

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. -Data Science (Business Analytics)				Semester : I	
Course/Module: R/R Studio and Tableau Programming				Module Code: MTDS01003	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
4	0	0	4	Scaled to 50 marks	Scaled to 50 marks
Pre-requisite: Some programming skill					
Objectives:					
<ul style="list-style-type: none"> • Learn how to program in R/R-Studio and how to use R/R-Studio for effective data handling and statistical analysis. • Learn how to install and configure software necessary for a statistical programming environment • Understand how to use Tableau visualization effectively to influence business decision making 					
Outcomes:					
After completion of the course, students would be able to:					
<ul style="list-style-type: none"> • Programming language concepts as they are implemented in a high-level statistical language. • Practical issues in statistical computing which includes programming in R including reading data into R, accessing R packages, writing R functions, debugging, and organizing and commenting R code. • Statistical data analysis and optimization will provide working case studies and project. • Statistical and visual representation of data using Tableau and Tableau programming • R and Tableau integration to do statistical work in Tableau 					
Detailed Syllabus:					
Unit	Description				Duration
1	Introduction R and R Studio Software Installation				05
2	Overview of R, R data types and objects, reading and writing data				05
3	Control structures, functions, scoping rules, dates and times				08
4	Loop functions, debugging tools				08
6	Introduction to Tableau Data transformation with Visual concepts				04



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

7	Programming with Tableau <ul style="list-style-type: none"> • Connecting and Loading Data in Tableau; Tableau Data types; Basic graphs and charts; Sheet, Dashboard and Story • Programming using Tableau; Simple linear and forecasting; Setting up a Tableau Server for enterprise and management decision making 	08 07
8	Integration with R/R-Studio (for statistical computation)	15
Total		60

Text Books:

1. Software for Data Analysis: Programming with R (Statistics and Computing) 2010 by John Chambers
2. R Programming for Data Science by Roger D. Peng

Reference Books:

1. The Art of R Programming - A Tour of Statistical Software Design, 2011 by Norman Matloff
2. Advanced R by Hadley Wickham Press: CRC Press - Chapman & Hall

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester : I	
Course/Module : Financial Institutions & Markets				Module Code: MTDS01006	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
3	0	0	3	Scaled to 50 marks	Scaled to 50 marks
Prerequisite: 1 Principle of Economics 2. Basics of financial management					
Objective: To provide an understanding on various financial institutions, their functions and different financial instruments used by the market participants. It also provides an overview of financial market					
Outcomes: After completion of the course, students would be able to: 1. Various financial instruments available in the financial market 2. Role of financial intermediaries 3. Role of money market and capital market regulators 4. Markets for various financial instruments					
Detailed Syllabus					
Unit	Description				Duration
1	Introduction to financial instruments and institutions: Money, equity, debt instruments, derivatives, foreign exchange, hedging instruments, Indian financial system, determinants of interest rate				4
2	Interest rate and Valuation: present value and future value computation, YTM, annuity valuation, Duration, Determinants of interest rate, demand and supply of bond Money market: Yield on money market securities, Money market securities-TB, call money, repo, cp, etc, money market participants, Money market regulator, role of Central Bank, payment system, credit system, Monetary policy of central bank- open market operation, reserve requirements, money supply and interest rate				8
3	Financial Service industry: a. Depository institutions: commercial banks, balance sheet of commercial bank, role of CB, cooperative banks, development banks, credit unions, payment banks b. Insurance company: life insurance companies, property-liability insurance, general insurance, Insurance Regulatory Authority c. Securities firm and investment bank d. Mutual fund and hedge fund: types of fund, investment types, risk diversification, pension fund, regulation of mutual fund				8

(Signature)

Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

4	Debt market and instruments: debt instruments, bond market, types of bond, international bond market, zero coupon bond, bond valuation, yield curve, Security Exchange Board of India (SEBI), primary and secondary bond market	6
5	Equity market and instruments: Stocks, ordinary and preferential stocks, primary and secondary stock market, initial public offering (IPO), public equity and private equity, stock market index, market participants, trading risk in equity market,	5
6	Mortgage market: Mortgage instruments, mortgage finance, mortgage backed securities, primary mortgage market and secondary mortgage market, participants in the mortgage market, subprime crisis	4
7	Derivative market and instruments: Types of derivatives-futures, options, forwards, swaps; types of options, hedging with derivative instruments, OTC derivatives, interest rate swap, credit default swap, pricing of derivatives	6
8	International financial system: foreign exchange market, determination of foreign exchange rate, purchasing power parity theory, foreign exchange risk	4
Total		45

Text Book:

- Mishkin (2011), "Financial Markets and Institutions", 8th edition, Pearson Education India

Reference Book:

- Kohn Meir (2013), "Financial Institutions and Markets" 2nd edition, Oxford University Press
- Saunders, A. and Cornett M.M (2014), "Financial markets and Institutions", 6th edition, McGraw Hill Education.

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

As per institute norms



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester : I	
Course/Module: Basics of Operations and Supply Chain Management				Module Code:MTDS01009	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
3	0	0	3	Scaled to 50 marks	Scaled to 50 marks
Pre-requisite: Nil					
Objectives:					
<ul style="list-style-type: none"> • To provide fundamentals of Operations and Supply Chain Management • To understand different Strategic, Tactical and Operational Decisions 					
Outcomes:					
After completion of the course, students would be able to:					
<ul style="list-style-type: none"> • Students will be able to learn Concepts, Techniques and apply them to real data sets from Operation and Supply chain fields. • Use Excel and OM Tools/software's to improve decision making in Operations. 					
Detailed Syllabus:					
Unit	Description				Duration
1	Role of Operations in Business. Vision Mission Defining Operational Goal and Value Creation Operations Strategy and Analytics; Flows and Layouts, Bottlenecks and variability. Little's Law. Process Analysis Basics				03
2	Capacity Planning; Throughput Analysis Scheduling and Capacity Management				03
3	Statistical Process Control. Using Statistical Tools Principles of Process Improvement and zero defect. Basics of Fractional Factorial experiments, Taguchi Loss Function and DOE. Six Sigma and applications				05
4	Lean Management, TPM Principles. Project Management .PERT ,CPM and Crashing				05
5	Theory of Constraints, Goal of a Firm Critical Chain Project Management. Drum Buffer and Rope				05



