**JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER APPLICATIONS**

**M.SC. BUSINESS AND DATA ANALYTICS**

**SEMESTER- I**

**Course Title: Business Analytics using R- 25M31CA111**

**Credits: 4 (2L+2P)**

**Course Objectives**

The objective of the course is to provide:

* Understanding of various models of Business Analytics.
* Understanding of the usage of the Business Analytics models as problem-solving tools.
* Knowledge of business data management and its role in managerial decision making.
* Ability to apply recent analytical tools for solving management problems.

**Course Outline:**

Foundations of business analytics: Introduction & Database analytics, Descriptive analytics: Data visualization, Descriptive statistics, Sampling and Estimation, Predictive Analytics: Trendlines and Regression Analysis, Forecasting techniques, Concepts of Data Mining, Prescriptive Analytics: Linear Optimization, Optimization analytics & Decision analysis, Introduction to R and RStudio, Data Visualization using R, Time Series Analysis and Forecasting using R, Business Problem Solving using R

**Course Title: Business Statistics using Excel-** **25M31CA112**

**Credits: 4 (2L+2P)**

**Course Objectives**

The objective of the course is to provide an:

* Introduce the fundamentals of statistics and their practical application using Microsoft Excel.
* Enable students to analyze, interpret, and visualize data for effective decision-making.
* Provide hands-on experience in applying statistical techniques through Excel-based tools and functions.

**Course Outline:**

Introduction to Statistics and Excel Basics: Data types, data entry, Excel interface, functions and formulas, Descriptive Statistics: Measures of central tendency and dispersion, frequency distribution, data visualization (charts, graphs), Probability and Probability Distributions: Basics, Normal, Binomial, Poisson distributions, Inferential Statistics: Hypothesis testing, confidence intervals, t-tests, chi-square tests, ANOVA, Correlation and Regression Analysis: Simple linear regression, multiple regression using Excel

**Course Title: Data Mining Tools & Techniques-** **25M31CA113
Credits: 4 (3L+1T)**

**Course Objective:**

This course provides an in-depth understanding of data mining concepts, tools, and techniques essential for uncovering meaningful patterns and insights from large-scale datasets. It blends theoretical knowledge with practical applications, emphasizing how data mining supports strategic decision-making in business contexts.Students will gain hands-on experience with widely used data mining platforms and languages, enabling them to preprocess data, perform pattern discovery, build predictive models, and evaluate outcomes effectively.

**Course Outline:**

Introduction to Data Mining: Definition and scope, Knowledge Discovery in Databases (KDD), Applications in business intelligence, CRM, and e-commerce, Data mining vs. traditional statistics Data Pre processing: Data cleaning, transformation, normalization, feature selection, handling missing values and noise, data integration, Exploratory Data Analysis, Association Rule Mining: Frequent itemset generation, Apriori and FP-Growth algorithms, Support, confidence, lift, and other interestingness measures, Applications in retail and recommendation systems, Clustering Techniques: K-Means, Hierarchical clustering, DBSCAN, Evaluating clustering quality, Real-world applications (e.g., customer segmentation, market analysis), Anomaly Detection: Types of anomalies (point, contextual, collective), Statistical, distance-based and density-based techniques, Use cases in fraud detection, network intrusion, Data Mining Tools and Platforms

**Course Title: Design Thinking and Innovation -** **25M31CA114**

**Credits: 2**

In a world of constant change, innovation has become essential for organizations to remain competitive. This course equips students with the mindset and tools of Design Thinking to foster innovation in solving complex business problems. It emphasizes a human-centered, iterative approach to innovation by focusing on user needs, ideation, prototyping, and testing to generate creative solutions that deliver real value.

## Course Objectives

* Develop an empathetic understanding of end-users and their unmet needs
* Use design thinking tools and methods to ideate, prototype, and test solutions
* Apply creative problem-solving approaches in real-world scenarios
* Integrate innovation frameworks with strategic business objectives
* Cultivate an innovation-oriented mindset for organizational transformation

## Course Outline:

Introduction to Design Thinking and Innovation, Empathy and User Research, Problem Definition and Opportunity Framing, Ideation Techniques and Creativity Tools, Prototyping and Testing Solutions, Design Thinking for Business Innovation, Strategy, Business Models and Innovation, Case Studies and Real-World Applications.

