# PROPOSAL FOR DIPLOMA IN BUSINESS ANALYTICS (SESSION 2020-21)

Contents: 1. Proposal in Detail 2. Statement of Expected Revenue Generated 3. Scheme of Examination 4. Syllabi of First Semester Courses

MAHARSHI DAYANAND UNIVERSITY
INSTITUTE OF MANAGEMENT STUDIES AND RESEARCH (IMSAR)

# MAHARSHI DYANAND UNIVERSITY
## Institute of Management Studies and Research

### Proposal for Diploma in Business Analytics (Session 2020-21)

| | | |
|---|---|---|
| 1. | **Course Title** | Diploma in Business Analytics for Academic Session 2020-21 |
| 2. | **Nodal Institute** | Institute of Management Studies and Research |
| 3. | **Course Coordinator (Institute/ Individual/s)** | Institute of Management Studies and Research/ Dr. Kuldeep Chaudhary |
| 4. | **Collaborating Deptt/ Institute within University** | |
| 5. | **In partnership** | Industry and Concerned Institutions |
| 6. | **Course Description** | Proposed Course will be of one year duration, divided in two semesters- odd and even of six months each. The Course Contents are as following: <br> Semester I: <br> 1. Business Analytics <br><br> 2. Fundamentals of Data mining <br><br> 3. Predictive Business Analytics <br><br> 4. Practical/Dissertation <br><br><br> Semester II: <br> 1. Applied Multivariate Analysis <br><br> 2. Advanced Statistics with R and Hadoop <br><br> 3. Time series econometrics <br><br> 4. Practical/ Dissertation |
| 7. | **Course Objectives** | The purpose of this Certificate Business Analytics programme is to develop skills and a mind set for participants that will allow them to identify and seize business opportunities using business analytics tools. |

| | | To enable the students to keep pace with changing technological advances. Diploma in Business Analytics program will prepare graduates to leverage the power of Data Analytics onto business trends and predictions, with our unique, industry-relevant curriculum to ensure future success. |
|---|---|---|
| 8. | **Programme Outcome** | The participants will acquire essential skills and knowledge for asking the right questions, addressing it with analysis of the right kind of data, and finally drive the decisions with the insights gained from the analysis to drive decisions<br><br>With increasing complexity of the business problems; limited ability of the human mind to analyze the alternative solutions and the limited time available for decision making will provide synergetic effect to graduates in taking feasible solutions to business problem . |
| 9. | **Duration** | One Year |
| 10 | **Intake and Supernumerary Seats** | Total 40 Seats |
| 11 | **Target Group** | Management and other Students, Management Professionals, Entrepreneurs, Advertising and Media Professionals, Content Developers, Individuals/ Businessmen/ Celebrities/ Social and Political Figures etc. |
| 12 | **Eligibility** | Graduates in any discipline<br>Lateral entry for certificate holder up to three years of registration i.e. the maximum tenure for completing diploma is 3 Yrs. |
| 13 | **Application for Admission** | Online Applications and Admission on Merit of Academic Eligibility in addition to lateral entries with due incorporation of reservation rules of admission framed by university time to time. |
| 14 | **Timings** | Weekdays: Online- 02:00 PM to 04:00 PM<br>Saturdays: Offline- 02:00 PM to 04:00 PM |
| 15 | **Teaching Mode** | Online and offline in blend |
| 16 | **Assessment and Evaluation Mode** | Internal Assessment and End of Semester Theory and Practical/ Viva-Voce  Examinations |
| 17 | **Fee Structure** | Rs. 15000 for first semester & Rs 12000 for $2^{nd}$ Sem |
| 18 | **Any Other** | For a successful run of the proposed programme, the institute requires a wholesome institutional support to develop infrastructural and academic resources in addition to existing set up of the institute.<br>**Expected revenue generation and expenditure statement is attached.** |

