKinney, Python for Data Analysis, O'Reilly
2. Jake VanderPlas, Python Data Science Handbook, O'Reilly
3. Reema Thareja, Python Programming, Oxford University Press
4. Allen Downey, Think Python, O'Reilly
5. Online Resources: Kaggle, UCI ML Repository

Discipline Centric Core Course (DCC)

DMSCC27001T: Database Management Systems (SQL & NoSQL)

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- To understand the fundamental concepts of database systems.
- To Gain hands-on experience in SQL for relational databases.
- To recognise fundamentals of PL/SQL
- To Introduce NoSQL databases and their use cases.
- To apply data modeling and query techniques in both RDBMS and NoSQL contexts.

SYLLABUS

Unit-I: Introduction to Databases Database: Definition, Characteristics, Advantages over file system Database Users and Architecture Data Models: Hierarchical, Network, Relational, Object-Oriented Data Independence DBMS vs RDBMS E-R Model: Entities, Attributes, Relationships, ER Diagrams

Unit-II: Relational Database Concepts & SQL Relational Model: Keys, Constraints, Normalization (1NF to 3NF) SQL Basics: DDL, DML, DCL, TCL Queries: SELECT, INSERT, UPDATE, DELETE Filtering, Sorting, Joins (INNER, OUTER, SELF), Subqueries Indexes, Views, Sequences, Synonyms Aggregate Functions, Group By, Having Clause

Unit-III: Advanced SQL & Transactions PL/SQL: Procedures, Functions, Triggers, Cursors Transaction Management: ACID Properties, Commit, Rollback, Savepoint Concurrency Control: Locks, Deadlock Handling Backup & Recovery Case Study using MySQL/PostgreSQL

Unit-IV: Introduction to NoSQL Limitations of RDBMS in Big Data What is NoSQL? Features & Types: Document, Key-Value, Column, Graph NoSQL vs SQL Comparison Use Cases of NoSQL

Unit-V: Working with NoSQL Databases Document Database (MongoDB): CRUD operations Indexing, Aggregation, Schema Design Key-Value Store (Redis or Cassandra): Data modeling, Use cases CAP Theorem and BASE Properties Introduction to cloud-based NoSQL: Firebase / DynamoDB

SUGGESTED BOOKS

1. Database System Concepts – Abraham Silberschatz, Henry Korth, S. Sudarshan
2. Learning SQL – Alan Beaulieu
3. NoSQL Distilled – Pramod J. Sadalage, Martin Fowler
4. MongoDB: The Definitive Guide – Kristina Chodorow
5. Online Resources: MySQL Docs, MongoDB Docs, PostgreSQL Tutorials

Ability Enhancement Compulsory Course (AECC)

CPSAC27001T: Communication & Presentation Skills

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- Students will gain a comprehensive understanding of basic sounds of English and identify key literary forms.
- Students will Interpret and appreciate selected poetic and literary texts by Shakespeare, Tagore, and R.K. Narayan, demonstrating a grasp of theme, tone, and literary techniques.
- Students will apply knowledge of English grammar structures such as form classes, articles, prepositions, modal auxiliaries, and the use of prefixes, suffixes, and connectives in context..
- Students will explore the concept of Using appropriate tenses, voice (active/passive), and speech (direct/indirect) so as to learn English effectively.
- Students will compose formal and informal letters, reports, and job applications with clarity, correct structure, and suitable vocabulary.

SYLLABUS

Unit-I: The Sounds of English: Consonants, Mono-thongs, Diphthongs. An Acquaintance with Literary Forms: - Elegy, Ballad, and Sonnet An Acquaintance with Figures of Speech:- Simile, Metaphor, Personification, and Irony

Unit-II: Poetry: William Shakespeare – All the World is a stage. Rabindranath Tagore – Where the Mind is without Fear. Act Play/Novel: R. K. Narayan – Vendor of Sweets.

Unit-III: Introduction to Form Classes, Tenses and its uses. Articles, Preposition and Modal auxiliaries.

Unit-IV: Active and Passive Voice, Direct and Indirect Speech, Prefixes and Suffixes, Connectives.

Unit-V: English Writing Skills: Formal Letters & Informal Letters, Report Writing, Application for Job / Job Letter.