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

6	Fundamentals of Supply Chain Management COR Metrics for analysing supply chain Understand Supply Chain Dynamics .	03
7	Demand Forecasting in a supply chain. Different advance models	05
8	Fulfilment (Distribution Planning) models Distribution Network Design Logics.	03
9	Transportation Planning and Warehouse Management	03
10	Sales and Operations Planning Aggregate Planning -Finding the best Plan.	03
11	Managing economies of scale: Cycle Inventory. Hierarchical Safety stock design for multi-product under capacity constraint and for MRO items. Designing Optimal level of Product availability	03
12	Collaborative Supply Chain (CPFR). e -business and the Supply Chain.	01
13	Global Sourcing Decisions	03
Total		45

Text Books:

1. Operations Management by Russel and Taylor 8th edn.
2. Managing Business Process Flows -Ravi Anupindi 4th edn.
3. Supply Chain Management 6th edn -Chopra , Meindl et al

Reference Books:

1. Factory Physics -Hopp and Spearman
2. Supply Chain Management - David Simchi Levi et al
3. Managing Business Process Flows - Ravi Anupindi

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

1. Case Analysis - 20%. Using of Excel Solver and Palisade Tools
2. One class tests. -30%
3. Two assignments -20%
4. Final Test -30%



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. -Data Science (Business Analytics)				Semester : I	
Course/Module : Data Gathering , Cleaning (ETL Process)				Module Code : MTDS01010	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
3	0	0	3	Scaled to 50 Marks	Scaled to 50 marks
Pre-requisite: Nil					
Objectives: Understanding of amount of data needed today for business decision is increasing, which is called Big Data. Mostly 60-75 percentage of time is spend on data gathering, cleaning and making these data process worthy for business decision. Hence it is important for students to understand ETL (Extract, Transform, and Load) process.					
Outcomes: After completion of the course, students would be able to: Upon completion of this course students will be able to obtain data from a variety of sources. You will know the principles of tidy data and data sharing. Finally, you will understand and be able to apply the basic tools for data cleaning and manipulation.					
Detailed Syllabus:					
Unit	Description				Duration
1	Introduction to Data Science				02
2	Data Scientist's Toolbox, Introduction to basic tools like R and R-Studio; Tableau (for Visual Analytics); SAS; SPSS; Matlab etc., Types of data questions, Steps in a data analysis				05
3	Getting and Cleaning Data - best practices: • Data collection • Data formats				02 02 02
4	Making data tidy Distributing data Scripting for data cleaning				04 04 04
5	ETL Process and Introduction to tools (CloverETL)				02
6	Sub-graphs Create new data sources and targets; Focus on business logic; Reduce complexity; Share your expertise				06



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

7	Automatic Metadata Propagation Save time and effort: No need to assign metadata to every edge – they are determined based on the component and its surroundings.	06
	Reuse transformations: Changes automatically propagate through complex transformations, making them easier to reuse. Distribute with sub graphs: Metadata embedded into sub graphs are readily available in upstream transformations, with no linking needed.	
8	Execution View Panel Real-time tracking: Watch data in real time as it flows through your transformation or job flow. Access stored debug data: Just double-click any layer of sub graphs or nested job flow, and inspect collected debug data. Troubleshoot finished runs: Connect to jobs executed by the Server and visually inspect what data flowed through successfully, in order to find potential problem areas.	06
Total		45

Text Books:

1. The Data Warehouse Etl Toolkit: Practical Techniques For Extracting, Cleaning, Conforming, And Delivering Data; by Ralph Kimball; Publisher: WILEY INDIA, Year - 2004

Reference Books:

1. The Microsoft Data Warehouse Toolkit: With SQL Server 2008 R2 and the Microsoft Business Intelligence Toolset Paperback - 2011 by Joy Mundy (Author), Warren Thornthwaite (Author), Ralph Kimball (Contributor); Publisher: Microsoft INC.

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester : I	
Course/Module: Probability and Statistics				Module Code : MTDS01011	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Internal Continuous Evaluation (ICE) As per Institute Norms (50 marks)	Term End Examinations (TEE) Theory (3 Hrs) (100 Marks)
4	0	0	4	Scaled to 50 marks	Scaled to 50 marks
Pre-requisite: Nil					
Objectives:					
<ul style="list-style-type: none"> • To provide advanced statistical background for analysing data and drawing inferences from that analysis • Predicative Analytics using liner and generalized liner model. 					
Outcomes:					
After completion of the course, students would be able to:					
<ul style="list-style-type: none"> • Students will be able to learn advanced statistical technique and apply them to the analysis of real data sets from different fields. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Duration
1	Descriptive Statistics: a) Measures of Central Tendencies - Grouped and Ungrouped Data; Mean, Sample Mean- Weighted mean; Median, Quartiles, b) Deciles, and Percentiles, Box plot, Mode Measures of Variability- Dispersion, Range, Standard deviation, Population v/s sample variance and standard deviation, Skewness, Kurtosis.				4 4
2	Introduction to Probability and Sampling distribution: a) Methods of Assigning probabilities, Probability Space, conditions of probability model, Events, simple and compound, Laws of probability, Probability density function, Cumulative distribution function, Expected values of Mean and Variance. Marginal, union, joint and conditional probabilities, Bayes' Theorem b) Random variables, discrete and continuous distributions, Expectation, moments of a distribution, Binomial, Poisson, uniform, and normal distributions, Normal approximation to the binomial distribution, Distributions of several random variables, moments of joint distributions, independence, covariance, correlation coefficient, Central Limit Theorem				8 8



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

3	Hypothesis Testing: a) Large Sample estimation of the population parameters and Hypothesis testing: Basics of Estimating the populations mean and difference; estimating the proportion and difference; large sample test for population mean, difference; large sample test for proportion, difference. b) Estimation of a population variance: Sampling distribution of variance, estimation. c) Inferences from small sample: Student's t distribution; Small sample t test for following – A population mean, A difference between two means, Confidence interval.	 6 6 6
4	Regression Model: a) least squares and linear regression: Introduction; Notation; Ordinary least squares; Regression to the mean; Linear regression; Residuals; Regression inference b) Multivariable regression: Multivariate regression; Multivariate examples; Adjustment; Residual variation and diagnostics; Multiple variables , Interaction Terms, Non-linear Transformations of the Predictors, Qualitative Predictors	 6 4
5	Generalized linear models: Logistic Regression, Binary outcomes, Count outcomes, Multiple Logistic Regression	 4 4
	Total	60