**Revenue and Expenditure Estimates of Purposed Diploma in Business Analytics**

| Estimated Revenue Generation from the Course | | | |
|---|---|---|---|
| Course Fee (Rs.) | | Rs 15000 for 1st Semester & Rs 12000 for 2nd Sem Total Rs 27000 | |
| Number of Seats | | ×40 | |
| **Gross Revenue Generated (Rs.)** | | 10,80,000 | **10,80,000** |
| **Estimated Expenditure Involved** | | | |
| Alternative- I (Approx. Amount) | | Alternative- II (Approx. Amount) | |
| Remuneration of Resource Persons-Per Lecture (Rs.) 2000×24 (Weeks)×12 (Lectures) | 5,76,000 | Salary of One Teacher Specialized in Business Analytics (Rs.) 57,700 ×12 (Months) | 6,92,400 | |
| Honorarium of Coordinator (Rs.) 2,000 × 12 (Months) | 24,000 | Honorarium of Coordinator (Rs.) 2,000 × 12 (Months) | 24,000 | |
| **Gross Expenditure Incurred (Rs.)** | 6,00,000 | | 7,16,400 | **600000 or 7,16,400** |
| **Estimated Net Revenue Generated (A-I)** | | | | **4,80,000** |
| **Estimated Net Revenue Generated (A-II)** | | | | **363,600** |

# SCHEME OF EXAMINATIONS FOR
# DIPLOMA IN BUSINESS ANALYTICS
# (SESSION 2020-21)

**First Semester**

| Course Code | Title of the Course (s) | External Marks | Sessional Marks | Practical Marks | Total Marks | Credits |
|---|---|---|---|---|---|---|
| 20CPDM11C1 | Business Analytics | 80 | 20 | | 100 | 4 |
| 20CPDM11C2 | Fundamentals of Data Mining | 80 | 20 | | 100 | 4 |
| 20CPDM11C3 | Predictive Business Analytics | 80 | 20 | | 100 | 4 |
| 20CPDM11C4 | Practical/Dissertation | 100 | | 100 | 200 | 8 |
| | | | | | **Total Credits** | **20** |

**Second Semester**

| Course Code | Title of the Course (s) | External Marks | Sessional Marks | Practical Marks | Total Marks | Credits |
|---|---|---|---|---|---|---|
| 20DPDM12C1 | Applied Multivariate Analysis | 80 | 20 | | 100 | 4 |
| 20DPDM12C2 | Advanced Statistics with R and Hadoop | 80 | 20 | | 100 | 4 |
| 20DPDM12C3 | Time series econometrics | 80 | 20 | | 100 | 4 |
| 20DPDM12C4 | Practical/Dissertation | 100 | | 100 | 200 | 8 |
| | | | | | **Total Credits** | **20** |

**Note**:

1. Internship Report: A candidate has to undergo the 4 Weeks Organizational/ Institutional Training only in the area of Business Analytics as consulted with course coordinator in the end of first semester prior to commencement of end of term theory examinations.
2. Project Report: A candidate has to undergo a Project specifically assigned after due consultation of Project Mentor/ Course Coordinator during second semester prior to commencement of end of term theory examinations.
3. The duration of all the end term theory examinations shall for 3 hours.
4. The Criteria for awarding internal assessment of 20 marks shall be as under:
   a) Sessional Test                         :*10 marks*
   b) Assignments and Presentations   :*5 marks*
   c) Attendance                              :*5 marks*
       Less than 65%                        :*0 marks*

| Upto 70% | :2 *marks* |
| Upto 75% | :3 *marks* |
| Upto 80% | :4 *marks* |
| Above 80% | :5 *marks* |

## Business Analytics

Course Outcomes After completing the course students would be able to:

Course Objective: To think critically in making decisions based on data and deep analytics.

Course Outcomes: Use technical skills in predicative and prescriptive modelling to support business decision-making. To translate data into clear and actionable insights.

### Unit 1
Introduction to Business Analytics
- Evolution, Architecture, Benefits and Future;
- Overview of analytics process – problem definition, data profiling, modeling, evaluation of results;
- Data profiling - Data preparation, exploration and visualization;
- Data Modeling: Relational data modeling – Logical, Physical and Conceptual data models, Need for multidimensional data models in present business context;
- Star, Snowflake and Fact Constellation Schemas;
- OLTP – Introduction, Characteristics, Models;
- OLAP – Introduction, benefits and architecture,
- ETL concepts, Data warehousing

### Unit 2
Descriptive analytics:
- KPI – characteristics, process of defining KPIs,
- KPI based balanced scorecard;
- Dashboards – Features of good dashboards, dashboard design;
- Reports, Querying

Predictive analytics and Data Mining - I:
- Introduction, Need, Evolution, Limitations and Applications;
- Terminology, advantages and limitations of ANN, Decision trees, Association rules, Genetic Algorithms, Fuzzy Logic;

### Unit 3
Predictive analytics and Data Mining - II:
- Clustering – Hierarchical and K means, cluster evaluation, cluster profiling;
- Regression – applications and types of regression techniques;
- Time series analysis

Optimizing business functions using Business Analytics applications
- Marketing and retail analytics,
- Financial analytics
- HR analytics
- Web analytics
- Big data analytics
- Unstructured analytics

Recommended Readings: 1. James R. Evans, Business Analytics, Pearson Education.

