

Post Graduate Certificate Program in Data Science & Business Analytics (DSBA)

Batch 02



Curriculum: Summary

Module No.	Module Description	Number of Sessions	Weightage (%)		
			Assg/CP	Exm	Tot
1	Descriptive Analytics	22	40	60	10
2	Predictive Analytics and Forecasting	22	40	60	10
3	Artificial Intelligence, Machine Learning, and Deep Learning	24	40	60	10
4	Database Management, Big Data and Social Media Analytics	24	40	60	10
5	Prescriptive Analytics	24	40	60	10
6.1	Story telling using Data	12	40	60	10
	Marketing Analytics and Digital Marketing				
6.2	Data Ethics and Security	2			
6.3	Operations, Supply Chain and Retail Analytics	6			
6.4	Financial Analytics	12			
6.5	HR Analytics	6			
7	Capstone Project Work and Presentation**	6			40
	Total	160			100

Important Notes:

- 1) Attendance (80%) in each module and throughout.
- 2) In any case, attendance must not fall below 50% in any Module.
- 3) Camera must be on during the sessions. You must be taking the classes from an appropriate location.
- 4) Certification criteria and grading.
- 5) Details will be shared soon.

** Project Presentation will be done in three phases.

Curriculum: Module 1

Module 1: Descriptive Analytics					
SI No	Topics	Sub-topics	Number of Sessions	Software	Faculty
1	Introduction to Data Science and Business Analytics	Descriptive, Predictive and Prescriptive Analytics; Brief CRISP DM cycle	2	Excel Toolpack	Prof Mahima
2	Basic Statistical Measures	Visualizing and describing categorical and numerical data, Measures of central tendency and dispersion, Measures for population and sample data, Measures for data with more than one variable	2	Excel Toolpack	Prof Chetan
3	Probability and Random variables	Basic probability, conditional probability, Bayes' Theorem	2	Excel Toolpack	Prof Chetan
4	Discrete & Continuous Distributions	Binomial, Poisson, Normal distributions, Sampling distributions	5	Excel Toolpack	Prof Chetan
5	Hypothesis Testing	Confidence Intervals and Hypothesis testing with known and unknown population characteristics, Mean, Proportion and Variance	5	Excel Toolpack	Prof Chetan
6	Analysis of Variance	T-tests, 2 sample t-tests, One-way and Two-way ANOVA	6	Excel Toolpack	Prof Chetan

Curriculum: Module 2

Module 2: Predictive Analytics and Forecasting					
SI No	Topics	Sub-topics	Number of Sessions	Software	Faculty
1	Introduction to R and Exploratory Data Analysis	Basic Structure in R : Data Types in R, Variables in R, Loops in R etc.	5	R	Prof Mahima
2	Linear Regression	Building Linear Regression Model, Model Diagnostics; Remedial Measure, Interpretation of Results	4	MS Excel, R	Prof Mahima
3	Multivariate Regression Techniques	Building Multiple Linear Regression Model, Model Diagnostics; Step-wise Regression Method, Results Interpretation	3	MS Excel, R	Prof Mahima
4	Time Series Regression Analysis and Forecasting	Forecasting Techniques and Models, Visualizing Time Series Data, Evaluating Forecast Accuracy, Time Series Decomposition (Trend, Seasonality, Randomness), Exponential Smoothing and Moving Averages, Time Series Regression Models, Forecasting with Regression	4	R	Prof Pavneet
5	Logistic Regression	Building Regression Models for Categorical Response Variable; ROC; Model Evaluation Techniques; Optimal Cut off	3	MS Excel, R	Prof Mahima
6	Panel Data Regression	Pooled data, 2-period panel data, fixed effects model, random effects model	3	R	Prof Chetan

