

School of Business and Management - CHRIST (Deemed to be University)

Business Analytics Specialization (BOS 2022)

Syllabus

Course Name: FUNDAMENTALS OF BUSINESS ANALYTICS	Course Code: MBA 236
Total number of hours: 30 Hrs	Credits: 3
Course Description: This is a three-credit course offered as a Program Core during the second trimester for all MBA students. This course aims to impart the foundational concepts and skills essential for a future manager to understand and manage data, use data for decision making and present the outputs creatively using data visualization techniques. The course further aims to build an understanding of machine learning and the way it is used by organizations.	
Course Objectives: On having completed this course, the students should be able: <ol style="list-style-type: none">1. To apply the basic concepts of Business Analytics2. To apply the concepts of Machine Learning3. To analyze the implications of Analytics in various functional areas4. To assess data visually using tools5. To evaluate data using simulations through MS-Excel	
Course Learning Outcomes: CLO-1: Identify the basic concepts of Business Analytics CLO-2: Identify the concepts of Machine Learning CLO-3: Analyze the implications of Analytics in various functional areas CLO-4: Assess data using visualization tools CLO-5: Evaluate data using simulations through MS-Excel	
Pedagogy: This course uses multiple pedagogies like interactive lecture, presentations, students' discussions, case analysis, and lab-based sessions in order to facilitate experiential learning.	
Syllabus	
Unit I. Introduction to Business Analytics 5 Hours Definition, Types - Descriptive, Predictive and Prescriptive Analytics, Ethics in data management, Business Analytics for decision making	
Unit II. Introduction to Machine Learning 6 Hours Machine Learning - Definition, Machine Learning workflow, Models - CRISP DM & SEMMA, Types - supervised, unsupervised and reinforcement learning, managerial applications of Machine Learning	
Unit III. Applications of Analytics 4 Hours Applications of Analytics in various functional areas - Finance, Marketing, Human Resources and Operations	

Unit IV. Fundamentals of Business Intelligence and Data Visualization **8 Hours**

Business Intelligence – Concept and architecture, Role and significance in Business, Fundamentals of visualization, Introduction to visualization tool (Tableau), data ingestion, working with visualization tool, dash boarding, story telling

Unit V. Business Modelling using MS-Excel **7 Hours**

functions, formulae, filters and conditional formatting. Pivot tables, Modelling using Multiple linear regression, Introduction to Monte Carlo simulation

Essential references:

1. Seema Acharya, R N Prasad. (2016). *Fundamentals of Business Analytics*. 2e. Wiley.

Recommended references:

1. Ramesh Sharda, Dursun Delen and Efraim Turban (2015). *Business Intelligence and Analytics: Systems for Decision Support*. 10th edition. Pearson
2. Introduction to Business Analytics
https://michael.hahsler.net/SMU/EMIS3309/slides/Evans_Analytics2e_ppt_01.pdf
3. Business Analytics and Decision Making
<https://www.cgma.org/Resources/DownloadableDocuments/business-analytics-briefing.pdf>
4. U Dinesh Kumar. (2017). *Business Analytics: The Science of Data: Driven Decision Making*, Wiley Publications.
5. Wayne Winston (2017). *Microsoft Excel 2016 Data Analysis and Business Modelling*, 5th Edition

Assessment Outline:

Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II	25
3	CIA-III	20
4	End Trimester (Departmental)	30
5	Attendance	05

Course Name: BUSINESS DATA MANAGEMENT	Course Code: MBA 341B
Total number of hours: 30 Hrs	Credits: 3
Course Description: This is a three-credit course offered as a Discipline Specific Elective during third trimester for Business Analytics Specialization students. It is an introductory course on Relational Database Management (RDBMS) concepts. The course includes aspects related to database architecture and creation & querying of data. Various concepts of RDBMS will be delivered through lab sessions.	
Course Objectives: At the end of the course, students should be able:	

1. To identify data and the components of Database Management System
2. To experiment with Database Model with its relationships
3. To discover Data Definition and Manipulation using SQL
4. To evaluate different Databases and its influence in various applications in a global environment
5. To evaluate knowledge of Query Language using SQL

Course Learning Outcomes:

CLO-1: Identify Data, components of Database Management System

CLO-2: Identify relationships in Database models

CLO-3: Examine manipulation methods using SQL along with data definition

CLO-4: Evaluate different databases and investigate challenges and opportunities in global communities

CLO-5: Evaluate knowledge extracted by querying using SQL

Pedagogy: This course uses multiple pedagogies like interactive lectures, lab sessions, student discussions, research articles and case studies.

Syllabus

Unit I. Database Management Systems- Overview (6 Hrs)

Data vs Information, Traditional Processing Systems, Database approach, Types of databases- Personal, Workgroup, Department, Enterprise, Inter-organizational, Virtual Storage, Functions and components of DBMS, Risks and Advantages of DBMS, Roles and Users of DBMS. Database Models, - RDBMS- Comparison between different data models. Database Architecture, Database Schemas- Logical, Conceptual and Physical, Designing Databases.

Unit II. Database Management Design (6 Hrs)

Database design strategies, Database structures- Tables, Views, Index. Logical Design vs Physical Design, Entity Relationship Modelling: Entity, Relationship, Cardinality, Types of Keys, Enhanced ER Design, Normalization and de-normalization, Setting up an RDBMS environment. Introduction to Database Languages: DDL, DML, TCL, DCL.

Unit III. Data Querying and Retrieval (6 Hrs)

Data Definition Language (DDL), Constraints, Integrity constraints, Data Manipulation Language (DML): UPDATE, DELETE, SELECT, Functions and Operators.

Unit IV. Advanced Querying (9 Hrs)

SELECT with Order BY, GROUP BY, Subqueries: Single row, Multi row; Set Operators, JOINS: Inner JOIN, Outer JOIN

Unit V. Database Management-Administration (3 Hrs)

Roles and Responsibilities of Database Administrator, Database Integrity and ACID (Atomicity, Consistency, Isolation and Durability) properties, Transaction Management, Commit and Rollback of Transactions

Emerging Trends: Self Study: Data Centers, Distributed Data Storage, Big Data- Storage and Retrieval, Web, Cloud Databases, Influence of Data Management, - Social-Media, Business, E-Commerce, Retail, Banking etc. Ethics while handling data

Essential Reference:

Cengage eBook support- Database Systems: Design, Implementation, and Management, 12th Edition by Carlos Coronel; Steven Morris (2017)

Recommended References:

A, P. A., Jain, N. R., & Vasgi, B. P. (2021). *Database Management System*. Technical Publications.

