Course Code	Course Title	L	T	P	C
BCSE334L	Predictive Analytics	3	0	0	3
Pre-requisite	NIL	Syllabus version			
		1.0			

Course Objectives

1. Learn the fundamental principles of analytics for business and learn how to Visualize and explore data to better understand relationships among variables.
2. To understand the techniques of modeling and examine how predictive analytics can be used in decision making.
3. Apply predictive models to generate predictions for new data.

Expected Course Outcome

Upon completion of the course the student will be able to

1. Understand the importance of predictive analytics and processing of data for analysis.
2. Describe different types of predictive models.
3. Apply regression and classification model on applications for decision making and evaluate the performance.
4. Analyze the impact of class imbalance on performance measure for model predictions and models that can mitigate the issue during training.
5. Define and apply time series forecasting models in a variety of business contexts.

Module:1	Introduction to Analytics	5 hours

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

Module:2	Data Pre-processing and Model Tuning	6 hours

Data transformations: Individual predictors, Multiple predictors, Dealing with missing values, Removing. Adding, Binning Predictors, Computing, Model Tuning, Data Splitting, Resampling.

Module:3	Predictive Modeling	6 hours

Propensity models, cluster models, collaborative filtering, applications and fundamental limitations. Statistical Modeling- Formal Definition, Model Comparison, Classification.

Module:4	Comparison of Regression Models	7 hours

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.

Module:5	Comparison of Classification Models	7 hours

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.

Module:6	Remedies for Severe Class Imbalance	6 hours

The Effect of Class Imbalance - Model Tuning - Alternate Cutoffs - Adjusting Prior Probabilities - Unequal Case Weights - Sampling Methods - Cost-Sensitive Training. Measuring Predictor Importance - Factors that can affect Model Performance.

Module:7	Time Series Analysis	6 hours

Methods for time series analyses – Analysis: Motivation – Exploratory analysis – Prediction and forecasting – Classification – Regression analysis – Signal estimation – Segmentation. Models – Autoregressive model - Partial autocorrelation function.

Module:8	Contemporary Issues	2 hours

	Total Lecture Hours:	45 hours

Text Book(s)			
1.	Kuhn, Max, and Kjell Johnson. Applied Predictive Modeling, 3rd Edition, Springer, 2019.		
2.	Jeffrey Strickland, Predictive analytics using R, Simulation educators, Colorado Springs, 2015.		
Reference Books			
1.	Anasse Bari, Mohamed Chaouchi, Tommy Jung, Predictive Analytics for dummies, 2nd edition Wiley, 2016.		
2.	Daniel T.Larose and Chantal D.Larose, Data Mining and Predictive Analytics, 2nd edition Wiley, 2015.		
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar			
Recommended by Board of Studies	12-05-2022		
Approved by Academic Council	No. 66	Date	16-06-2022