Text Books:

1. An Introduction to Statistical learning with application in R . Hastie T, Robert T. (2014). Springer Science Business Media: New York

Reference Books:

1. Statistics for Management, Seventh Edition, by Richard I. Levin, David S. Rubin, Pearson
2. An Introduction to Categorical Data Analysis. Agresti, A. (2012). John Wiley & sons
3. The Element of Statistical Learning, Data mining, Inference and Prediction. Hastie, T, Tibshirani, R, & Friedman, J. (2011). New York: Springer Series in Statistics.
4. Hair, Black, Babin, Anderson and Tatham (2009). Multivariate Data Analysis, Pearson

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester : I	
Course/Module: Programming for Analytics				Module Code :MTDS01012	
Teaching Scheme			Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -- in Question Paper)
4	0	0	4	Scaled to 50 marks	--

Pre-requisite: Some programming skill

Objectives:

- Navigate the SAS windowing environment
- Read and validate various types of data into SAS data sets
- Create and combine SAS variables and subset data
- Create and enhance listing and summary Business reports by control and combine SAS data set input and output
- Read and summarize different types of data and transform character, numeric, and date variables.
- Perform DO loop and SAS array processing
- Programming to apply Statistical techniques on Business Data for decision making

Outcomes:

After completion of the course, students would be able to:

- Enable students to learn SAS programming skills to handle, clean-up and process large data for statistical analysis
- Besides basic programming it also explain the techniques for processing, controlling, and manipulating SAS data sets.

Detailed Syllabus:

Unit	Description	Duration
1	Getting Started with SAS Working with SAS Syntax Getting Familiar with SAS Data Sets	03 03 02
2	Reading SAS Data Sets Reading Excel Worksheets Reading Delimited Raw Data Files	06
3	Validating and Cleaning Data Manipulating Data Combining SAS Data Sets	03 03 02
4	Enhancing Reports Producing Summary Reports	05
5	Introduction to Graphics Using SAS/GRAPH	05



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

6	Controlling Input and Output	03
	Summarizing Data	03
	Reading and Writing Different Types of Data	02
7	Data Transformations	03
	Processing Data Iteratively	02
8	Project on SAS	15
	Total	60

Text Books:

1. SAS Enterprise Guide Manual

Reference Books:

1. Statistics for Management, Seventh Edition, by Richard I. Levin, David S. Rubin, Pearson

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	--
Term Work Marks	50
Total Marks :	50

Details of Term work:

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. – Data Science (Business Analytics)				Semester : I	
Course/Module: Basic Marketing				Module Code : MTDS01013	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
3	0	0	3	Scaled to 50 marks	Scaled to 50 marks
Prerequisite: Nil					
Objectives:					
<ul style="list-style-type: none"> • Introducing students to Marketing Concepts and Orientation. • To help participants understand various marketing tools/models for solving marketing problems. • To help participants comprehend various situations and marketing terminologies. 					
Outcome:					
After completion of the course, students would be able to: <ul style="list-style-type: none"> • To develop Conceptual and Analytical Skills to enable an informed marketing perspective in business decisions. 					
Detailed Syllabus					
Unit	Topics				Duration
1	Understanding the Marketing Environment The Customer The Competition Consumer Behaviour Organisational Buying Behaviour Market Research				10
2	Crafting the Marketing Strategy Segmentation and Targeting Forecasting Marketing Plan				7
3	Creating Value Product Management, PLC New Product Development Process Crafting Brand Equity Creating Value through Customer Service, Understanding Services Businesses Pricing				13
4	Communicating and Delivering Value Integrated Marketing Communication				10



Signature
 (Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

	Selling through Sales Force Selling through the Distribution Channel International Marketing	
5	Sustaining Customer Value and Maintaining Growth Customer Relationship Management Marketing Performance and Control	5
TOTAL HRS		45

Text Book:

1. Kotler On Marketing: How to Create, Win, and Dominate, Author: Philip Kotler, 2015
2. Crossing the Chasm: Marketing and Selling Disruptive Products to Mainstream Customers, Author: Geoffrey Moore, 201

Reference Book:

1. All Marketers are Liars: The Underground Classic That Explains How Marketing Really Works--and Why Authenticity Is the Best Marketing of All, Author: Seth Godin, 2015
2. Good to Great: Why Some Companies Make the Leap and Others Don't. Author: Jim Collins

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

As per institute norms



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. -Data Science (Business Analytics)				Semester: II	
Course/Module: Big Data Technology				Module Code: MTDS02001	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Internal Continuous Evaluation (ICE) As per Institute Norms (50 marks)	Term End Examinations (TEE) Theory (3 Hrs) (100 Marks)
4	0	0	4	Scaled to 50 Marks	Scaled to 50 marks
Pre-requisite: R/R-Studio/SAS/Tableau programming					
Objectives: Big data Analytics refers to skills, practices and techniques used in converting large scale data and its storage about computation challenges to convert data into information and knowledge that aid making business decision. This discipline consists of an understanding of: <ul style="list-style-type: none"> • Distributed storage and computation and usage of concept like Map Reduce, developed and widely used by Google search engine • The use of the above analysis and visualization to aid decision making 					
Outcomes: After completion of the course, students would be able to: <ul style="list-style-type: none"> • Upon completion of this course one will be able to setup, manage and exploit big data cluster for analytics from social media. This will make student ready to setup and manage environment of cluster, cloud, grid and stream computing. • One will be able to setup Hadoop or Casendra cluster for handling big data and distributed file system and computing. Helps work on large scale systems and social media systems. • One will be able to provide cyber security as an expert to high net asset systems with critical data 					
Detailed Syllabus: (per session plan)					
1	Introduction to Big Data				04
2	Big Data				04
	• What is Big data				04
	• How do to process big volume data				04
	• Setup Hadoop and / or Casendra				04
3	• Map Reduce				04
	• Ranking algorithm				04
	• Community detection cluster (application of clustering)				04
3	• Data Visualization in Big Data				04