Assessment Outline:

Sl.No	Particulars	Weightage
1	CIA- I	20
2	CIA-II(Departmental)	25
3	CIA-III	20
4	ETE(Departmental)	30
5	Attendance	5

Course Name: PROGRAMMING WITH PYTHON	Course Code: MBA342B
Total number of hours: 30	Credits: 3
Course Description: This is a three-credit course offered as a Discipline Specific Elective during third trimester for all Business Analytics Specialization students. Python is a general-purpose programming language which is simple and incredibly readable. The course discusses the fundamental principles of Object-Oriented Programming as well as in-depth data and information processing techniques. The course introduces core programming basics – including data types, control structures, algorithm development and program design with functions – through Python. During this course, students will explore real-world software development challenges while solving practical and contemporary business problems.	
Course Objectives: At the end of the course, students should be able: 1. To identify various data types in python 2. To apply various types of string operations for data processing 3. To utilize functions for efficient programming. 4. To analyze the data using Numpy and Pandas. 5. To apply various data visualisations to capture data characteristics.	
Course Learning Outcomes: On having completed this course student should be able to: CLO-1: Outline Python programs for various scenarios using expressions, text or strings. CLO-2: Construct data structures of various types using Python programs. CLO-3: Construct Python programs for data manipulation using NumPy and Pandas CLO-4: Develop efficient Python programs using functions. CLO-5: Design Python programs to visualize business data using matplotlib, Pandas and seaborn	
Pedagogy: This course uses multiple pedagogies like interactive lecture, hands-on practical sessions, and a project in the form of experiential learning.	
Syllabus Unit I Introduction to Python 3 Hours Programming essentials; data types and expressions – strings, variables, assignment, operators, type conversions; Using functions and modules – arguments and return values; Control statements:	

for loops – count-controlled, augmented assignment, steps; if-else statements – one-way, multiway (elif), logical operators and Boolean expressions; while loops – break, loop logic, errors and testing.

Unit II String Operations and Data Structures

6 Hours

Strings and text files: string concatenation, subscript operator, indexing, slicing a string; string methods, manipulating files and directories; text files: reading/writing text and numbers from/to a file.

Lists: basic list operators, list methods, mutators, aliasing, object identity and structural equivalence; tuples; dictionaries: dictionary literals, adding and removing keys, accessing and replacing values, traversing dictionaries.

Unit III Design with Functions

6 Hours

Overview of Object-oriented programming, pickling, exception handling – the try-except statement. Overview of Functions, Functions as abstraction mechanisms, removing redundancy, hiding complexity; recursive functions; Managing a program's namespace – module variables, parameters and temporary variables; scope, lifetime, named arguments; higher-order functions – Map, Filter & Reduce; anonymous (lambda) functions. Simple student management system using python constructs and files.

Unit IV Data Manipulation using Numpy and Pandas

9 Hours

The NumPy module: ndarrays, array-oriented programming, mathematical and statistical methods, sorting arrays, file input and output with arrays, array slicing using NumPy. The pandas module: pandas data structures – Series, Data Frame, Index objects; indexing, selection and filtering, function application and mapping, sorting and ranking, mathematical and statistical methods, reading and writing data in text formats, data preparation, transformation, wrangling – join, combine, reshape, data aggregation and group operations; string manipulation. Pandas-eval () and query ().

Unit V Data Visualisation

6 Hours

Advanced Plots and charts types (stacked bar chart, area chart, bubble chart, box plot, venn diagram, tree map), The matplotlib package: setting graph attributes, saving plots to files, plot configuration files, plotting with pandas and seaborn. Integrating with other Visualization tools.

Essential Reference:

1. Manaranjan Pradhan, U Dinesh Kumar. (2019) Machine Learning using Python, Wiley
2. Lambert KA., Juneja BL. (2015). Fundamentals of Python. Cengage Learning.

Recommended Reference:

1. McKinney W (2018). Python for Data Analysis. 2nd Edition. O'Reilly Media.

Assessment Outline:

Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II (Departmental)	25
3	CIA-III	20
4	End Trimester (Departmental)	30
5	Attendance	05

Course Name: EXPLORATORY DATA ANALYSIS	Course Code: MBA343B
Total number of hours: 30 Hrs	Credits: 3
Course Description: This is a three-credit course offered as a Discipline Specific Elective during third trimester for all Business Analytics Specialization students. The course enables the students to use the R programming language for performing basic data analysis including data preparation, data manipulation, data visualization, descriptive statistics and statistical modelling.	
Course Objectives: At the end of the course, a student should be able: <ol style="list-style-type: none"> 1. To organize data using R programming 2. To apply analytical techniques using R programming 3. To identify patterns from data. 4. To discover insights from data. 5. To discover principal component analysis 	
Course Learning Outcomes: On having completed this course student should be able to: CLO-1: Demonstrate data preparation using R programming. CLO-2: Illustrate data using R programming to use it for analysis. CLO-3: Infer data graphically using R programming. CLO-4: Outline data using R programming. CLO-5: Interpret principal component analysis using R programming.	
Pedagogy: This course uses multiple pedagogies like interactive lecture, research article, and hands-on sessions in the form of experiential learning.	
Syllabus	
Unit I Introduction to R 3 Hours Importing data into R – text files, Excel, from other statistical software packages, from databases, and from the web, viewing data. Arithmetic with R, Variable assignment, basic data types in R. Vectors, Matrices, Data frames and Lists. Categorical data – factors, discretizing variables.	
Unit II Data Preparation 7.5 Hours Exploring raw data, basic data visualization through graphs, cleaning data, preparing data for analysis – missing and special values, outliers and obvious values. The dplyr package and the tbl class, Selecting and mutating data – joining data with dplyr, filtering and arranging data, Filtering based on factors, summarizing data and the pipe operator, Group_by and working with databases.	
Unit III: Data Exploration 7.5 Hours Exploring categorical data, exploring numerical data, Descriptive Statistics – measures of central tendency and variability. Exploratory Data Analysis using graphs.	
Unit IV Data Visualization 6 Hours Frequency tables and Cross-tabulation.	

Introduction to base graphics in R, different plot types, adding details to plots, managing visual complexity, creating plot arrays.

Advanced plot customization, other graphics systems in R.

The ggplot2 package, Grammar of Graphics, aesthetics, geometries, the qplot() function, statistics in graphs.

Unit V Application of PCA for product analytics

6 Hours

Selection of relevant variables for product analysis

Dimensionality Reduction Techniques- Principal Component Analysis and Factor Analysis, Feature selection using PCA, PCA based regression and Anomaly detection using PCA

Essential references:

1. Wickham H., Golemund G. (2016). R for Data Science: Import, Tidy, Transform, Visualize, and Model Data. O'Reilly Media.