**Course Title: Business Communication -** **25M31CA115**

**Credits: 3**

**Course Objectives:**

The objective of the course is to provide:

* An understanding of communication principles and their application in a business context.
* Exposure to various modes of communication including verbal, non-verbal, and written forms.
* Skills to craft and deliver effective business messages for diverse stakeholders.
* Competence in handling business meetings, presentations, and negotiations.

**Course Outline:**

Fundamentals of Communication: Process, Types, Barriers, and Listening Skills, Written Communication: Business Letters, Email Etiquette, Memos, Reports, Oral Communication: Presentations, Group Discussions, Interviews, Strategic Communication: Crisis Communication, Intercultural and Virtual Communication, Negotiation Skills

**Course Title: Introduction to Data Science-** **25M31CA116**

**Credits: 3**

**Course Objectives**

The objective of the course is to provide an:

* To use industry-standard tools such as Python, Pandas, NumPy, Matplotlib, and Scikit-learn to manipulate, analyze, and visualize data.
* To communicate findings effectively through data storytelling, dashboards, and visual reports.
* To gain hands-on experience through projects and case studies from various domains like healthcare, finance, marketing, and social media.

**Course Outline:**

Introduction to Data Science: Definition, importance, applications, Data Science lifecycle: CRISP-DM and OSEMN frameworks, Roles of a data scientist and interdisciplinary nature, Types of data: Structured vs. unstructured, Tools of the trade, Data collection methods (APIs, web scraping basics, databases), Data cleaning: handling missing data, outliers, and duplicates, Data transformation: normalization, encoding categorical variables, Exploratory Data Analysis (EDA): summary statistics, distributions, Data visualization, Descriptive statistics, Probability concepts and distributions, Inferential statistics, Correlation and causation, Introduction to statistical modelling, Supervised vs. unsupervised learning, Performance metrics, Introduction to Big Data and cloud-based tools, Basics of working with time series and text data

**Course Title: Business Analytics using R (Lab)-** **25M35CA111**

**Credits: 1**

**Course Objectives**:

By the end of the course, students will be able to:

* Use R and RStudio for data manipulation, visualization, and analysis.
* Apply descriptive, predictive, and prescriptive analytics techniques to real-world datasets.
* Perform regression, forecasting, optimization, and data mining using R packages.
* Solve business problems by interpreting R outputs and creating actionable insights.

**Course Outline:**

Introduction to R and RStudio: Installing packages, basic syntax, data structures (vectors, data frames), importing/exporting data (CSV, Excel). Data Wrangling with R: Cleaning data (dplyr, tidyr), handling missing values, merging datasets. Descriptive Analytics in R: Summary statistics, frequency tables, visualization using ggplot2 (bar plots, histograms, box plots). Predictive Analytics: Linear and logistic regression (lm, glm), time series forecasting (forecast, ts), data mining techniques (clustering with kmeans, classification). Prescriptive Analytics: Linear optimization (lpSolve), decision trees (rpart), scenario analysis. Business Case Studies: Solving real-world problems (sales forecasting, customer segmentation, resource optimization) using R scripts and markdown reports.

**Course Title: Business Statistics using Excel Lab-** **25M31CA112**

**Credits: 1**

**Course Objectives** :

By the end of the course, students will be able to:

* Apply statistical concepts using Excel’s built-in functions, formulas, and data analysis tools.
* Perform data cleaning, visualization, and descriptive statistics in Excel.
* Conduct probability, hypothesis testing, and regression analysis with real-world datasets.
* Interpret Excel outputs for business decision-making

**Course Outline:**

Introduction to Excel for Statistics: Data types, entry, and formatting; Excel functions (SUMIF, COUNTIF), formulas, and basic data organization. Descriptive Statistics in Excel: Calculating measures of central tendency (mean, median, mode) and dispersion (variance, standard deviation); creating frequency tables, histograms, and box plots using Excel charts. Probability Distributions: Simulating and analyzing Normal, Binomial, and Poisson distributions with Excel functions (NORM.DIST, BINOM.DIST, POISSON.DIST). Inferential Statistics: Conducting hypothesis tests (z-test, t-test) using Data Analysis ToolPak; interpreting p-values and confidence intervals; performing chi-square tests and one-way ANOVA. Correlation and Regression: Calculating Pearson’s correlation coefficient; running simple and multiple linear regression with Excel’s regression tool; interpreting outputs (R-squared, coefficients). Data Visualization: Advanced charts (scatter plots, trendlines, pivot charts) for business insights. Case Studies/Projects: Analyzing real datasets (sales, finance, surveys) to apply all techniques.