Curriculum: Module 3

Module 3: Artificial Intelligence, Machine Learning, and Deep Learning					
SI No	Topics	Sub-topics	Number of Sessions	Software	Faculty
1	Introduction to artificial Intelligence	History of AI; Theoretical foundation; Scope of AI; AI Taxonomy	2	Python	Prof Sunil
2	Python for machine learning	Variables and functions; modules and open source resources; datatypes: lists, dictionaries, arrays, dataframes; data manipulation: indexing, slicing, merging, groupby.	6	Python	Prof Sunil
3	Supervised Machine Learning	Introduction to ML; Classifiers vs Regressors; K-NN models; Evaluation of ML models; Comparison of classifiers (K-NN, GNB, DTC, RFC, SVC); Comparison of Regressors.	6	Python	Prof Kalpit
4	Unsupervised Machine Learning	Matrix Algebra and Dimension Reduction; SVD and PCA; Clustering (Hierarchical and k-means Clustering); ARM; Feature Engineering (Manual vs Automated)	6	Python	Prof Kalpit
5	Neural Network	Introduction; Perceptron and Mathematical Foundations of NN; Feedforward Networks; Multilayer Neural Network; Back Propagation (Gradient descent method, Back propagation rules); Termination criteria; Deep neural network (CNN & RNN); Computer Vision	4	Python	Prof Kalpit

Curriculum: Module 4

Module 4: Database Management, Big Data and Social Media Analytics					
SI No	Topics	Sub-topics	Number of Sessions	Software	Faculty
1	Database Management Systems	Data modeling and E-R diagrams; Relational databases; Basic SQL queries; Filtering, sorting, and calculating data; Sub-queries and joins; Data warehousing	6	MySQL	Prof Siddharth
2	Big Data Management	An overview of Big Data and social media analytics; Big Data Characteristics; Systems perspective of managing big data; data lakes; MapReduce; Hadoop Ecosystem; Data Security	2	Python	Prof Sunil
3	Natural Language Processing	Working with text in Python; corpus creation; Regex; NLP pipeline architecture; Information Extraction; Chatbot architecture; Sentiment analysis; Topic modelling	6	Python	Prof Sunil
4	Network Theory and Social Network Analysis	Fundamentals of network theory; measures of centrality; social network analysis; social media analytics	2	Python	Prof Sunil
5	Data Visualization using Tableau and Power BI	Need for data visualization; Basic visualizations in Tableau and PowerBI; Choosing the right visuals; Calculations; Filtering; Dashboards and storytelling	8	Power BI; Tableau	Prof Siddharth

Curriculum: Module 5

Module 5: Prescriptive Analytics					
SI No	Topics	Sub-topics	Number of Sessions	Software	Faculty
1	Introduction to Decision Modelling	Introduction to Mathematical Modelling and Linear Programming. Working with Excel Solver, Graphical Solution Approach and Introduction to Simplex Method	2	MS Excel	Prof Shuvabrata
2	Linear Programming: Formulation and Applications	Applications to Manufacturing, Marketing, Finance, Employee Staffing, etc	3	MS Excel	Prof Shuvabrata
3	Linear Programming: Sensitivity Analysis	Sensitivity Analysis using Excel Solver Reports, Graphical Explanations, Case Studies	2	MS Excel	Prof Shuvabrata
4	Transportation and Assignment Problems	Models and Applications	2	MS Excel	Prof Shuvabrata
5	Integer Programming	Introduction, Models, Applications and Solution Approaches; Introduction to heuristics	4	MS Excel/Open Solver	Prof Shuvabrata
6	Goal Programming	Weighted and Ranked GP approaches, Applications	2	MS Excel	Prof Shuvabrata
7	Decision Analysis	Decision making under Uncertainty and Risk	2	MS Excel	Prof Shuvabrata
8	Simulation Modelling	Monte Carlo Simulation, Applications to Inventory Management, Queuing, Revenue Management, etc	3	MS Excel	Prof Shuvabrata
9	Multi-criteria Decision Making	Topsis, DEMATEL, Interpretive Structural Modelling	4	Excel	Prof Harpreet