2. Davenport, H., Harris J.G. (2007), Competing on Analytics: The New Science of Winning, Harvard Business Review Press.

3. Davenport H., Harris J.G. and Morison R. (2010). Analytics at Work: Smarter Decisions, Better Results, Harvard Business Review Press.

4. Schniederjans M.J., Schniederjans D.G. and Starkey C.M. (2014). Business Analytics Principles, Concepts, and Applications with SAS: What, Why, and How, FT Press Analytics.

5. Provost F., Fawcett T. (2013). Data Science for Business: What you need to know about data mining and data-analytic thinking, O'Reilly Media.

6. Siegel E. (2013). Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die, Wiley.

7. Fitz-enz J. and Mattox J. (2014).Predictive Analytics for Human Resources, Wiley and SAS Business Series.

8. Maisel L. and Gokins G. (2014). Predictive Business Analytics: Forward Looking Capabilities to Improve Business Performance, Wiley.

Instructions for External Examiner: The question paper shall be divided in two sections. Section A shall comprise of eight short answer type questions from whole of the syllabus carrying two marks each, which shall be compulsory. Answer to each question should not exceed 50 words normally. Section B shall comprise 8 questions (2 questions from each unit). The students will be required to attempt four questions selecting one question from each unit. All questions will carry equal marks

# Fundamentals of Data Mining

Objectives of the Course: To describe the concept of Data Mining & its attributes.

Course Outcome:

CO1: Application of the concept of data mining components and techniques in designing data mining systems.

CO2: Solving basic Statistical calculations on Data

CO4: Describing the aspect of data pre-processing

CO5: To explain the concept of Data Cleaning & Integration

## UNIT-I

Introduction to Data Mining: basic concepts in data mining, machine learning, scientific methods, theoretical basis of data mining process, data measurement, exploratory data analysis, data visualization, measurement of data similarity and dissimilarity.

## UNIT-II

Data Pre-processing: overview, data cleaning, data integration, data reduction, data transformation and data discretization; Data Warehouse and Online Analytics Processing: data warehouse, data cube and OLAP, data warehouse design and usage; Data Cube Technology-data cube computation, and its methods.

## UNIT-III

Principles of Data Mining: predictive modelling- classification and regression, model fitting as optimization, evaluation of predictive performance, over fitting, regularization; clustering and pattern detection.

## UNIT-IV

Text Mining: information retrieval and search, text classification, unsupervised learning; Web Data Analysis: Web data- collection and interpretation, analysing user browsing Behaviour, learning from click through data, predictive modelling and online advertising, link analysis and the PageRank algorithm. Social Network Analysis: descriptive analysis of social networks,

network embedding and latent space models, network data over time: dynamics and event-based networks link prediction.

Recommended Readings:

1. Han J., Kamber M., Pei J. Data Mining: Concepts and Techniques, The Morgan Kaufmann Series in Data Management Systems.

2. Pang-Ning Tan, Introduction to Data Mining, Pearson Education.

3. Provost F. Data Science for Business: What you need to know about data mining and data-analytic thinking. O'Reilly Media.

4. Miner G. and Nisbet R. Handbook of Statistical Analysis and Data Mining Applications. Academic Press.

5. Ledolter J. Data Mining and Business Analytics with R .Wiley.

6. Witten I.H. and Frank E. Data Mining: Practical Machine Learning Tools and Techniques, The Morgan Kaufmann Series in Data Management Systems.

7. Dean J. Big Data, Data Mining, and Machine Learning: Value Creation for Business Leaders and Practitioners .Wiley and SAS Business Series.

8. Abu-Mostafa Y.S. and Magdon-Ismail M. Learning from Data.

Instructions for External Examiner: The question paper shall be divided in two sections. Section A shall comprise of eight short answer type questions from whole of the syllabus carrying two marks each, which shall be compulsory. Answer to each question should not exceed 50 words normally. Section B shall comprise 8 questions (2 questions from each unit). The students will be required to attempt four questions selecting one question from each unit. All questions will carry equal marks

## Predictive Business Analytics

Course Objective: To make prediction by analysing data using predictive analytics tools.