Recommended references:

1. Cotton, R. (2013). Learning R: A Step-by-Step Function Guide to Data Analysis *1st Edition* [Kindle Version]. Retrieved from <http://www.amazon.in>.
2. Knell, R. (2013) Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R. [Kindle Version]. Retrieved from <http://www.amazon.in>.
3. Murray, S. (2013) Learn R in a Day. [Kindle Version]. Retrieved from <http://www.amazon.in>.

Assessment Outline:

Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II (Departmental)	25
3	CIA-III	20
4	ETE (Departmental)	30
5	Attendance	05

Course Name: ARTIFICIAL INTELLIGENCE FOR MANAGERS	Course Code: MBA362B
Total number of hours: 30 Hrs	Credits: 3
Course Description: The origins of Artificial Intelligence (AI) can be traced to the seminal work done by Alan Turing during the World War. Artificial Intelligence has come a long way since then and currently impacts all areas of our lives. Advances in computing power have made the application of brute force to AI feasible, e.g., machine learning. This Generic Elective course in the third trimester provides an insight into Artificial Intelligence, Machine Learning, and Robotic Process Automation (RPA).	

<p>Course Objectives:</p> <p>At the end of the course, a student should be able:</p> <ol style="list-style-type: none"> 1. To Apply the Fundamentals, and Economics of Artificial Intelligence (AI) 2. To Make use of the role of AI systems as agents 3. To Experiment with potential applications suitable for RPA based on domain knowledge 4. To Examine appropriate machine learning and deep learning techniques to solve business problems 5. To Discuss the ethical perspective while developing AI applications
<p>Course Learning Outcomes:</p> <p>CLO-1: Apply the Fundamentals and Economics of Artificial Intelligence (AI)</p> <p>CLO-2: Make use of the role of AI systems as Agents</p> <p>CLO-3: Experiment with potential applications suitable for RPA based on domain knowledge</p> <p>CLO-4: Examine appropriate machine learning and deep learning techniques to solve business problems</p> <p>CLO-5: Discuss the ethical perspective while developing AI applications.</p> <p>Pedagogy: This course uses multiple pedagogies like interactive lectures, student discussions and PPTs, research articles and case studies.</p>
<p>Syllabus</p> <p>Unit I. Introduction to AI (3 Hours) Introduction to AI; History and evolution of AI; Why AI now? Economics of AI: Prediction Machines</p> <p>Unit II. Foundations of AI (4.5 Hours) Intelligent agents; Uninformed search, Heuristic search; adversarial search, game playing</p> <p>Unit III. Robotic Process Automation (4.5 Hours) Robotic Process Automation; Cognitive AI.</p> <p>Unit IV. Machine Learning: (13.5 Hours) Supervised Learning: Basic concepts, Classification; Artificial Neural Networks Unsupervised Learning: Clustering, Association Applications of Deep learning concepts</p> <p>Unit V. Future of AI (4.5 Hours) Future and Ethics of AI.</p> <p>Essential Reference:</p> <p>Taulli, T. (2019). <i>Artificial Intelligence Basics</i>. Apress Agarwal, A., Gans, J. & Goldfarb, A. (2018). <i>Prediction Machines</i>, Harvard Business Review Press.</p> <p>Recommended references:</p> <p>Russell, S., Norvig, P (2010) <i>Artificial Intelligence: A Modern Approach (3rd ed.)</i>. Prentice Hall. Tacker, J. (2020) <i>The Age of AI: Artificial Intelligence and the future of Humanity</i>, Zondervan</p>

Daugherty, Paul R., Wilson, H. J., *Human+Machines Reimagining Work in the Age of AI*

Ertel, W. *Introduction to Artificial Intelligence*. Springer

Assessment Outline:

Sl.No	Particulars	Weightage
1	CIA- I	20
2	CIA-II	25
3	CIA-III	20
4	End Trimester Exam	30
5	Attendance	5

Course Name: BUSINESS FORECASTING	Course Code: MBA4xxB
Total number of hours: 30	Credits: 3
Course Description: Business Forecasting is offered as a Discipline Specific Elective course offered in the fourth trimester for BA Specialization students. This course introduces advanced forecasting models that enable students to apply such models to business problems. The course is designed to provide students with the understanding of forecasting in various business domains. The course introduces various quantitative methods along with hands-on exercise and real-life problems where students can apply these models for analysing data from various business domains.	
Course Objectives: At the end of the course, the students will be able: <ol style="list-style-type: none"> 1. To compare various types of forecasting 2. To identify data patterns 3. To contrast the various approaches to forecasting 4. To evaluate models using various measures 5. To elaborate the implications of forecasting on decision making 	
Course Learning Outcomes: CLO-1: Outline various types of Forecasting CLO-2: Identify Data Patterns to set up forecasting methods CLO-3: Contrast the cross-sectional and time series approaches to Forecasting CLO-4: Evaluate models using various performance measures CLO-5: Elaborate the implications of forecasting on decision making	
Pedagogy: Lecture, case study methodology and conceptual explanations including hands-on lab sessions based on tools.	
Syllabus	
Unit I Introduction to Forecasting 3 Hours Significance of Forecasting, History of Forecasting, Types of Forecasting, Forecasting process.	
Unit II Time Series Methods 7.5 Hours Random Walk, Autocorrelation, Smoothing Methods, Holt-Winter Methods, Time Series Components, Stationarity, Additive & Multiplicative Models, MA, AR, ARIMA, lead-lag indicators, Box-Jenkins Methodology, Durbin Watson Test, Application of Time Series modelling to Decision Making	
Unit III Time Series Models of Heteroscedasticity 7.5 Hours	

Measuring Volatility of Financial Time Series, Volatility Clustering, ARCH and GARCH models, Application to Decision Making

Unit IV Artificial Neural Networks

6 Hours

Introduction, Structure of ANNs, Types of Layers, Multi-layer Perceptron, Back Propagation, Model Training, Lab session using a software tool

Unit V Deep Learning Models

6 Hours

Need for Deep Learning, Regularization, Optimization for Training Deep Models, Overview of Deep Learning frameworks, Introduction to CNNs, RNNs and LSTMs.

Essential Reference:

1. Hanke, J.E. and Wichern D., Business Forecasting, 9th edition, Pearson, 2015
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press
Francois Chollet, Deep Learning with Python.