Curriculum: Module 6

Module 6.1: Communications and Marketing					
SI No	Topics	Sub-topics	Number of Sessions	Software	Faculty
1	Story telling using Data	Storytelling	1		Prof. Mukesh/Ranjan
		The data-based storytelling process; How to build a data story	2		Prof. Mukesh Kumar
		Visual storytelling; How to deliver a data story	2		Prof. Ranjan Kumar
2	Marketing Analytics and Digital Marketing	Fundamentals of Marketing	1		Prof. Gurbir Singh
		Marketing Mix: 4 Ps & STPs	1		Prof. Gurbir Singh
		Marketing Analytics: Tools and Techniques	1		Prof. Arun Kaushik
		New Product Preference by Conjoint analysis; Perceptual mapping by Multidimensional scaling	2	SPSS	Prof. Arun Kaushik
		Introduction to Digital Marketing	1		Prof. Aswathy Asokan Ajitha
		Digital Marketing: Tools and Techniques	1		Prof. Aswathy Asokan Ajitha

Curriculum: Module 6

Module 6.2: Data Ethics and Security					
SI No	Topics	Sub-topics	Number of Sessions	Software	Faculty
1	Data Ethics and Security		2	-	Prof Nagarajan
Module 6.3: Quantitative Methods and Operations Management					
SI No	Topics	Sub-topics	Number of Sessions	Software	Faculty
1	Introduction to Operations and Supply Chain Management	Supply chain Network and Capacity Planning	2	Excel	Prof Harpreet
2	Operations and Supply Chain Analytics	Vehicle routing and distribution planning	2	Excel	Prof Harpreet
3	Retail Analytics	Data Driven Assortment planning	2	Excel	Prof Harpreet

Curriculum: Module 6

Module 6.4: Finance, Accounting and Control					
Sl No	Topics	Sub-topics	Number of Sessions	Software	Faculty
1	Introduction to Accounting	1) Mechanics of Accounting, meaning and interpretation of Financial Statements; 2) Financial Statements and Decision Making	4		Prof. Pankaj
2	Introduction to Finance	Introduction to financial markets: Financial assets, classification, functions, Time value of money – Present value, future value, discount rate / opportunity cost, discount factor, effect of compounding, Capital budgeting – NPV, IRR and its drawbacks, Payback period, and discounted payback period	4	Excel	Prof. Udayan
3	Financial Analytics	Introduction to Analytics in Banking context, Lifecycle Analytics in Banking and credit cards, Role of Analytics in Risk Management, Addressing market risk, credit risk, liquidity risk and operational risk.	4	R	Prof. Nabendu

Curriculum: Module 6

Module 6.5: Organizational Behaviour and Human Resources					
SI No	Topics	Sub-topics	Number of Sessions	Software	Faculty
1	Introduction to HRM		2		Prof Ravishankar V. Kommu
2	HR Analytics	Recruitment Analytics	1	SPSS	Prof Ravishankar V. Kommu
		Performance Analytics	1	SPSS	Prof Ravishankar V. Kommu
		Diversity Analytics	1	SPSS	Prof Ravishankar V. Kommu
		Turnover Analytics	1	SPSS	Prof Ravishankar V. Kommu

Faculties



Arun Kumar Kaushik
PhD, IIT Roorkee



Aswathy Asokan Ajitha
PhD, IIT Madras & Curtin
University



Chetan Chitre
PhD, IIM Bangalore



Harpreet Kaur
PhD, IIT Delhi



Kalpīt Sharma
Ph.D., IIM Lucknow



Mahima Gupta
PhD, IIM Lucknow



Mukesh Kumar
PhD, Jawaharlal Nehru University



Pavneet Singh
PhD, IIM Ahmedabad

Faculties



Nabendu Paul
PhD, IIM Bangalore



Pankaj Gupta
PhD, IIM Indore



Ranjan Kumar
PhD, IIM Lucknow



Ravishankar V. Kommu
PhD, IIM Calcutta



Udayan Sharma
PhD, IIM Lucknow



Shuvabrata Chakraborty
PhD, IIM Lucknow



Siddharth Gaurav Majhi
PhD, IIM Ranchi



Gurbir Singh
PhD, IIM Indore



Sunil Reddy Kunduru
PhD, IIM Bangalore

Faculties



Dr. Nagarajan Ramamoorthy
PhD, Robert H. Smith School of Business, University of Maryland



THANK
YOU
AND
WISH YOU
ALL THE BEST