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

	<ul style="list-style-type: none"> • Social Media mining • Introduction to text data mining • Basic concepts in text retrieval • Information retrieval models • Implementation of a search engine • Evaluation of search engines • Advanced search engine technologies • Stream data analytics 	04
4	Pig, Hive, MongoDB, Spark	32
	Total	60

Text Books:

1. An Introduction to Statistical learning with application in R. by Trevor Hastie, Robert Tibshirani (2013). Publisher/Edition: Springer Science + Business Media New York.
2. SAS E-Minor reference Manual

Reference Books:

1. An Introduction to Categorical Data Analysis Second Edition, Wiley-inter-science, A John Wiley & sons, INC, Publication
2. The Element of Statistical Learning, Data mining, Inference and Prediction by Trevor Hastie, Robert Tibshirani, Jerome Friedman, Publication: Springer Series in Statistics

Any other information:

Details of Internal Continuous Assessment (ICA)

Test Marks: 20

Term Work Marks: 30

Details of Term work:

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. -Data Science (Business Analytics)				Semester: II	
Course/Module : Advanced Statistical Learning				Module Code: MTDS02002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Internal Continuous Evaluation (ICE) As per Institute Norms (50 marks)	Term End Examinations (TEE) Theory (3 Hrs) (100 Marks)
4	0	0	4	Scaled to 50 Marks	Scaled to 50 marks
Pre-requisite: Data Science I					
Objectives:					
<ul style="list-style-type: none"> To introduce and provide some core and necessary data mining techniques so that students understand how to work with large data sets and apply the appropriate data mining technique to answer business questions 					
Outcomes:					
After completion of the course, students would be able to:					
<ul style="list-style-type: none"> Students will able to learn a number of well-defined data mining tasks such as classification, estimation, prediction, affinity grouping and clustering, and data visualization are discussed 					
Detailed Syllabus: (per session plan)					
Unit	Description				Duration
1	ANOVA/MANOVA: Chi-Square and Analysis of Variance, Multivariate analysis of variance				6
2	Extension of regression analysis: Ridge Regression, The Lasso				4
3	Multivariate Analysis:				6
	a) Canonical Analysis, Canonical Roots/Variates				8
	b) Using Bayes' Theorem for Classification, Procedure of Discriminant Analysis, Linear Discriminant Analysis, Estimating Misclassification Probabilities, Quadratic Discriminant Analysis				6
	c) Conjoint analysis,				10
	d) Principal Components Analysis (PCA) and Factor Model: Procedure Principal Component Analysis (PCA), Maximum Likelihood Estimation Method, Factor Rotations, Varimax Rotation, Estimation of Factor Scores.				10
e) Cluster Analysis: Measures of Association for Continuous Variables, Measures of Association for Binary Variables,				10	

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

	Agglomerative Hierarchical Clustering, Ward's Method, K-Means Procedure, K-NearestNeighbors	
4	Time Series Analysis: Characteristics of Time Series Data, Stationarity, Unit root; Detrending and De-seasonalizing , Autoregressive Moving Average (ARIMA) model; Exponential Smoothing Techniques; Forecasting through ARIMA and ARMA with Exponential smoothing; ACF and PACF, Univariate Time Series Models	10
	Total	60
Text Books: 1. An Introduction to Statistical learning with application in R. Hastie T, Robert T. (2014). Springer Science Business Media: New York 2. Hair, Black, Babin, Anderson and Tatham (2009). Multivariate Data Analysis, Pearson		
Reference Books: 1. Statistics for Management, Seventh Edition, by Richard I. Levin, David S. Rubin, Pearson 2. An Introduction to Categorical Data Analysis. Agresti, A. (2012). John Wiley & sons 3. The Element of Statistical Learning, Data mining, Inference and Prediction. Hastie, T, Tibshirani, R, & Friedman, J. (2011). New York: Springer Series in Statistics. 4. Gujarati, Damodar N, and Dawn C. Porter. Basic Econometrics. Boston, Mass: McGraw-Hill, 2009		
Any other information: Details of Internal Continuous Assessment (ICA) Test Marks: 20 Term Work Marks: 30 Details of Term work: 1. Practical based on 10 Experiments 2. Two class tests. 3. Minimum two assignments		

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. -Data Science (Business Analytics)				Semester: II	
Course/Module : Business Visualization				Module Code:MTDS02004	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -- in Question Paper)
2	0	0	2	Scaled to 50 marks	-
Pre-requisite: R/R-Studio/SAS/Tableau programming.					
Objectives: Use of Visual analytics is the science of analytical reasoning facilitated by interactive visual interfaces. <ul style="list-style-type: none"> • Use of visual analytics tools and techniques to synthesize information and derive insight from massive, dynamic, ambiguous, and often conflicting data • Data representations and transformations that convert all types of conflicting and dynamic data in ways that support visualization and analysis 					
Outcomes: After completion of the course, students would be able to: <ul style="list-style-type: none"> • Analytical reasoning techniques that enable users to obtain deep insights that directly support assessment, planning, and decision making • Techniques to support production, presentation, and dissemination of the results of an analysis to communicate information in the appropriate context to a variety of audiences. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Duration
1	Introduction to data and its visualization				02
2	Defining the Research and Development Agenda for Visual Analytics				02
3	The Science of Analytical Reasoning Build upon theoretical foundations of reasoning, sense-making, cognition, and perception to create visually enabled tools to support collaborative analytic reasoning about complex and dynamic problems.				02 02

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

4	<p>Visual Representations and Interaction Technologies</p> <p>Develop a new suite of visual paradigms that support the analytical reasoning process.</p> <p>Create a science of visual representations based on cognitive and perceptual principles that can be deployed through engineered, reusable components. Visual representation principles must address all types of data, address scale and information complexity, enable knowledge discovery through information synthesis, and facilitate analytical reasoning.</p>	02 02 02 04
5	<p>Data Representations and Transformations</p> <p>Develop both theory and practice for transforming data into new scalable representations that faithfully represent the content of the underlying data</p> <p>Create methods to synthesize information of different types and from different sources into a unified data representation so that analysts, first responders, and border personnel may focus on the meaning of the data</p>	04 04 04
Total		30

Text Books:

1. The Research and Development Agenda for Visual Analytics by James J. Thomas
Kristin A. Cook - 2013
2. Mastering the Information Age Solving Problems with Visual Analytics
by Daniel Keim, Jörn Kohlhammer, Geoffrey Ellis and Florian Mansmann -
2014

Reference Books:

1. Visual Analytics by Daniel A. Keim, Florian Mansmann, Andreas Stoffel, Hartmut Ziegler University of Konstanz, Germany - 2014

Any other information:

Details of Internal Continuous Assessment (ICA)

Test Marks: 20

Term Work Marks: 30

Details of Term work:

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments

Signature

(Prepared by Concerned Faculty/HOD)

Signature

(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. -Data Science (Business Analytics)					Semester: II		
Course/Module : Python Programming					Module Code:MTDS02005		
Teaching Scheme				Evaluation Scheme			
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -- in Question Paper)		
2	0	0	2	Scaled to 50 marks	-		
Pre-requisite: Nil							
Objectives:							
<ul style="list-style-type: none"> To provide theoretical structure and practical applications of Python programming to solve data manipulation, analysis for business 							
Outcomes:							
After completion of the course, students would be able to:							
<ul style="list-style-type: none"> Students will be able to learn advance technique and apply them to manipulate, analysis and see insight of real data sets from different fields. Learn to use language, function and packages available to solve real business problems. 							
Detailed Syllabus: (per session plan)							
Unit	Description					Duration	
1.	Installing Python - Overview					02	
2.	Write Hello World					02	
3.	Python Data Structure					04	
4.	Using Python to access web data					04	
5.	Using database with python					06	
6.	Arithmetic and logical operation in python					04	
7.	Writing function in python					04	
8.	Using packages in python					04	
	Total					30	

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Text Books:

1. Python for Informatics, Exploring Information, version 2.7.0, Copyright © 2015- Charles Severance

Reference Books:

1. E-books

Software:

1. Python

Any other information:

Details of Internal Continuous Assessment (ICA)

Test Marks: 20

Term Work Marks: 30

Details of Term work:

1. Two class tests.
2. Three assignments

Signature

(Prepared by Concerned Faculty/HOD)

Signature

(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester: II	
Course/Module : Operations Research				Module Code: MTDS02006	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
3	0	0	3	Scaled to 50 Marks	Scaled to 50 marks
Pre-requisite: Nil					
Objectives:					
<ul style="list-style-type: none"> To provide theoretical and practical applications of Operations Research Tools and their applications in Data Science related work in Operations , Finance, Marketing and HR. 					
Outcomes:					
After completion of the course, students would be able to:					
<ul style="list-style-type: none"> Students will be able to learn advanced technique and apply them to the analysis of real data sets from different fields. Learn to use Tools like Palisade Decision Suite, Excel Solver to solve real problems. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Duration
1	Introduction to Operations Research. Problem solving thro Model Building. Models of Cost, Revenue and Profit.				01
2	Linear Programming. Model Building. Problem Solving thro Graphical and Simplex Algorithm. Dual Problem. Post Optimality and Sensitivity Analysis				10
3	Assignment, Transportation and Network Models Maximization, Minimization model, North west Corner , Vogels Approximation Method, MODI (U-V)method				08
4	Network Flows. Dijkstra's shortest Path Algorithm , Maxm Flow Min Cut Theorem .Ford Fulkerson Algorithm				04
5.	Integer Programming and Applications. Travelling Salesman Problem. Branch and Bound Algorithm. Applications in Finance				04
6.	Queing Theory and Applications. Steady state analysis with M/M/1. Applications in Service Industry.				05

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

7.	Dynamic Programming. Aircraft scheduling and Cutting stock Algorithm.	04
8.	Decision Tree and Applications. Utility Curve Application in Operations, Marketing (Pricing) etc	02
9.	Game Theory and Competitive Strategies. Two person zero sum Game. Domination, Saddle Point, Pure and Mixed Strategies	03
10.	Simulation: Monte Carlo Simulation. Application in probabilistic real life situations of Operations, Marketing, Logistics and Finance including Risk Management	04
	Total	45

Text Books:

- Hillier and Liebermann –Operations Research McGraw Hill 2016
- Anderson Sweeney –Introduction to Management Science South Western 2013

Reference Books:

- Taha, Hamdy –Operations Research 10/e Pearson India
- Kapoor, V.K. –Operations Research ; Problems and Solutions

Softwares:

- Palisade Decision Tools suite (www.palisade.com)

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

- Two class tests.
- Three assignments

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester: II	
Course/Module : Research Project				Module Code: MTDS02007	
Teaching Scheme			Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -- in Question Paper)
2	0	0	2	Scaled to 50 marks	-
Pre-requisite: Nil					
Objectives:					
<ul style="list-style-type: none"> • Apply all learning in this semester and work on a topic of research leading to a paper in journal or seminar. 					
Outcomes:					
After completion of the course, students would be able to:					
<ul style="list-style-type: none"> • Learn research methodology • Write a technical paper 					
Detailed Syllabus: (per session plan)					
Unit	Description				Duration
1	Select a topic of research				02
2	Paper review				10
3	Make a strategy to work on a project (subject finalization)				05
4	Actual research				10
5.	Finalization of paper for publication				03
	Total				30
Text Books:					
1. Research methodology					
2. Actual paper reading					
Any other information:					
Details of Internal Continuous Assessment (ICA)					
Test Marks: 20					
Term Work Marks: 30					
Details of Term work:					
As per institute norms					