Course outcome:

CO1: analyse current and historical facts to make predictions about future, or otherwise unknown, events.

CO2: understand and exploit patterns in historical and transactional data

CO3: identify risks and opportunities.

UNIT-I

Introduction to Predictive Analytics: overview, business intelligence, predictive analytics in relation to business intelligence, statistics, data mining; Big data, importance in decision making; Setting up problem-CRISP-DM, business understanding, Defining data, target variable and measures of success for predictive modelling; Methodology of predictive modelling.

UNIT-II

Prediction Methods: Linear Regression- best subset selection, forward selection, backward selection, step-wise regression, Cp mallows and adjusted R-square criteria; k-Nearest Neighbours (k-NN); Regression TreesCART,CHAID; Neural Nets- architecture of neural nets, neurons, input layer, hidden layers, output layer.

UNIT-III

Classification Methods: the naïve rule, Naïve-Bayes classifier, K-Nearest neighbours, Classification Trees, Neural Nets, Logistic Regression.

UNIT-IV

Non-supervised Learning: Association Rules-support and confidence, the apriori algorithm, the selection of strong rules; Cluster Analysis- hierarchical methods, optimization and the k-means algorithm, similarity measures, other distance measures. Ensemble Methods: Nelson and Granger-Ramanathan methods for continuous targets, Majority voting for categorical targets, Bagging, Boosting.

Recommended Readings:

1. Miller Thomas W. Modelling Techniques in Predictive Analytics with Python and R, Pearson Education.

2. Maisel L. and Cokins G. Predictive Business Analytics: Forward Looking Capabilities to Improve Business Performance. Wiley.

3. Marketing Data Science: Modelling Technique in Predictive Analytics with R and Python, Pearson Education.

4. Siegel E. Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die. Wiley.

5. Bartlett R. A Practitioner's Guide to Business Analytics: Using Data Analysis Tools to Improve Your Organization's Decision Making and Strategy .McGraw-Hill Education.

6. Fitz-enz J. and Mattox II J. Predictive Analytics for Human Resources. Wiley.

7. Abbot D. Applied Predictive Analytics: Principles and Techniques for the Professional Data Analyst; Wiley.

8. Dean J. Big Data, Data Mining, and Machine Learning: Value Creation for Business Leaders and Practitioners .Wiley and SAS Business Series.

Instructions for External Examiner: The question paper shall be divided in two sections. Section A shall comprise of eight short answer type questions from whole of the syllabus carrying two marks each, which shall be compulsory. Answer to each question should not exceed 50 words normally. Section B shall comprise 8 questions (2 questions from each unit). The students will be required to attempt four questions selecting one question from each unit. All questions will carry equal marks

## Time Series Econometrics

Objective of the Course:

To analyze time series data using tools of econometrics.

Course outcome:

CO1: understand the stationary time series models.

CO2: perform forecasting with time series data.

CO3: apply time series techniques to state space models, ARCH and GARCH, multivariate time series.

UNIT-I

Business Forecasting: Business forecasting and planning, Common time series patterns, Types of forecasting methods, Statistical fundamentals for evaluating forecasting.

UNIT-II

Univariate Smoothing Methods: Moving average, weighted moving average, Exponential smoothing, Seasonal indexes, Trend-seasonal and Holt-Winters smoothing.

UNIT-III

Stationary Time Series Models: Stochastic process, Stationarity, Modelling AR, MA, ARM processes, Deterministic and stochastic trends, unit roots, Testing unit roots – Dickey and Fuller, Phillips and Perron tests.

UNIT-IV

Multivariate Models: Intervention analysis, Transfer function models, VAR analysis – Estimation, Identification and the Impulse response function. Long run Models: Cointegration – Eagle-Granger Methodology, Johanson approach, Error correction models, Granger Causality, Exogeniety, Modelling Volatility: ARCH, GARCH, and ARCH-M and EGARCH models.

Recommended Readings: 1. John. E. Hanke, Business Forecasting, Pearson Education.