SUGGESTED BOOKS

1. "An Introduction to Literary Forms" by W.H. Hudson.
2. "The Vendor of Sweets" by R.K. Narayan
3. "English Verse: An Introduction" by David Kennedy
4. "High School English Grammar and Composition" by P.C. Wren & H. Martin.
5. "Effective English Communication" by M.A. Yadugiri & Geetha Rajeevan.

Discipline Centric Core Course (DCC)

FDACC27001P: Data Visualization Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISES

Assignment 1: Install and Configure Tools
Install Jupyter Notebook / Google Colab
Set up Python libraries: matplotlib, seaborn, plotly, pandas
Optional: Install Tableau Public or Power BI

Assignment 2: Exploring Datasets
Load datasets (CSV/Excel) using pandas
Display basic stats, missing values, and column types

Assignment 3: Bar Charts and Pie Charts
Visualize sales data by region using a bar chart
Plot pie chart for population distribution by state

Assignment 4: Line Graphs and Area Plots
Plot time-series data (e.g., stock prices, COVID-19 cases)
Area chart for revenue over months

Assignment 5: Histograms and Boxplots
Histogram for marks scored in exams
Boxplot to show distribution of salaries by department

Assignment 6: Scatter Plots and Heatmaps
Correlation between variables using scatter plot
Heatmap for correlation matrix of a dataset

Assignment 7: Pair Plots and KDE
Use Seaborn to plot pairplot for Iris dataset
Kernel Density Estimation (KDE) plot for customer age

Assignment 8: Interactive Dashboards with Plotly
Create interactive visualizations with tooltips, sliders
Use plotly.express for animations

Assignment 9: Getting Started with Tableau
Connect to dataset (CSV or Excel)
Create bar chart, line graph, and pie chart

Assignment 10: Dashboard Creation in Tableau
Create a dashboard for sales or education dataset
Use filters, legends, and actions

Discipline Centric Core Course (DCC)

PDACC27001P: Python Programming Lab

(60 CIA + 40 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISES

1. Write a program in Python to count repeated characters in a string.

2. Write a program in Python to implement various string operators.

3. Write a program in Python to implement different types of built in string oriented functions.

4. Write a program in Python to create, append, and remove list elements from a given list. (List elements must be from user side)

5. Write a program in Python to display the sum and square of given integer elements from a given list.

6. Write a program in Python to find the largest and smallest number in a user defined list.

7. Write a program in Python to find unique and duplicate items of a user defined list.

8. Write a program in Python to count the numbers of characters in the string and store them in a dictionary data structure.

9. Write a program in Python to implement linear search.

10. Write a program in Python to implement various built in functions for Tuple.

11. Write a program in Python to implement Regular Expression (RegEx).

12. Write a program in Python to define a module to find Fibonacci Numbers and import the module to another program.

13. Write a program in Python to define a module and import a specific function in that module to another program.

14. Write a Python script named demo.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.

15. Write a program in Python to accept student details and store in a database.

Discipline Centric Core Course (DCC)

DMSCC27001P: DBMS LAB

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISES

1. Basics of SQL
Create a database and perform basic operations: CREATE, USE, DROP
Create tables using appropriate data types, constraints (PK, FK, NOT NULL)

2. DML Operations
Insert, update, delete records
Examples:
Insert student data
Update course details
Delete a record with specific conditions

3. Querying Data
Use of SELECT, WHERE, ORDER BY, GROUP BY, HAVING
Pattern matching with LIKE, IN, BETWEEN
Example: List students whose marks are between 60 and 80

4. Joins and Subqueries
Inner Join, Left Join, Right Join
Correlated and Non-Correlated Subqueries
Example: Retrieve department name of students using joins

5. Aggregate Functions
SUM(), COUNT(), AVG(), MAX(), MIN()
Use with GROUP BY
Example: Find total salary paid in each department

6. Views and Indexing
Create and query views
Implement indexing to improve performance
Example: Create a view showing employee names and their salaries

7. Transactions and PL/SQL
Demonstrate COMMIT, ROLLBACK, and SAVEPOINT
Write basic PL/SQL procedures/functions
Example: Create a stored procedure to insert student data

Part B: NoSQL-Based Assignments (MongoDB or similar)
1. Introduction to NoSQL
Install and set up MongoDB
Understand databases, collections, documents