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. -Data Science (Business Analytics)				Semester: II	
Course/Module : Machine Learning and Data Mining				Module Code: MTDS02011	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
4	0	0	4	Scaled to 50 Marks	Scaled to 50 marks
Pre-requisite: Basic Statistics and Knowledge of some computer programming					
<p>Objectives: This course provides a broad introduction to machine learning and statistical pattern recognition. Topics include:</p> <ul style="list-style-type: none"> • Supervised learning (generative/ discriminative learning, parametric/ non-parametric learning, neural networks and support vector machines) • Unsupervised learning (clustering, dimensionality reduction, kernel methods) • learning theory <ul style="list-style-type: none"> ○ Bias/variance tradeoffs ○ VC theory ○ Large margins • Reinforcement learning and adaptive control <p>The course will also discuss recent applications of machine learning, such as to robotic control, data mining, autonomous navigation, bioinformatics, speech recognition, and text and web data processing.</p>					
<p>Outcomes: After completion of the course, students would be able to: The course provides a technical perspective on key emerging trends in handling big data to building predictive model for industry applications and issues in the business and technology involving data.</p>					
Detailed Syllabus: (per session plan)					
Unit	Description				Duration
1	Introduction - Basic concepts.				04
2	Supervised learning. Supervised learning setup. LMS; Logistic regression. Perceptron. Exponential family; Generative learning algorithms. Gaussian discriminant analysis. Naive Bayes; Support vector machines; Model selection and feature selection; Ensemble methods: Bagging, boosting; Evaluating and debugging learning algorithms.				05 05 05

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

3	Learning theory Bias/variance tradeoff; Union and Chernoff/Hoeffding bounds; VC dimension. Worst case (online) learning; Practical advice on how to use learning algorithms.	05 05
4	Unsupervised learning. Clustering. K-means; EM. Mixture of Gaussians; Factor analysis; PCA (Principal components analysis); ICA (Independent components analysis)	07 05 05
5	Reinforcement learning and control. MDPs. Bellman equations; Value iteration and policy iteration; Linear quadratic regulation (LQR). LQG; Q-learning. Value function approximation; Policy search. Reinforce. POMDPs. Practical Machine Learning Prediction study design; In sample and out of sample errors; Over-fitting; Receiver Operating Characteristic (ROC) curves; The caret package in R; Preprocessing and feature creation; Prediction with regression; Prediction with decision trees; Prediction with random forests; Pruning; Boosting; Prediction blending; Use SAS to achieve all of the above; Clustering; Conjoint Analysis	03 04 07
Total		60

Text Books:

1. Machine Learning, A Probabilistic Perspective, By Kevin P. Murphy, Publisher: MIT Press, August 2012 edition

Reference Books:

1. A Course in Machine Learning, by Hal Daumé III, 2012 edition
2. Introduction to machine learning by Alex Smola and S.V.N. Vishwanathan, Publisher: Cambridge University Press. 2010 Edition

Any other information:

Details of Internal Continuous Assessment (ICA)

Test Marks: 20

Term Work Marks: 30

Details of Term work:

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments

Signature

(Prepared by Concerned Faculty/HOD)

Signature

(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester: II	
Course/Module : Marketing Analytics				Module Code:MTDS02014	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practica 1 (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
4	0	0	4	Scaled to 50 Marks	Scaled to 50 marks
Prerequisite: Statistics, Advanced Business Analytics, Research Methodology, working with excel sheets.					
Objectives:					
<ul style="list-style-type: none"> • To understand the role of analytical techniques and computer spreadsheet models and metrics for marketing decisions • To provide exposure to examples demonstrating the value of data-based marketing in managerial context 					
Outcomes:					
After completion of the course, students would be able to:					
<ul style="list-style-type: none"> • Enables its participant to put together data, models and analyses and translate concepts into context specific strategic and tactical marketing decisions • Enhances skills in viewing marketing processes and relationships systematically and analytically 					
Detailed Syllabus: (per session plan)					
Unit	Description				Duration
1.	Introduction to the marketing response models, their				6
2.	Segmentation and Targeting Decisions using cluster analysis				6
3.	Leveraging data to make positioning decisions through				6
4.	Customer Life time value				6
5.	New Product Decisions using conjoint analysis				6
6.	Optimizing Resource Allocation Decisions				6
7.	Advertising and Communications Decisions ADBUDG				6
8	Sales Force and Channel Decisions: allocating sales revenues,				6
9	Pricing and Decisions : Value in use pricing and Demand				6

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

10.	Brand Analytics – Measuring brand value	6
	Total	60

Prescribed text:

1. Lilien G. L, Rangaswamy A. and Bruyn A. (2012). *Principles of Marketing Engineering*. Trafford Publishers

Reference Books:

1. Venkatesan, R.; Farris, P.; Wilcox, R. T. (2014), *Cutting Edge Marketing Analytics: Real World Cases and Data Sets for Hands on Learning*, Pearson FT Press
2. Sorger, S. (2013), *Marketing Analytics: Strategic Models and Metrics*, CreateSpace Independent Publishing Platform
3. Mark J. (2010), *Data-Driven Marketing: The 15 Metrics Everyone in Marketing Should Know*, Wiley
4. Winston, W. L. (2014), *Marketing Analytics: Data-Driven Techniques with Microsoft Excel*, Wiley.

Internet references/ Software's

Any other information:

Details of Internal Continuous Assessment (ICA)

Test Marks: 20

Term Work Marks: 30

Details of Term work:

Class Tests/ Presentations

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester: II	
Course/Module : Advanced Supply Chain Analytics				Module Code: MTDS02017	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
4	0	0	4	Scaled to 50 Marks	Scaled to 50 marks
Pre-requisite: Nil					
Objectives:					
<ul style="list-style-type: none"> To provide advanced Knowledge and methodologies for Price and Revenue Optimization and Risk Analysis in Operations, Project Management and and Supply Chain Management. 					
Outcomes:					
After completion of the course, students would be able to:					
<ul style="list-style-type: none"> Students will be able to learn advanced concepts and Tools and apply them to the analysis of real data sets from different fields. Will become proficient to model and solve problems with adv software Tools. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Duration
1	Introduction What is Price and Revenue Optimization?				02
2	Review of Pricing Theory : Market Segmentation with differential Pricing				03
3	Quantitative Models of Consumer Demand				03
4	Regression Model				03
5	Quantitative Models of Consumer Demand Models of Consumer Demand; Reservation Prices; Aggregate Demand Models; Discrete Choice Models				03
6	Consumer Choice Models				03
7	Customized Pricing				03
8	Pricing as Constrained Optimization				04
9	Markdown Management (in Poor Market and Retail scenario)				03
10	Capacity Control by Linear Programming ; Capacity Control with Stochastic Demand				06