2. Delurgio Stephen A., Forecasting Principles and Applications, McGraw-Hill.

3. Patterson K.,An Introduction to Applied Econometrics, Palgrave.

4. Enders Walter, Applied Econometrics Time Series, John Wiley.

5. Diehold Francis X., Elements of Forecasting, South Western, Thomson.

6. Spyros G. Makridakis, Steven C. Wheelwright and Rob J. Hyndman, Forecasting Methods and Application, John Wiley.

Instructions for External Examiner: The question paper shall be divided in two sections. Section A shall comprise of eight short answer type questions from whole of the syllabus carrying two marks each, which shall be compulsory. Answer to each question should not exceed 50 words normally. Section B shall comprise 8 questions (2 questions f

# Advanced Statistics with R and Hadoop

**Course Objective: To make use of R in statistics**
**Course outcome:**
CO1: Introduction to Descriptive Statistics,
CO2: Random variables,
CO3: Probability distribution: Discrete distribution – binomial, negative binomial, passion, Continuous distribution – normal distribution;
CO4: Hypothesis testing, ANOVA 1, ANOVA 2

Unit 1
Intro to R:
- Origin of R, R Paradigm, R Inference, R Advantage, R Disadvantages,
- R Coding, R Help, R Statistical Offerings, R Coding Practices, R Work Space,
- Data Exploration - Basic Commands in R, Additional Useful Commands
- Dealing with Lists and Dataframes,
- Import Export from txt, xls & CSV.

Data Manipulation with R:
- Basic Data Manipulation, Additional Functions for Data Manipulation,
- Accessing Elements in R Objects,
- Using By Function, Sub setting Data,
- Using Cut Function,
- Handling Dates in R.

## Unit 2

Visualization in R:
- Introduction to Plots in R,
- Plotting Descriptive Statistics,
- Plotting Variable Relationships,
- Advance Plotting in R, Customizing and Saving the Plots.

Unit 3

Data Exploration and Preparation:
- Data preparation, Dealing with Character Data, Regular Expressions in R,
- Missing Data in R,
- Creating New Variables,
- Variable Transformations,

- Linear Regression,
- Logistic Regression.

Unit 4

Working with R HADOOP:
- Introduction, need, working, uses,
- Focus on the MapReduce,
- Hadoop Streaming,
- Enabling R on Hadoop, R Hadoop Packages.

## Applied Multivariate Analysis

Course Objective: Application of Multivariate analysis in business problem solving

Course outcome:

CO1: understand multivariate data structure, multinomial and multivariate normal distribution

CO2: apply Multivariate analysis of variance (MANOVA) of one and two- way classified data.

UNIT-I Multivariate Analysis: Concept, the variate, Measurement scales, Measurement error, Methodology of Model Building. Multivariate Analysis of Variance: One independent variable at two levels and one dependent variable, two-group MANOVA, Multiple-group MANOVA, MANOVA for two independent variables or factors. Repeated Measure Analysis of Variance: Between-subject and within-subject factors and designs, univariate and multivariate approaches to repeated measure analysis.

UNIT-II

Principal Components Analysis: Geometry of principal components analysis, analytical approach, issues relating to the use of principal components analysis, use of principal components scores. Factor Analysis: Basic concepts and terminology of factor, objectives of factor analysis, geometric view of factor analysis, factor analysis techniques-principal components factoring (PCF), principal axis factoring, and factor analysis versus principal components analysis, factor rotation, and factor scores.

UNIT-III

Discriminant Analysis: Geometric view, analytical approach, classification methods, Fisher's linear discriminant, Mahalanobis distance. Canonical Correlation: Geometry of canonical correlation, analytical approach, canonical variates and the canonical correlation, statistical significance tests for the canonical correlations, interpretation of the canonical variates, practical significance of the canonical correlation. Cluster Analysis: Hierarchical clustering, Non-hierarchical Clustering.

UNIT-IV

Structural Equation Modeling: Path Analysis, Confirmatory Factor Analysis, Structured Means Models.

Recommended Readings:

1. Tabachnick, Using Multivariate Statistics, Pearson Education.

2. Structural Equation Modeling: Path Analysis, Confirmatory Factor Analysis, Structured Means Models.

3. Tinsley, Harward E and Brown Stered D., Handbook of Applied Multivariate Statistical and Mathematical Modelling, Academic Press.

4. Morrison D F., Multivariate Statistical Analysis, McGraw Hill.

5. Overall J E and Klett C., Applied Multivariate Analysis, McGraw Hill.

6. Hair, Anderson, Tatham and Black. Multivariate Data Analysis, Pearson Education.

7. Nargundlar, R., Marketing Research, Tata McGraw Hill. 8. Johnson Richard A and Wichern Dean W., Applied Multivariate Statistical Analysis, Pearson Education

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