2. Basic CRUD Operations
insertOne(), insertMany()
find(), updateOne(), updateMany()
deleteOne(), deleteMany()

3. Querying Documents
Use of filters, comparison operators ($gt, $lt, $in)
Sorting and projections
Example: Find all books with price > 500

4. Aggregation Framework
$group, $match, $project, $sort, $limit
Example: Calculate total sales per region

5. Indexing and Performance
Create single and compound indexes
Example: Index the email field in a users collection

6. Data Modeling in NoSQL
Design schema for:
Student information system
E-commerce product catalog

7. Connecting NoSQL to Application
Optional task: connect MongoDB with a Node.js or Python application using Mongoose or PyMongo

PGDDA Semester: II 2025-26

Discipline Centric Core Course (DCC)

FMLCC27002T: Fundamental of Machine Learning

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- Understand the fundamentals of Machine Learning and its applications.
- Apply supervised learning techniques like regression and classification.
- Analyze unsupervised learning techniques including clustering.
- Evaluate ML models using standard metrics.
- Implement ML algorithms using Python and libraries like Scikit-learn.

SYLLABUS

Unit-I: Introduction to Machine Learning Definition and scope of ML Types of Machine Learning: Supervised, Unsupervised, Semi-supervised, Reinforcement Applications of ML in real life Machine Learning vs Traditional Programming Overview of ML tools (Python, Jupyter Notebook, Scikit-learn)

Unit-II: Data Preprocessing and Exploration Data cleaning, normalization, encoding Handling missing values Feature selection and dimensionality reduction (PCA basics) Data visualization techniques (Matplotlib, Seaborn)

Unit-III: Supervised Learning Linear Regression: concept, algorithm, implementation Logistic Regression K-Nearest Neighbors (KNN) Decision Trees and Random Forest Model performance: Confusion Matrix, Accuracy, Precision, Recall, F1-score

Unit-IV: Unsupervised Learning Clustering techniques: K-Means, Hierarchical Clustering Association Rules (Apriori algorithm basics) Applications of unsupervised learning Visualizing clusters

Unit-V: Model Evaluation and Deployment Cross-validation techniques Overfitting and Underfitting Model tuning using GridSearchCV Basics of ML model deployment using Flask/Streamlit

SUGGESTED BOOKS

1. "Introduction to Machine Learning with Python" by Andreas C. Müller & Sarah Guido
2. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron
3. Tom Mitchell, “Machine Learning”, McGraw Hill
4. Online resources: Coursera, Kaggle, Scikit-learn documentation

Discipline Centric Core Course (DCC)

BDTCC27002T Big Data Technologies (Hadoop/Spark)

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- Explain the characteristics and challenges of big data.
  Describe Hadoop architecture and its ecosystem components.
  Write basic MapReduce programs for data processing.
  Use Apache Spark for in-memory data analytics.
  Apply big data tools for analyzing real-world datasets.

SYLLABUS

Unit-I: Introduction to Big Data Definition and Evolution of Big Data Characteristics of Big Data (Volume, Variety, Velocity, Veracity, Value) Traditional vs Big Data Approaches Applications of Big Data in various domains Challenges in handling big data

Unit-II: Hadoop Ecosystem Overview of Hadoop and HDFS (Hadoop Distributed File System) Hadoop Architecture and Components YARN: Yet Another Resource Negotiator Hadoop MapReduce: Concepts, Workflow Introduction to Hive, Pig, HBase

Unit-III: Programming with MapReduce Developing MapReduce programs using Java or Python Input Splits and Record Readers Combiner and Partitioner Counters and Sorting Debugging and Testing MapReduce jobs

Unit-IV: Apache Spark Fundamentals Introduction to Spark and RDD (Resilient Distributed Dataset) Spark vs Hadoop MapReduce Spark Architecture: Driver, Executors, Cluster Manager Transformations and Actions in Spark Spark SQL, DataFrames, and Datasets

Unit-V: Real-Time Big Data Analytics Introduction to Streaming Data and Spark Streaming Spark MLlib for Machine Learning Connecting Spark with HDFS, Hive Hands-on case studies: Log analytics, Sentiment analysis, Real-time dashboards

SUGGESTED BOOKS

1. Tom White, Hadoop: The Definitive Guide, O'Reilly Media
2. Jules S. Damji et al., Learning Spark: Lightning-Fast Big Data Analysis, O'Reilly
3. Vignesh Prajapati, Big Data Analytics with R and Hadoop, Packt
4. Chuck Lam, Hadoop in Action, Manning

Discipline Centric Core Course (DCC)

CDACC27002T: Cloud Platforms for Data Analytics (AWS/Azure/GCP)

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- Understand cloud computing fundamentals and service models.
- Explore key cloud platforms: AWS, Microsoft Azure, and Google Cloud Platform.
- Apply cloud tools for data storage, processing, and analytics.
- Gain hands-on experience with cloud-based analytics services.