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

11	Implementation Challenges in PRO	02
12	Yield Management	02
13	Optimal Ordering for Style Goods	03
14	Annual Planning(Aggregate Planning) under Uncertainty	02
15	Manpower scheduling under uncertainty	02
16	Optimal Plant Capacity planning under stochastic environment	02
17	Optimal Truck Loading	
18	Decision making under uncertainty	05
19	Optimal Bidding in great uncertainty (oil and Gas , Elect Power)	02
20	Optimal Machine Replacement /Reconditioning decision	02
21	Capital Budgeting with uncertain machine usage pattern	02
22	Hedging with Futures(Pricing of Future Contracts in Strategic Purchasing)	03
	Total	60

Text Books:

1. Price and Revenue Optimization –Don T. Phillips
2. Decision Making under uncertainty with Palisade Risk Optimizer for EXCEL-Wayne Winston

Reference Books/Reading Materials:

1. Statistics for Management, Seventh Edition, by Richard I. Levin, David S. Rubin, Pearson
2. Operations Research –Hillier , Liebermann
3. Profit and Revenue Management related Cases and Journal Articles from Airlines, Hotel , Travel Industry

Softwares:

1. Microsoft EXCEL, Palisade Decision Tools (www.palisade.com) , LINDO/LINGO

Any other information:

Details of Internal Continuous Assessment (ICA)

Test Marks: 20

Term Work Marks: 30

Details of Term work:

1. 6 Case Study analysis
2. One class tests.
3. 4 Group assignments

Signature

(Prepared by Concerned Faculty/HOD)

Signature

(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. – Data Science (Business Analytics)				Semester : II	
Course/Module : Finance Analytics (Elective)				Module Code: MTDS02018	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
4	0	0	4	Scaled to 50 Marks	Scaled to 50 marks
Pre-requisite: Nil					
Objectives: After gaining knowledge in basic finance, interested students for this elective subject will learn application on statistical and stochastic methods and processes on financial data and gain advanced knowledge to find deep insight from financial data to make business impact.					
Outcomes: After completion of the course, students would be able to: <ul style="list-style-type: none"> • In this course you will learn to write a document using R markdown, integrate live R code into a literate statistical program, compile R markdown documents using knitr and related tools, and organize a data analysis so that it is reproducible and accessible to others. 					
Detailed Syllabus:					
Unit	Description				Duration
1	Corporate finance Analyzing ratios from the three financial statements. Analysis of the financial position of the companies from various sectors. Applications for forecasting the same.				4
2	Forecasting methodology- quantitative approach				4
3	Working capital Concept & significance of working capital. Analyzing the working capital position of a company from different industries				4
4	Capital budgeting under risk and uncertainty Understand the techniques applied to evaluate capital projects under normal circumstances and under risk and uncertainty. Analyze capital projects on the basis of the techniques and models.				4
5	Business cycles - real estate and economics				4
6	Smart cities: govt should take this forward for better business environment				4

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

7	Sustainable development - a necessary condition for sustainable economy	4
8	Financial Risk- overview, definition, types of financial risk, financial and non-financial risks	4
9	Basel Accord and Risk management <ul style="list-style-type: none"> • Evolution of Basel Accords, • Basel I, Basel II and Basel III, • Regulatory mechanism for risk management, • Capital to Risk Weighted Asset ratio (CRAR) 	7
10	Credit risk modeling <ul style="list-style-type: none"> • Standardized approach and IRB approach • Probability of default (PD), loss give default (LGD) and exposure at default (EAD) • Credit rating system • Credit scoring model: Z-Score model, Logistic model to estimate PD • KMV model • Credit matrix and other credit risk models • Credit default swap 	7
11	Operational risk (OR) modeling <ul style="list-style-type: none"> • Definition and concept of OR • Basel II and operational risk management • Operational risk management framework- identification, assessment, measurement and management • Computation of OR capital charge- BIA, TSA and AMA • Advanced measurement Approach (AMA) to model OR • Monte-Carlo simulation to compute OpVaR • Quantitative and qualitative elements of OR management 	7
12	Market risk modeling <ul style="list-style-type: none"> • Definition and types of market risk • Value at Risk (VAR) • Variance co-variance approach • Historical simulation approach 	7
	Total	60

Text Books:

1. Case Study approach

Reference Books:

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

1. Reto R. Gallati. "Risk management and capital adequacy", McGraw - Hill publication. 2003.
2. Philippe Jorion. "Financial risk manager handbook", GARP.

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

Class Tests/ Projects / Presentations

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. – Data Science (Business Analytics)				Semester : III	
Course/Module : Data Science - III				Module Code : MTDS03008	
Teaching Scheme			Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
4	0	0	4	Scaled to 50 marks	Scaled to 50 marks
Pre-requisite: Data Science-I, Data Science-II					
Objectives: The students will learn the main concepts of Time Series theory and methods of analysis. Students will understand the differences between cross-sections and time series, and those specific economic problems, which occur while working with data of these types.					
Outcomes: After completion of the course, students would be able to: Students should become skillful in analysis and modelling of stochastic processes of ARMA (p, d, q) models, get acquainted with co-integration and error correction models, autoregressive models with distributed lags, understand their application in real world.					
Detailed Syllabus:					
Unit	Description				Duration
1	Overview of simultaneous equation models				6
2	Regressive dynamic models: Regressive dynamic models.				4
	Autoregressive models with distributed lags (ADL)				4
	Introduction to VARs, Structural VARs				8
3	Granger causality. Hypothesis testing on rational expectations. Market efficient hypothesis				4
4	Vector auto-regression model and co-integration Time series co-integration. Co-integration regression. Testing of co-integration. Vector auto-regression and co-integration. Co-integration and error correction model.				12
5	Volatility models: ARCH, GARCH and EGARCH modelling, volatility forecasts.				12
6	Panel data: The fixed effects model, Time-fixed effects models, The random effects model				10
Total					60



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Text Books:

1. Gujarati, Damodar N, and Dawn C. Porter (2009) Basic Econometrics. Boston, Mass: McGraw-Hill

Reference Books:

1. Brooks C (2014) Introductory Econometrics for Finance, Cambridge: Cambridge University Press.
2. James Hamilton (1994) Time Series Analysis, Princeton University Press

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program : M. Tech Data Science (Business Analytics)				Semester: III	
Course/Module: Deep Learning				Module Code:MTDS03009	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
4	0	0	4	Scaled to 50 marks	Scaled to 50 marks

Pre-requisite: Machine Learning and Data Mining

Objectives: Expand the knowledge gained in Database Management Systems in several directions like Non-Relational data models, deductive (Intelligent) database systems, Distributed systems, web based systems and object oriented systems etc.