Recommended References:

3. U Dinesh Kumar (2017), Business Analytics: The Science of Data - Driven Decision Making, WILEY
4. Gujarati, DN and Porter DC, Basic Econometrics, 5th edition, McGraw-Hill, 2009
5. Greene WH. Econometric Analysis, 7th Edition, Pearson Education, 2010
6. Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L., Multivariate data analysis, 7th edition, Prenticehall, 1998

Assessment Outline:

Sl No	Particulars	Weightage
1	CIA-I	20
2	CIA-II (Departmental)	25
3	CIA-III	20
4	ETE (Departmental)	30
4	Attendance	05

Course Name: MACHINE LEARNING ALGORITHMS - 1	Course Code: MBA442B
Total number of hours: 30 Hrs	Credits: 3
Course Description: This is a three-credit course offered as a Discipline Specific Elective during fourth trimester for all Business Analytics Specialization students. This course provides the core knowledge and skills needed in the area of Machine Learning Algorithms. Businesses today accumulate large amounts of data through their transaction processing systems and social networks. There is tremendous potential in such data to extract vital information for better business decision making.	
Course Objectives: At the end of the course, students would be able to	

1. Make use of R programming skills for data exploration 2. Experiment with Machine Learning Algorithms 3. Examine business problems using Machine learning algorithms 4. Compare classification and prediction models in the real-world scenario 5. Appraise business problem using Machine Learning Algorithms	
Course Learning Outcomes: By the end of the course, the students should be able to: CLO-1: Apply exploratory analysis of the data using R programming CLO-2: Identify the significance of supervised machine learning algorithms CLO-3: Analyze business problems using supervised machine learning algorithms CLO-4: Recommend appropriate analytical models of classification and prediction for real-time business scenarios using R programming CLO-5: Explain feasible solutions for real- life business problems under investigation	
Pedagogy: This course uses multiple pedagogies like interactive lecture, research article, and hands-on sessions in the form of experiential learning.	
Syllabus	
Unit I Machine Learning Algorithm for Decision Making	3 Hours
Introduction to Machine Learning Algorithms, Supervised and Unsupervised learning, Use of Machine Learning for customer churning, prediction, segmentation. Issues in Prediction and Ethics in Machine Learning*	
Unit II Sales and Revenue prediction	6 Hours
Using Simple and Multiple Linear Regression, step wise regression, forward and backward methods, Model building, Model Validation and residual analysis. Economic significance, Marketing action on regression outputs	
Unit III Defaulter prediction in Banking	6 Hours
Using Logistic Regression and Discriminant analysis for fraud detection of customers in banking sector. Model estimation, Binary logit and multinomial models. Concept of Discriminant analysis, fisher function, fitting the model, validation of the model fit and model performance assessment. Economic significance, Marketing action on regression outputs	
Unit IV Attrition prediction	7.5 Hours
Using Classification Trees for Segmentation, Identification of strategies in Human Resources Concept, Introduction to Decision trees and random forest, Concept of Partitioning, Data pre-processing, Model training, Model building in R, Model comparison, parameter tuning.	
Unit V Fraud detection in Finance	7.5 Hours
Customer classification problem in Finance for fraud detection Using SVM and KNN Introduction, Hyper plane, Maximal Margin Classifier, Soft Margin Classifier, Kernels, Model building in R Introduction to the concept of K-Nearest neighbour , application and prediction using the model	

Essential references:

1. U Dinesh Kumar (2017), Business Analytics: The Science of Data - Driven Decision Making, Wileys

Recommended references:

1. Turban, E., Aronson, J. E., Liang, T.-P., & Sharda, R. (2010). *Decision support and business intelligence systems* (9th ed., p. 720). Prentice-Hall.
2. Berson, A., Smith, S. J., & F. (1997). *Data Warehousing, Data Mining and OLAP* (1st ed., p. 640). Computing McGraw-Hill.
3. Han, J., & Kamber, M. (2000). *Data Mining: Concepts and Techniques* (1st ed., p. 550). Morgan Kaufmann
4. Shmueli, G., Patel, N. R., & Bruce, P. C. (2008). *Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner* (2nd ed., p. 428). Wileys

Assessment Outline:

Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II (Departmental)	25
3	CIA-III	20
4	End Trimester (Departmental)	30
5	Attendance	05

Course Name: BUSINESS INTELLIGENCE AND DATA VISUALIZATION**Course Code: MBA 443B****Total number of hours: 30 Hrs****Credits: 3****Course Description:**

This is a three-credit course offered as a Discipline Specific Elective during the fourth trimester for all Business Analytics Specialization students. Students learn about the various sources of data and the need to draw meaningful business insights from its explosive growth. The process of transforming transaction data into analytical data through ETL modelling is discussed.

A message which cannot be conveyed through a large set of texts can be presented through visual imagery. The course includes hands-on exposure to visualization tools. The course would help the students to quickly examine large amounts of data, visualize trends and issues efficiently and influence decision making.

It is expected that the students who take up this course will have basic understanding about fundamentals of databases, RDBMS concepts and Entity Relationship modelling.

Course Objectives:

At the end of the course, students should be able:

<ol style="list-style-type: none"> 1. To make use of data by imbibing a culture of data-driven decision making in organizations. 2. Apply the fundamentals of Data warehousing using ETL model. 3. Examine queries, reports from OLAP cubes using a Business Intelligence Tool. 4. Analyze data in an appropriate visual form by using visualization tools. 5. Deduct an effective story from a given set of data by designing dashboards. 	
Course Learning Outcomes: CLO-1: Identify the value of data through data- driven decision making. CLO-2: Apply the fundamentals of Data warehousing using ETL model. CLO-3: Discover queries, reports from OLAP cubes using Business Intelligence tool. CLO-4: Inspect data in visual form by using tools. CLO-5: Deduct an effective story from a given set of data using dashboards.	
Pedagogy: This course uses multiple pedagogies like interactive lectures, Case and article analysis, hands-on sessions and creating applications using relevant tools.	
Syllabus	
Unit I Introduction to Business Intelligence	5 Hours
Terminology, Evolution of BI, OLAP vs OLTP, OLAP basics, Data models for OLAP, ERP and BI, Popular BI tools, Use of Excel for BI (Pivot table)	
Unit II Online Analytical Processing	6 Hours
Dimensions, Cubes, Measures, Drill-down, Roll-up, Slice-and-dice, MOLAP, ROLAP, HOLAP, Building an OLAP cube**	
Application of BI, Users of BI, BI for advanced reporting	
Unit III BI and Data warehouse Concepts	6 Hours
Data Warehouse Need, Definition and Characteristics, Types of data sources, ETL, Multidimensional data modelling, Entity Relationship & Multidimensional modelling, Star and Snowflake schemas Data marts, Top-down and Bottom-up approaches to DW architecture, BI and DW implementation issues, Data quality, Data auditing.	
Unit IV Data Visualization through Tableau	9 Hours
Purpose of data visualization, guiding principles - Good & Bad representation, Use of colour & scales, Types of charts, relevant use of charts for various scenarios	
Creating a plot, Histograms, Line charts, Bar charts, Pie charts, Box plots, Scatter plots	
Concepts, KPIs, Visual representation, Using BI for building dashboards, business metrics, scorecards, Interactive dashboards, Story-telling through dashboards	
Unit V Advanced Topics in Business Intelligence	4 Hours
Cloud computing, SaaS model, Big Data & Hadoop Distributed File System, Mobile BI, Socialmedia, Intelligence from Social networks, Latest trends in BI, Ethical aspects of Business Intelligence.	