SYLLABUS

Unit-I: Introduction to Cloud Computing Cloud computing concepts: IaaS, PaaS, SaaS Deployment models: Public, Private, Hybrid Benefits and challenges Cloud security basics Overview of AWS, Azure, and GCP architectures

Unit-II: Cloud Storage & Data Services Storage services in AWS (S3, Glacier), Azure (Blob Storage), GCP (Cloud Storage) Data warehousing: Amazon Redshift, Azure Synapse, BigQuery Data lake concepts and architectures Case Study: Data lifecycle in the cloud

Unit-III: Data Processing & Analytics AWS: Lambda, EMR, Athena Azure: Data Factory, Synapse, Databricks GCP: Dataflow, Dataproc, BigQuery ML ETL/ELT workflows Real-time vs Batch processing

Unit-IV: Machine Learning and AI Services AutoML (AWS SageMaker, Azure ML Studio, Google Vertex AI) Prebuilt AI services: Vision, Speech, NLP APIs Model deployment and monitoring in the cloud

Unit-V: Cloud Monitoring, Costing & Governance Monitoring and logging: AWS CloudWatch, Azure Monitor, GCP Cloud Logging Cost estimation tools and calculators Cloud resource management and optimization Compliance and governance tools

SUGGESTED BOOKS

1. AWS Certified Data Analytics Study Guide – Asif Abbasi
2. Google Cloud Platform for Data Analytics – Sanket Thodge
3. Azure Data Engineering – Vlad Riscuita

Discipline Elective Course (DSE)

DSACC27002T: Domain-Specific Analytics

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- Understand the application of analytics in specific domains like healthcare, finance, marketing, retail, social media, and education.
- Gain hands-on experience with domain datasets and use relevant analytical techniques.
- Develop domain-specific dashboards and analytical models using tools like Python, R, Excel, Power BI, etc.

SYLLABUS

Unit-I: Introduction to Domain Analytics Definition and scope of domain analytics Types of domains: Business, Healthcare, Finance, Education, Social Media, etc. Challenges in domain-specific data Tools and platforms for domain analytics

Unit-II: Healthcare Analytics Types of healthcare data: EHR, clinical, patient-generated Use cases: disease prediction, hospital readmission analysis, patient risk scoring Descriptive & predictive analytics in healthcare Case Study: Predicting diabetes or heart disease using machine learning

Unit-III: Financial Analytics Key financial indicators and KPIs Fraud detection, credit scoring, customer churn Time series forecasting in stock market or sales Case Study: Loan default prediction using logistic regression

Unit-IV: Marketing and Retail Analytics Customer segmentation, market basket analysis Recommendation systems Campaign analysis and ROI Case Study: Predictive model for online customer purchases

Unit-V: Educational Analytics Learning analytics and student performance prediction
Dropout prediction MOOC platform analytics Case Study: Student performance analysis using classification models

SUGGESTED BOOKS

1. "Data Science for Business" by Foster Provost and Tom Fawcett
2. "Healthcare Analytics" by Hui Yang, Eva K. Lee
3. "Practical Business Intelligence" by Ahmed Sherif

Discipline Elective Course (DSE)

ICSSE27002T: Introduction to Cyber Security

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- Explain the fundamentals of cyber security and its importance.
- Recognize various cyber attacks and countermeasures.
- Apply basic security principles to protect IT systems.
- Analyze security threats in networks and software.
- Demonstrate knowledge of legal and ethical issues in cyber security.

