COURSE TITLE	**PREDICTIVE AND ADVANCED ANALYTICS**
COURSE CODE	**04BM0203**
COURSE CREDITS	**3**

Course Outcomes: After completion of this course, student will be able to:

1. Explain the significance and applications of predictive analytics in decision-making processes.
2. Apply various data mining and machine learning techniques to extract patterns and build predictive models.
3. Develop and interpret predictive models using regression analysis and advanced machine learning algorithms.
4. Implement time series forecasting models and understand their applications.
5. Apply predictive analytics techniques to specific industry problems and present findings effectively.

Pre-requisite of course: Familiarity with Statistical terms, Understanding of basic business functions, Basic statistics and data analysis skills

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	0	30	20	50	0

Contents : Unit	Topics	Contact Hours
1	**Foundations of Predictive Analytics** Foundations of Predictive Analytics, Data Collection, and Preparation Introduction to Predictive Analytics: Definition of Predictive Analytics, Key Components of Predictive Analytics, Importance and Applications of Predictive Analytics in Business, Finance, Marketing, Healthcare, Manufacturing, Key Concepts and Terminology such as: Data Mining, Machine Learning, Big Data, Predictive Model	8
2	**Exploratory Data Analysis (EDA)and Regression Analysis** Exploratory Data Analysis (EDA): Descriptive Statistics, Data Visualization Techniques, Univariate Analysis, Bivariate Analysis, Multivariate Analysis, Time Series data; Hypothesis Testing: Formulating Hypotheses (Null and Alternative), Types of Errors (Type I and Type II) , Regression Analysis Simple Linear Regression: Model Assumptions, Multiple Linear Regression	10

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Contents : Unit	Topics	Contact Hours
3	**Machine Learning Algorithms and Time Series Analysis** Overview of Machine Learning: Supervised Learning, Unsupervised Learning, Applications and Use Cases: Finance, Healthcare, Marketing, Supervised Learning Algorithms; Unsupervised Learning Algorithms: Clustering	10
4	**Time Series Analysis** Introduction to Time Series Data: Components of Time Series, Decomposition, Additive and Multiplicative Models, Trend Extraction, Seasonal Adjustment, Residual Analysis, Practical Applications, Smoothing Techniques, Time Series Forecasting Models, ARIMA Models (Autoregressive Integrated Moving Average), Model Structure, Model Implementation	8
5	**Applications of Predictive Analytics** Business Analytics: Sales Forecasting: Time series analysis, regression models. Case Studies: Real-world examples of sales forecasting. Financial Forecasting, Case Studies: Examples of economic forecasting in government and finance sectors. Marketing Campaigns and Customer Segmentation, Web Usage Mining and E-commerce Data Analysis	9
Total Hours		**45**

Textbook :

1 Time Series Analysis and Its Applications: With R Examples, Robert H. Shumway and David S. Stoffer , Springer, 2025

2 Pattern Recognition and Machine Learning , Christopher M. Bishop, Springer, 2016

References:

1 Data Mining: Concepts and Techniques, Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, and Jian Pei, Elsevier, 2022

2 Applied Predictive Modeling, Applied Predictive Modeling, Max Kuhn and Kjell Johnson, Springer, 2013

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
0.00	0.00	40.00	40.00	10.00	10.00

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Instructional Method:

1 Interactive classroom sessions
2 Group projects and simulations
3 Guest lectures from industry professionals

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