Essential Reference:

Prasad, R. N., & Acharya, S. (2016). *Fundamentals of Business Analytics* (1st ed., p. 348). Wiley India.

Recommended References

Soukup, T., & Davidson, I. (2002). *Visual Data Mining* (First ed.). New Delhi: Wiley dreamtech India Pvt. Ltd.

Turban, E., Aronson, J. E., Liang, T.-P., & Sharda, R. (2010) *Decision support and business intelligence systems* (9th ed., p. 720). Prentice-Hall.

Assessment Outline:

Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II (Departmental)	25
3	CIA-III	20
4	ETE (Departmental)	30
5	Attendance	05

Course Name: MANAGERIAL APPLICATIONS OF ANALYTICS	Course Code: MBA 462B
Total number of hours: 30 Hrs	Credits: 3
Course Description: This is a three-credit course offered as a Generic Elective during the fourth trimester for MBA students. The course demonstrates how analytics as a horizontal can cut across many verticals called domains or functional areas. In this course, students get exposed to applications of analytics in business domains like Marketing, Finance, Human Resources and Operations. This course also enables students to be well conversant with domain specific analytical concepts.	
Course Objectives: On having completed the course, the students will be able to: <ol style="list-style-type: none"> 1. To apply the linkages between Marketing function and Analytics 2. To apply the linkages between linkages between Finance function and Analytics 3. To analyse the workflows in operations from an analytics perspective 4. To examine the role of analytics in HRM processes 5. To discover the role of analytics in different domains for solving business problems 	
Course Learning Outcomes: CLO-1: Apply the conceptual framework to establish linkages between Marketing function and Analytics CLO-2: Apply the conceptual framework to establish linkages between Finance function and Analytics	

CLO-3: Analyze the analytical opportunities in the workflows		
CLO-4: Examine the role of analytics in Human capital management		
CLO-5: Discover the role of analytics in multiple domains to solve business problems		
Pedagogy: This course follows case study-based pedagogy. Concepts of various domains are driven through real life case studies.		
Syllabus		
Unit I. Analytics in Marketing		7 Hours
Basics of Marketing Management, High level Framework to understand the marketing function – A context diagram depicting high level process flow and parties involved in marketing function Key Performance Indicators/Drivers of marketing function, Baseline and Benchmark KPI's. Application of analytics in marketing function with regard to market segmentation, customer profiles, market-mix models, customer analytics, customer churn, Recency, Frequency and Monetary analysis, social media and optimization of marketing budget and spend.		
Unit II. Analytics in Finance		7 Hours
Basics of Financial Management, High level Framework to understand the Finance function – A context diagram depicting high level process flow and parties involved in Finance function Key Performance Indicators/Drivers of Finance function, Baseline and Benchmark KPI's, Application of analytics in finance function with regard to stock market, high frequency trading, sentiments, working capital, ratios, decision making, business valuation and financial fraud.		
Unit III. Analytics in Operations		6 Hours
Basics of Operations Management. Inventory control. Using analytics in Manufacturing and Service Operations		
Unit IV. Analytics in Human Resource Management		4 Hours
Basics of HR Management, High level Framework to understand the HR function – A context diagram depicting high level process flow and parties involved in HR function, Key Performance Indicators/Drivers of HR function, Baseline and Benchmark KPI's, Application of analytics in human resource function with regard employee attrition, employee retention, workforce analysis, core and non-core activity analysis, capacity planning and resource optimization, skill analysis using association mining techniques, demand sensing and planning and channel analytics.		
Unit V. Application of Analytics in Domains		6 Hours
Use of analytics in different domains such as Supply Chain Management, Healthcare, Medicine, Entertainment, Telecommunication, Aviation, Military, Hospitality, Education, Insurance, E-Retail, Manufacturing, Agriculture, Sustainable Development, Internet of Things (IoT).		
Assessment Outline:		
Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II	25
3	CIA-III	20

4	End Trimester Exam	30	
5	Attendance	05	

Course Name: BIG DATA ANALYTICS	Course Code: MBA541B
Total number of hours: 30 Hrs	Credits: 3
Course Description: This is a Discipline Specific Elective course offered to the Business Analytics students in their fifth trimester. The course encompasses fundamentals of Big Data, Big Data architecture and Big Data ecosystem and basics of Cloud Computing. By the end of the course, students will be able to independently work on Big Data platforms spanning different domains.	
Course Objectives: At the end of the course, a student should be able: <ol style="list-style-type: none"> 1. To identify the significance of big data concepts and its eco system. 2. To apply the big data distributed computing techniques. 3. To contrast between Traditional and Big Data Processing 4. To analyse big data models 5. To assess the business use cases of Big Data Analytics 	
Course Learning Outcomes: CLO-1: Identify the significance of big data concepts and its eco system CLO-2: Apply the big data distributed computing techniques. CLO-3: Contrast between Traditional and Big Data Processing CLO-4: Analyze big data models CLO-5: Assess the business use cases of Big Data Analytics	
Pedagogy: This course uses multiple pedagogies like interactive lectures, student discussions lab sessions, research articles and case studies.	
Syllabus Unit I. Introduction to Big Data Ecosystem (3 Hrs) Importance of Big Data, Description of open-source Hadoop ecosystem and its near-term future directions, Major challenges of data, contribution of growth of interconnected devices to Big Data, Types of Big Data, Evolution from Traditional Data processing to Big Data Processing Unit II. Big Data Ecosystem - I (5 Hrs) Introduction to Apache Hadoop and its ecosystem – HDFS, YARN, MapReduce. Hortonworks Data Platform (HDP), Apache Ambari Unit III. Big Data Ecosystem – II (8 Hrs) Apache Spark – the general-purpose distributed computing engine, security and data governance, Stream computing Unit IV. Big SQL (9 Hrs) Db2 Big SQL, Data access in HDFS, Create and run queries in Db2 Big SQL server Introduction to IBM Watson Studio, Analyze data using Watson Studio Unit V. Applications of Big Data (5 Hrs) Big Data applications in cloud, Big Data Analytics in Healthcare, Big Data Analytics in Ecommerce, Big Data Analytics in Social Media, Big Data Analytics in Multimedia, Bigdata in Mobile Communications. Ethics of Big Data in Cyber Security	

Essential references:

1. Seema Acharya and Subhashini Chellappa. Big Data and Analytics. 1st Edition. Wiley (2019)
2. IBM Course material

Recommended references:

1. Radha Shanthamani, M Vijayalakshmi. Big Data Analytics. 2nd Edition. Wiley (2016)
2. Karau, H., Konwinski, A., Wendell, P., & Zaharia, M. (2015). *Learning Spark*. Sebastopol, California, United States: O'Reilly.