SYLLABUS

Unit-I: **Introduction to Cyber Security** Importance and scope of cyber security
Threats, vulnerabilities, and attacks Types of attackers (script kiddies, insiders, hacktivists, etc.) Security goals: Confidentiality, Integrity, Availability (CIA)

Unit-II: **Cyber Crimes and Laws**
Types of cyber-crimes (hacking, phishing, identity theft, etc.) Indian IT Act 2000 and amendments Legal frameworks and cyber law policies Cyber forensics basics

Unit-III: **Network Security Fundamentals**
Introduction to network security Firewalls, IDS/IPS Cryptography basics: symmetric & asymmetric encryption Secure communication protocols (SSL/TLS, VPNs)

Unit-IV: **System and Application Security**
Operating system security principles Malware types and prevention Secure coding practices Authentication, authorization, and access control

Unit-V: **Cyber Security Tools and Practices**
Antivirus, anti-malware, and firewall tools Penetration testing and ethical hacking basics Incident response and disaster recovery Cyber hygiene and best practices for individuals

SUGGESTED BOOKS

1. Cybersecurity: The Beginner's Guide by Raef Meeuwisse
2. Principles of Information Security by Michael E. Whitman & Herbert J. Mattord
3. Cyber Security Essentials by James Graham, Richard Howard, and Ryan Olson
4. Information Security by Mark Stamp
5. IT Act 2000 (India) – Government Publications

Discipline Centric Core Course (DCC)

MLTCC27002P: Machine Learning Techniques LAB

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISES

Data Cleaning and Transformation
Load a dataset (e.g., Titanic/Iris).
Handle missing values, normalization, encoding categorical data.
Visualize with matplotlib/seaborn.
Exploratory Data Analysis (EDA)
Generate summary statistics.
Create plots: histograms, boxplots, scatter plots.
Find correlation between features.
Linear Regression
Predict house prices using the Boston dataset.
Evaluate performance using RMSE, MAE.
Polynomial Regression
Apply to a non-linear dataset.
Compare with linear regression results.
Logistic Regression
Binary classification on Titanic dataset.
Evaluate using confusion matrix, accuracy, precision, recall.
Decision Tree Classifier
Apply to the Iris dataset.
Visualize the decision tree.
Random Forest Classifier
Classify the Wine dataset.
Compare with Decision Tree performance.
K-Nearest Neighbors (KNN)
Apply to handwritten digits (MNIST - smaller version).
Evaluate with accuracy and classification report.
K-Means Clustering
Apply to Iris dataset (without labels).
Visualize clusters and evaluate with silhouette score.
Hierarchical Clustering
Dendrogram creation using scipy.
Apply Agglomerative Clustering and visualize.
Cross-Validation
Apply k-fold cross-validation on a classification problem.
Compare scores.
Hyperparameter Tuning
Use GridSearchCV on Random Forest / KNN.
Visualize parameter vs. accuracy.

Discipline Centric Core Course (DCC)

BDACC27002P: Big Data Analytic Lab Hadoop LAB

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISES

Assignment 1: Introduction to Hadoop & HDFS
Install and configure Hadoop in pseudo-distributed mode.
Create directories and upload files to HDFS.
Basic HDFS commands: put, get, ls, rm, du, dfsadmin.

Assignment 2: Word Count using MapReduce
Write and execute a MapReduce program to count the frequency of words in a text file.
Run the job and interpret the output.

Assignment 3: Sorting Data using MapReduce
Develop a MapReduce program to sort a list of integers.
Input format: numbers in a file; Output: sorted numbers.

Assignment 4: Weather Dataset Analysis
Use a given weather dataset.
Write a MapReduce job to find:
Maximum temperature for each year.
Average temperature per month.

Assignment 5: Hadoop Streaming with Python
Write a MapReduce job using Python as mapper and reducer.
Example: Word count or log file analysis.

Discipline Centric Core Course (DCC)

SAPCC27002P: Seminar & Presentation

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	8 Hours	120 Hours

SUGGESTED LABORATORY EXERCISES

Assignment 1: Topic Selection & Abstract Writing
Task: Select a technical topic (e.g., Artificial Intelligence, Cybersecurity, Cloud Computing, etc.)
Deliverables:
Title of the Seminar
Abstract (150–200 words)

Assignment 2: Literature Review
Task: Conduct a literature survey on the selected topic using at least 5 research papers or articles.
Deliverables:
Summary of existing work (500–700 words)
References in IEEE/APA format Tools: Google Scholar, IEEE Xplore, ResearchGate

