

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

## New Scheme Based On AICTE Flexible Curricula Artificial Intelligence & Data Science, VII-Semester Departmental Elective-702 (D) Predictive Analytics

### Course Objectives

1. Learn the fundamental principles of Predictive analytics for business.
2. Visualize and explore data to better understand relationships among variables.
3. Examine how predictive analytics can be used in decision-making.
4. Apply predictive models to generate predictions for new data.
5. Apply Time Series analysis for solving real world problems.

### Course Outcomes

After completion of the course, students will be able to

1. Understand the importance of predictive analytics.
2. Able to prepare and process data for the models.
3. Learn about statistical analysis techniques used in predictive models.
4. Learn about important time series models and their applications in various fields.
5. Formulate real life problems using multivariate time series models and its applications.

## Syllabus

### Unit I: Introduction and Understanding Data

Introduction to predictive analytics – Business analytics: types, applications- Models: predictive models – descriptive models – decision models - applications - analytical techniques.

Data types and associated techniques – complexities of data – data preparation, pre-processing – exploratory data analysis.

### Unit II: Principles and Techniques

**Predictive modeling:** Propensity models, cluster models, collaborative filtering, applications and limitations - Statistical analysis: Univariate and Multivariate Statistical analysis.

**Model Selection** - Preparing to model the data: supervised versus unsupervised methods, statistical and data mining methodology, cross-validation, overfitting, bias-variance trade-off, balancing the training dataset, establishing baseline performance.

### Unit III: Regression and Classification Models

Measuring Performance in Regression Models - Linear Regression and Its Cousins - Non-

Linear Regression Models - Regression Trees and Rule-Based Models Case Study: Compressive Strength of Concrete Mixtures.

**Measuring Performance in Classification Models** - Discriminant Analysis and Other Linear Classification Models - Non-Linear Classification Models - Classification Trees and Rule-Based Models – Model Evaluation Techniques

#### **Unit IV: Time Series Analysis**

Unit-IV Time Series Analysis: Introduction , Examples of time series, Stationary models and autocorrelation function, Estimation and elimination of trend and seasonal components, Stationary Process and ARMA Models -- Basic properties and linear processes, Introduction to ARMA models, properties of sample mean and autocorrelation, function, Forecasting stationary time series, ARMA(p, q) processes, ACF and PACF, Modeling and Forecasting with ARMA.

**Unit V: Nonstationary and Seasonal Time Series Models-** ARIMA models, Identification techniques, Unit roots in time series, Forecasting ARIMA models, Seasonal ARIMA models Regression with ARMA errors.Multivariate Time Series analysis, State-Space Models, Deep Learning techniques of time series forecasting

#### **Text Book(s):**

1. Jeffrey Strickland, Predictive analytics using R, Simulation educators, Colorado Springs, 2015.
2. Max Kuhn and Kjell Johnson, Applied Predictive Modeling, 1st edition Springer, 2013.
3. Brockwell, Peter J. and Davis, Richard A. (2002). Introduction to Time Series and Forecasting, 2nd edition. Springer-Verlag, New York.

#### **ReferenceBooks:**

1. Anasse Bari, Mohamed Chaouchi, Tommy Jung, Predictive analytics for dummies, 2nd edition Wiley, 2016.
2. Dinov, ID., Data Science and Predictive Analytics: Biomedical and Health Applications using R, Springer, 2018.
3. Daniel T.Larose and Chantal D.Larose, Data Mining and Predictive analytics, 2nd edition Wiley, 2015.
4. Data Mining and Predictive Analytics, 2ed (An Indian Adaptation) by Daniel Larose, OP Wali - John Wiley Publication