Assessment Outline:

Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II (Departmental)	25
3	CIA-III	20
4	ETE (Departmental)	30
5	Attendance	5

Course Name: MACHINE LEARNING ALGORITHMS - 2	Course Code: MBA542B
Total number of hours: 30 Hrs	Credits: 3
Course Description: This is a three-credit course offered as a Discipline Specific Elective during fifth trimester for Business Analytics Specialization students. The course encompasses fundamental concepts behind neural networks, clustering and association mining techniques predominantly segmentation and profiling models. By the end of the course, the students would be able to independently work on these models to address varied business problems.	
Course Objectives: At the end of the course, students would be able to <ol style="list-style-type: none"> 1. To Make use of R programming skills for model building 2. Experiment Machine Learning Algorithms 3. Examine business problems using Machine learning algorithms 4. Compare different Machine Learning Algorithms in the real-world scenario 5. Appraise business problems using Machine Learning Algorithms 	
Course Learning Outcomes: At the end of the course, students should be able to: CLO-1: Perform classification and predictive analysis of the data CLO-2: To understand and apply un-supervised machine learning algorithms to solve various business problems	

CLO-3: Design and develop appropriate analytical models of classification and prediction for real-time business scenarios	
CLO-4: Analyze and interpret the data for real life business problems using various algorithms	
CLO-5: Propose feasible solutions for real life business problems under investigation	
Pedagogy: This course uses multiple pedagogies like interactive lecture, research article, and hands-on sessions in the form of experiential learning.	
Syllabus	
Unit I Customer segmentation	6 Hours
Introduction to cluster analysis- Hierarchical methods, Introduction to hierarchical and partitioning clustering, process of hierarchical and partitioning clustering, different types of hierarchical clustering methods, Non-hierarchical methods, Partitioning methods in cluster analysis- K-means clustering.	
Unit II Market Basket Analysis	6 Hours
Introduction to association mining techniques, product recommendation in retail market, introduction to Market Basket Analysis (MBA), creating and exploring dataset, Item frequency plot, support, lift and confidence measures and their interpretations and Apriori Algorithms. Introduction to recommender lab.	
Unit III RFM Model	6 Hours
Customer segmentation using RFM analysis	
RFM Analysis, calculation of RFM score, visualization and segmentation	
Unit IV Introduction to optimization	6 Hours
Introduction to optimization techniques and application using Marketing Mix Modelling	
Unit V Case studies on optimization	6 Hours
A case study approach to Optimization in Marketing, Operations and Supply chain	
[Total - 30 Hours]	
Essential References:	
U Dinesh Kumar (2017), Business Analytics: The Science of Data - Driven Decision Making, WILEY	
Recommended References:	
<ol style="list-style-type: none"> 1. Applied Multivariate Statistical Analysis by Richard A. Johnson, Dean W. Wichern, PHI Learning 2. Data analysis and graphics with R by Robert Kabacoff 3. Practical Data Science with R by Nina Zumel and John Mount 4. Multivariate Data Analysis by Hair Black Babin Anderson Tatham, Pearson publication 5. Shmueli, G., Patel, N. R., & Bruce, P. C. (2008). Data Mining for Business Intelligence: 6. Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner (2nd ed., p. 428). WILEY 	
Assessment outline:	

Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II (Departmental)	25
3	CIA-III	20
4	End Trimester (Departmental)	30
5	Attendance	05

Course Name: Deep Learning	Course Code: MBA 543B
Total number of hours: 30 Hours	Credits: 3
Course Description: The course is offered as a Discipline Specific Elective during the fifth trimester for Business Analytics Specialization students. The course focuses on the foundations of Deep Learning and its applications in various domains as it is one of the most highly sought-after skills in AI.	
Course Objectives: At the end of the course the students will be able to: <ol style="list-style-type: none"> 1. Make use of Neural Network concepts for Deep Learning. 2. Identify the deep learning frameworks and models. 3. Analyse data using CNN. 4. Analyse data using RNN. 5. Recommend a Deep Learning model in a selected domain. 	
Course Learning Outcomes: On having completed this course student should be able to: CLO-1: Understand the essentials of Neural Network. CLO-2: Comprehend the working of deep learning models and its framework. using Deep Learning Programming Framework. CLO-3: Apply CNN using Deep Learning Programming Framework. CLO-4: Apply RNN using Deep Learning Programming Framework. CLO-5: Discuss applications of Deep Learning Models in various domains.	
Pedagogy: This course uses multiple pedagogies like interactive lectures, Case and article analysis and Hands-on approach.	
Syllabus Unit I Introduction to Neural Networks (8 Hours) Structure of Neuron, Network Architecture, Perceptron and its types, Linear and Non-Linear Problems, Activations Functions, Supervised Learning with Neural Networks, Gradient Descent, Vanishing Gradient, Feed forward Neural Networks, Back Propagation Algorithm. Unit II Introduction to Deep Learning (6 Hours) Need for Deep Learning, Deep Feedforward Networks, Regularization, Optimization for Training Deep Models, Overview of Deep Learning frameworks, Introduction to Deep Learning Programming Framework. Unit III Convolutional Neural Network (5 Hours) Convolution Operation, Pooling, Variants of Basic Convolution Functions, CNN, Application of CNN.	

Unit IV Recurrent Neural Network (5 Hours)
Understanding the simple recurrent unit (Elman unit), Recurrent and Fully Recurrent Neural Network, Application of RNN.

Unit V Applications of Deep Learning (6 Hours)
Applications of Deep Learning Models different domains like Computer Vision, Natural Language Processing, Speech Recognition with case studies, Future of Deep Learning.

Essential references:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press
2. Francois Chollet, Deep Learning with Python.

Recommended references:

3. Suresh Samudrala Machine Intelligence: Demystifying Machine Learning, Neural Networks and Deep Learning, Notion press.
4. Simon Haykin, Networks and Learning Machines, Pearson.