Assignment 3: PowerPoint Presentation Design
Task: Create a professional presentation (8–12 slides)
Content Must Include:
Title Slide
Introduction
Problem Statement
Existing Technologies/Approach
Case Study or Application
Conclusion
References
Tools: Microsoft PowerPoint / Google Slides / Canva

Assignment 4: Seminar Rehearsal
Task: Perform a mock seminar presentation before a group or mentor
Evaluation:
Body language
Eye contact
Voice clarity
Confidence

Assignment 5: Final Seminar Presentation
Task: Deliver a 10–15 minute presentation
Assessment By: Faculty panel
Evaluation Criteria:
Content Depth
Delivery & Engagement
Slide Design
Handling Q&A

Skill Enhancement Course (SEC)

AMESC27001P Advance MS Excel LAB

(20 CIA + 80 EoSE. = Max. Mark s: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	6 Hours	90 Hours

SUGGESTED LABORATORY EXERCISES

Logical Functions
Use IF, AND, OR, IFERROR for decision-making tasks (e.g., grading students based on marks).

Lab 2: Lookup Functions
Apply VLOOKUP, HLOOKUP, XLOOKUP, and INDEX-MATCH for data retrieval from different tables.

Lab 3: Date & Time Functions
Use TODAY(), NOW(), DATEDIF(), EOMONTH() for calculating due dates, age, tenure, etc.

Lab 4: Data Validation
Create drop-down lists, restrict data entry using custom rules, and add input messages.

Lab 5: Conditional Formatting
Highlight top 5 values, color-code based on conditions, use icon sets for trend indication.

Lab 6: Sorting & Filtering
Sort data using multiple criteria. Apply custom filters to display specific records.

Lab 7: Pivot Tables
Create a pivot table to summarize sales data by region, category, and time.

Lab 8: What-If Analysis
Use Goal Seek to calculate required marks to achieve a target grade.
Use Data Tables to show different EMI values by changing interest rate.

Lab 9: Scenario Manager
Prepare different financial models and compare best, average, and worst-case scenarios.

Lab 10: Charts
Create bar charts, pie charts, line charts, and combo charts with dual axes.

Lab 11: Interactive Dashboards
Build a basic dashboard using form controls (slicers, scroll bars) and link it with summary reports.

Skill Enhancement Course (SEC)

CPISC27002I: Capstone Project / Internship (Industry-based)

(40CIA + 160 EoSE. = Max. Marks: 200)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	6 Hours	90 Hours

SUGGESTED LABORATORY EXERCISES

1. Project Selection and Proposal

- Students must propose a project idea (web app, mobile app, system software, etc.)
- Individual or team of max 3 students
- Proposal should include:
    - Title
    - Problem statement
    - Objectives
    - Scope
    - Tools/Technologies planned
    - Expected Outcome
- Faculty guide will be assigned

2. System Analysis and Design

- Feasibility Study
- Requirement Gathering and Specification (SRS Document)
- UML Diagrams (Use Case, Class, Sequence, Activity)
- Data Flow Diagrams (DFD)
- ER Diagram (if DBMS is used)

3. Development and Implementation

- Coding using appropriate front-end and back-end tools
- Integration of modules
- Database Design and Implementation
- Version Control (e.g., Git) – recommended
- Use of frameworks and APIs if applicable

4. Testing and Deployment

- Unit testing, Integration testing, System testing
- Bug fixing and validation
- Deployment on local server/cloud platform (Heroku, Firebase, etc.)
- User Manual or Help Guide preparation

5. Final Report and Presentation

Project Report Documentation Guidelines

Formatting

- A4 size, Times New Roman, 12pt, 1.5 line spacing
- Justified alignment, 1" margin on all sides
- Header/Footer with page numbers

Content Structure

- Cover Page (Project Title, Student Info, College Name, Guide Name, Year)
- Certificate from Institution
- Declaration by Student
- Acknowledgment
- Abstract (200–300 words)
- Table of Contents
- Chapters:
    - Chapter 1: Introduction
    - Chapter 2: System Analysis (Problem, Objectives, SRS, Feasibility)
    - Chapter 3: System Design (DFD, ERD, UML diagrams)
    - Chapter 4: Implementation (Tools, Code snapshots, UI)
    - Chapter 5: Testing and Validation
    - Chapter 6: Conclusion and Future Enhancement
- Bibliography / References
- Appendix (if needed: code, extra screenshots)

Presentation Guidelines

- **Duration:** 10–15 minutes
- **Mode:** PowerPoint or Google Slides
- **Suggested Slides:**
    - Title Slide
    - Problem Statement
    - Objectives
    - Tools/Tech Stack
    - System Architecture & Design
    - Screenshots / Demo
    - Testing Highlights
    - Conclusion & Future Work

Value Added Course (VAC)

EDPVC27002T: Ethics, Data Privacy & Responsible AI

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- To understand ethical issues in computing and AI.
- To learn about data privacy laws, principles, and practices.
- To promote responsible use of artificial intelligence and digital technologies.
- To build critical thinking around bias, fairness, transparency, and accountability in AI systems.

SYLLABUS

Unit-I: Introduction to Ethics in Technology Ethics: Meaning and theories (Utilitarianism, Deontology, Virtue Ethics) Ethics in computing and internet usage Professional ethics and codes (ACM/IEEE) Digital citizenship and social responsibility

Unit-II: Data Privacy Principles & Regulations What is data privacy? Types of data (PII, PHI, SPI), Data protection principles (Consent, Minimization, Retention) Overview of major regulations: GDPR (EU) IT Act (India), DPDP Bill (India) CCPA (California) Data anonymization and encryption basics

Unit-III: Responsible AI and Fairness AI and ML basics recap Bias in data and algorithms Discrimination and fairness Case studies of AI gone wrong Responsible design of AI systems

Unit-IV: Transparency, Explainability & Accountability What is explainable AI (XAI)? Black-box vs white-box models Role of audits in AI Algorithmic transparency Human-in-the-loop approaches

Unit-V: Future Challenges & Contemporary Issues AI and surveillance Deepfakes, misinformation, and ethical media Social media ethics and data harvesting Ethical issues in facial recognition and biometrics Role of global organizations (UNESCO, OECD AI Principles)

SUGGESTED BOOKS

1. "Ethics for the Information Age" by Michael J. Quinn
2. "Weapons of Math Destruction" by Cathy O'Neil
3. "Artificial Intelligence: A Guide for Thinking Humans" by Melanie Mitchell
4. GDPR official documentation and India's DPDP Bill (2023)
5. NITI Aayog's "Responsible AI for All" report

Value Added Course (VAC)

CLCVC27002T: Cloud Computing

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

Course Outcome: On successful completion of the course, the students will be able to:

- Understand cloud computing fundamentals, models, and architecture.
- Learn about virtualization, cloud infrastructure, and services.
- Gain practical skills in using cloud platforms like AWS, Azure, or GCP.
- Explore security, governance, and deployment strategies in the cloud.

SYLLABUS

Unit-I: **Introduction to Cloud Computing**
Definition and Characteristics of Cloud Computing Cloud Deployment Models: Public, Private, Hybrid, Community Cloud Service Models: IaaS, PaaS, SaaS Benefits and Challenges of Cloud Computing Use Cases and Applications

Unit-II: **Cloud Architecture & Virtualization**
Cloud Reference Model Cloud Infrastructure: Data Centers, Hypervisors Virtualization: Concept, Types (Full, Para, OS-level) Virtual Machines, Containers (Docker) Resource Management and Scheduling

Unit-III: **Cloud Service Providers**
Overview of AWS, Microsoft Azure, Google Cloud Platform Cloud Storage: S3, Blob Storage Compute Services: EC2, Azure VMs, GCP Compute Engine Networking in Cloud: VPC, Subnets, Load Balancers

Unit-IV: **Cloud Security and Compliance**
Security Issues in Cloud Computing Identity & Access Management (IAM) Data Privacy and Protection Legal & Regulatory Compliance (GDPR, HIPAA) Risk Management and Governance

Unit-V: **Cloud Applications and Trends**
Serverless Computing and Function-as-a-Service (FaaS) Edge and Fog Computing
Multi-cloud and Hybrid Cloud Strategies Cloud Automation and DevOps Tools Emerging Trends: AI in Cloud, Kubernetes, FinOps

SUGGESTED BOOKS

1. Cloud Computing: Principles and Paradigms – Rajkumar Buyya
2. Cloud Computing: Concepts, Technology & Architecture – Thomas Erl
3. Mastering Cloud Computing – Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi
4. AWS Certified Cloud Practitioner Guide – Ben Piper