Assessment Outline:

Sl.No	Particulars	Weightage
1	CIA- I	20
2	CIA-II	25
3	CIA-III	20
4	End Trimester Exam	30
5	Attendance	05

Course Name: TEXT AND SOCIAL MEDIA ANALYTICS	Course Code: MBA 544B
Total number of hours: 30 Hours	Credits: 3
<p>Course Description: This is a three-credit course offered as a Discipline Specific Elective during the fifth trimester for Business Analytics Specialization students. The course introduces the students to the basic and intermediate levels of text and social media analytics. The coverage includes (a) basics of language processing, use of machine learning to analyze text and social media data, sentiment analysis, and, (b) the use of common software tools to carry out text, social media, and social network analysis.</p>	
<p>Course Objectives:</p> <p>At the end of the course the students will be able:</p> <ol style="list-style-type: none"> 1. To identify the applications of Natural Language Processing. 2. To experiment with various text pre-processing techniques. 3. To discover relevant topics using Topic Modeling approach. 4. To interpret sentiments using Sentiment analysis for effective decision making. 5. To design social network analysis for business decision making. 	
<p>Course Learning Outcomes: On having completed this course student should be able to:</p> <p>CLO-1: Demonstrate the applications of Natural Language Processing using Python programming.</p> <p>CLO-2: Measure text similarity with the purpose of clustering words and sentences.</p> <p>CLO-3: Determine sentiment from text reviews using Python programming.</p> <p>CLO-4: Analyze social media data and networks.</p>	

CLO-5: Develop Python programs for case scenarios involving text and social media data.	
Pedagogy: This course uses multiple pedagogies like interactive lecture, HBR case and article analysis, and a project in the form of experiential learning.	
Syllabus	
Unit I Natural Language Processing (NLP)	3 Hours
Natural language; text corpora and lexical resources.	
Introduction to NLP, overview of the applications: semantic analysis – question answering systems including chatbots; contextual recognition including coreference resolution, speech recognition, word sense disambiguation, named entity recognition (NER); text summarization including topic modelling; text classification including feature extraction and sentiment analysis. Ethical practices in handling data.	
Unit II Text Pre-processing, Similarity and Clustering	6 Hours
Text pre-processing: tokenization – sentence and word tokenization; normalization – cleaning text, removal of special characters and stop words, stemming, lemmatization; parts of speech (PoS) tagging – utility of ngrams.	
Text similarity: Information retrieval; feature extraction – Bag of Words, TF-IDF, and word2vec models; term and document similarity; similarity measures – cosine similarity, Jaccard similarity and Levenshtein distance; Document clustering using k-means clustering, hierarchical clustering and affinity propagation.	
Unit III Sentiment Analysis	6 Hours
Introduction to Data Acquisition and Extraction: Web Scraping, Defining the sentiment analysis problem – objective and tasks; understanding affect, emotion, mood, and opinion; setting up dependencies; preparing the data for analysis; supervised machine learning using SVM; unsupervised lexicon-based techniques; model performance evaluation.	
Unit IV Social Media Analytics	9 Hours
Introduction; social media and social media networks; social media data – structured and unstructured data. Applications.	
Data analysis and visualization: Collecting and extracting social media data; statistical analysis of data – key metrics like CTR, number of views, CPM; extracting useful patterns; social network analysis; creating network graphs; node importance – key influencers; modelling network dynamics and growth.	
Unit V Case Studies	6 Hours
Natural language processing and sentiment analysis of customer reviews.	
Social media network analysis of Facebook data.	
Sentiment analysis of Twitter data with a specific reference to the ethics of using social media data.	
Essential references:	
1.Dipanjan Sarkar: Text Analytics with Python: A Practitioner's Guide to Natural Language Processing 2nd Edition. Apress (2019).	

2. Marco Bonzanini: Mastering Social Media Mining with Python. 1st edition. Packt Publishing (2016).

Recommended references:

1. Steven Struhl: Practical Text Analytics: Interpreting Text and Unstructured Data for Business Intelligence. 1st edition. Kogun Page (2015).

2. Bing Liu: Sentiment Analysis: Mining Opinions, Sentiments, and Emotions. 1st edition. Cambridge University Press (2015).

Assessment Outline:

Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II (Departmental)	25
3	CIA-III	20
4	End Trimester (Departmental)	30
5	Attendance	05

Course Name: BUSINESS PROBLEM FRAMING	Course Code: MBA561B
Total number of hours: 30 Hrs	Credits: 3
Course Description: This is a three-credit course offered as a Generic Elective during fifth trimester for MBA students. The course aims at sensitizing the students on the need for structuring unstructured business problems using general management tools. The likelihood of success of efforts aimed at solving a problem depends on how well a problem is framed and how well it is communicated. This is even more pertinent in today's dynamic business environment with an information overload. It is therefore important that students, as future managers, learn to think critically and apply this learning to approach problems from many perspectives. The course draws exercises and cases from various functional domains and industries.	
Course Objectives: At the end of the course, students should be able to: <ol style="list-style-type: none">1. Identify the need for business problem framing from design thinking perspective2. Apply appropriate management tools to business problem framing, and decision making under uncertainties3. Analyze the business problem with right business problem framing through data and management framework4. Evaluate industry trends and their impact on problem framing from global perspective5. Measure the effectiveness of the business problem in achieving the business goals and overall strategies	
Course Learning Outcomes: CLO-1: Identify the need for business problem framing CLO-2: Apply various management tools to business problems framing and solutioning CLO-3: Analyze the business problem with right business problem framing with prior estimates CLO-4: Evaluate the relevant industry trends and their impact on business problem framing from global perspective CLO-5: Measure the effectiveness of the business problem framing in achieving the business goals and overall strategies from global perspective	

Pedagogy: This course uses both theoretical and hands-on approach to deliver the concept of Problem Framing and Solving. The pedagogy includes case studies, hands-on sessions and discussions.

Syllabus

Unit I Problem Framing and Solving: an overview

4 Hours

Introduction to problem framing and problem solving in managerial decision making. Need for critical thinking and creative solutions to problems in a business organization. Problem framing skills of a business manager in the enhancement of business potential. Introduction to Design Thinking and Design Thinking Process. Application of Design Thinking in achieving path-breaking solutions.

Unit II Multi Framing and Scenario Planning

10 Hours

Dealing with uncertainties, demonstration through probabilistic reasoning and Bayesian Belief models, examples through propensity models from marketing and finance domains. Multi framing as a tool for identifying a problem and outlining what an acceptable resolution might look like, The Reframing Matrix, Using Decision Trees for decision making under uncertainty, Scenario Planning & What-If Analysis for creating scenarios, sensitivity analysis of sales, interest, profit and breakeven analysis.

Unit III Using Information for Problem Framing & Solving

8 Hours

Using estimates, forecasts, information and prior decisions for problem framing and solving, Role of experts in problem framing. The Analytics framework for Problem Solving. McKinsey's 8 step framework for problem solving. Introduction to Theory of constraints (ToC) process and demonstration example from lean manufacturing.

Unit IV Trends: What they are, how to use them

4 Hours

Understanding trends, events and their relationships in a company's environment, Trends and their impact of problem framing. The confluence of trends and its cross impact in decision making, can ignoring the "explicit" trends help organizations think creatively?

Unit V Trade-offs, Red Teaming & The Psychology of Problem Framing

4 Hours

Factors driving trade-off decisions with a particular reference to emerging markets, Red-Teaming: How to think like the enemy, the psychology of Problem Framing- Narrow Bracketing – risk taking, overconfidence, Reference points – risk taking, value, loss aversion, The liability of "newness."

Recommended references:

1. Thomas Wedell-Wedellsborg (2020) What's Your Problem? Harvard Business Review Press
2. Paul Bracken (2008) "How to Build a Warning System" Managing Strategic Surprise (Cambridge University Press)

Assessment Outline:

Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II (Departmental)	25
3	CIA-III	20
4	End Trimester Exam	30
5	Attendance	05

Course Name: CLOUD COMPUTING AND INTERNET OF THINGS	Course Code: MBA 641B
Total number of hours: 30 Hrs	Credits: 3
Course Description: This is a three-credit course offered as a Discipline Specific Elective during the sixth trimester for Business Analytics Specialization students. It provides the ground-up coverage on the high-level concepts of cloud and IOT landscape, architectural principles, techniques, design patterns, security challenges and real-world practices.	
Course Objectives: At the end of the course, students should be able: <ol style="list-style-type: none"> 1. To identify the essentials of Cloud computing. 2. To discover various cloud architectures. 3. To examine Internet of Things (IOT) architecture. 4. To compare security issues in Cloud and IOT. 5. To recommend a business application using IOT and Cloud. 	
Course Learning Outcomes: CLO-1: Identify the essentials of Cloud computing. CLO-2: Discover various cloud architectures. CLO-3: Examine Internet of Things (IOT) architecture. CLO-4: Compare security issues in Cloud and IOT. CLO-5: Recommend a business application using IOT and Cloud.	
Pedagogy: This course uses multiple pedagogies like interactive lecture, presentations and case studies.	
Syllabus Unit I. Cloud Computing Fundamentals 6 Hours Introduction to Cloud Computing, Basic Concepts, Evolution of Cloud Computing Unit II. Cloud Platform Architecture and Virtualization 6 Hours Cloud platform architecture, Deployment Models, Service Models. Basics of Virtual Machines - Hypervisor. Types of Hardware Virtualization, virtualization of CPU, Memory and I/O devices. Unit III. Internet of Things 6 Hours IoT Architecture, Devices and Sensors, IoT communication and protocols, IIOT Unit IV. Cloud &IoT Security 6 Hours Cloud Computing Security Architecture, Cloud Infrastructure security. Security and Privacy for IoT/Cloud Computing	

Unit V. Application of IoT and Cloud**6 Hours**

IoT and cloud integration, Application development and cloud processing using AMAZON Web Services, AZURE Cloud Services.

Essential references:

1. Virtualization: A Beginners Guide, Danielle Ruest, Nelson Ruest, — McGraw-Hill Osborne Media, 2009.
2. Cloud Security A Comprehensive Guide to Secure Cloud Computing Ronald L. Krutz Russell Dean Vines
3. Cloud Computing: A Practical Approach Anthony T. Velte Toby J. Velte, Ph.D. Robert Elsenpeter
4. Beginning Serverless Computing Developing with Amazon Web Services, Microsoft Azure, and Google Cloud
5. Cloud Computing: Implementation, Management and Security, CRC Press, 2017. Rittinghouse, John W., and James F. Ransome
6. Internet of Things: A Hands-On Approach Paperback – 2015 by Arsheep Bahga (Author), Vijay Madiseti (Author)

Assessment Outline:

Sl. No	Particulars	Weightage
1	CIA- I	20
2	CIA-II	25
3	CIA-III	20
4	End Trimester	30
5	Attendance*	05

Note: * Refer to Students Handbook for particulars

Course Name: CAPSTONE PROJECT**Course Code: MBA586B/686B****Total number of hours: 45 Hours****Credits: 4**

Course Description: The Business Analytics Capstone project is a three-credit course offered to Business Analytics Specialization students in their fifth and sixth trimesters. A capstone project is a mode of experiential learning, carried out at the culmination of the program. It gives the students an opportunity to apply what they have learnt about how to make data-driven decisions to a real business challenge faced by various companies. The students will have to choose a reputed organization and study a specific business problem associated with it. The specific role that the student will be playing in the organization and the scope of their work in the company will have to be finalized in consultation with the corporate mentor and with the approval of the academic mentor.

The students are required to submit a final report in the specific format detailing their learning in the organization in addition to appraising their academic mentor of the weekly progress.

Course Objectives:

On having completed this course, students will be able to:

1. To identify the appropriate business problem
2. To develop lit map from relevant literature review
3. To analyze the business problem using CRISP DM framework
4. To interpret the results
5. To propose business solutions for the problem

Course Learning Outcomes: On having completed this course student should be able to:

CLO-1: Identify the appropriate business problem

CLO-2: Develop lit map from relevant literature review

CLO-3: Analyze the business problem using CRISP DM framework

CLO-4: Interpret the results

CLO-5: Propose business solutions for the problem

Pedagogy: The students are required to identify an organization and the topic/problem for study during their fourth trimester in consultation with their corporate mentor approved by the academic mentor. Students are required to undergo a minimum period of 6 weeks of study. They need to produce the Initial Information Report giving the details of the project, company and corporate mentor before the end of the first week of their joining. The student will need to be in constant touch with the academic mentor explaining the progress of the project. The students will be evaluated based on their frequent interactions with the mentor, panel review, presentations at various stages, review by an industry expert and the conference presentations.

Assessment Outline:

Sl. No	Particulars	Weightage
1	Project Proposal	20
2	Review of Literature	20
3	Project Design and Conceptual Framework	20
4	Data Analysis and Interpretation	15
4	Project Report, Presentation & Viva-voce	30
5	Capstone Report and Viva Voce	30
6	Conference Presentation/Publication	15