Course Outcomes:

After completion of the course, students would be able to:

1. Design database using concept of extended entity relationship model.
2. Implement functions and procedures using concepts of PL/SQL
3. Implement object oriented concepts in database.
4. Compare and contrast different types of advance database management systems.
5. Describe database Administration and its management.

Detailed Syllabus:

Unit	Description	Duration
1.	Introduction to deep learning: Neural network basics: Supervised Learning with Neural Networks, Computation graph, Broadcasting in Python	07
2.	Shallow neural networks: Computing a Neural Network's Output, Vectorizing across multiple examples, Explanation for Vectorized Implementation, Activation functions, Derivatives of activation functions, Gradient descent for Neural Networks, Back-propagation intuition, Random Initialization	07
3.	Deep Neural Networks: Deep L-layer neural network, Forward Propagation in a Deep Network, Getting your matrix dimensions right, Building blocks of deep neural networks, Forward and Backward Propagation, Parameters verses Hyper parameters	07
4.	Improving Deep Neural Networks: Hyper parameter tuning, Regularization and Optimization: Practical aspects of Deep Learning: Initialization, Regularization, Gradient Checking	07



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

5.	Optimization algorithms: Mini-batch gradient descent, Understanding mini-batch gradient descent, exponentially weighted averages, Understanding exponentially weighted averages, bias correction in exponentially weighted averages, Gradient descent with momentum	08
6.	Hyperparameter tuning, Batch Normalization and Programming Frameworks	08
7.	Convolutional Neural Networks: Foundations of Convolutional Neural, Deep convolutional models: case studies, Object detection, Special applications: Face recognition & Neural style transfer	08
8.	Sequence Models: Recurrent Neural Networks, Natural Language Processing & Word Embedding, Sequence models & Attention mechanism	08
	Total	60

Text Books:

Deep Learning, by Ian Goodfellow, Yoshua Bengio, Aaron Courville (e-book)

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

1. Minimum 5 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech Data Science (Business Analytics)				Semester: III	
Course/Module: Artificial Intelligence				Module Code:MTDS03010	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
4	0	0	4	Scaled to 50 marks	Scaled to 50 marks
Pre-requisite: Machine Learning and Data Mining					
Objectives: Expand the knowledge gained in Database Management Systems in several directions like Non-Relational data models, deductive (Intelligent) database systems, Distributed systems, web based systems and object oriented systems etc.					
Course Outcomes: After completion of the course, students would be able to: 1. Design database using concept of extended entity relationship model. 2. Implement functions and procedures using concepts of PL/SQL 3. Implement object oriented concepts in database. 4. Compare and contrast different types of advance database management systems. 5. Describe database Administration and its management.					
Detailed Syllabus:					
Unit	Description				Duration
1.	Introduction to AI, history of AI, course logistics, and roadmap				05
2.	Intelligent agents, uninformed search				05
3.	Heuristic search, greedy search, A* algorithm, stochastic search				05
4.	Adversarial search, game playing				05
5.	Machine Learning 1: basic concepts, linear models, K nearest neighbours, over-fitting				06
6.	Machine Learning 2: perceptrons, neural networks, naive Bayes				06
7.	Machine Learning 3: Decision trees, ensemble, logistic regression, and unsupervised learning				06
8.	Constraint satisfaction problems				05
9.	Markov decision processes, reinforcement learning.				05
10.	Logical agents, propositional logic and first order logic				05
11.	AI applications to natural language processing (NLP)				04
12.	AI applications and course review				03
	Total				60
Text Books:					

Goray

Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Artificial Intelligence, A Modern Approach. Stuart Russell and Peter Norvig. Third Edition. Pearson Education.

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

1. Minimum 5 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester : III	
Course/Module: Sentiment, Web and Text Analytics				Module Code:MTDS03011	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks -100 in Question Paper)
3	0	0	3	Scaled to 50 marks	Scaled to 50 marks
Pre-requisite: DS I and DS II					
Objectives:					
<ul style="list-style-type: none"> • Understanding extraction of insight from unstructured web. Text analytics is the process of analyzing unstructured text, extracting relevant information, and transforming it into useful business intelligence. • Building model around Sentiment analysis determines if an expression is positive, negative, or neutral, and to what degree 					
Outcomes:					
<p>After completion of the course, students would be able to:</p> <p>After the course students will be equipped with tools and knowledge to extract information and insight from web, text to make business impact. Students also will be equipped to understand sentiments from unstructured information flow from web or streams</p>					
Detailed Syllabus:					
Unit	Description				Duration
1	Part of speech tagging, Syntactic analysis, Semantic analysis, Ambiguity, Text representation, especially bag-of-words representation, Context of a word; context similarity, Paradigmatic relation, Syntagmatic relation				6
2	Entropy, Conditional entropy, Mutual information, Topic and coverage of topic, Language model, Generative model, Unigram language model, Word distribution, Background language model, Parameters of a probabilistic model, Likelihood, Bayes rule, Maximum likelihood estimation, Prior and posterior distributions, Bayesian estimation & inference, Maximum a posteriori (MAP) estimate, Prior model, Posterior mode				5



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

3	Mixture model, Component model, Constraints on probabilities, Probabilistic Latent Semantic Analysis (PLSA), Expectation-Maximization (EM) algorithm, E-step and M-step, Hidden variables, Hill climbing, Local maximum, Latent Dirichlet Allocation (LDA)	5
4	Clustering, document clustering, and term clustering, Clustering bias, Perspective of similarity, Mixture model, likelihood, and maximum likelihood estimation, EM algorithm, E-step, M-step, underflow, normalization (to avoid underflow), Hierarchical Agglomerative Clustering, and k-Means, Direction evaluation (of clustering), indirect evaluation (of clustering), Text categorization, topic categorization, sentiment categorization, email routing, Spam filtering, Naïve Bayes classifier, Smoothing	5
5	Generative classifier vs. discriminative classifier, Training data, Logistic regression, K-Nearest Neighbor classifier, Support Vector Machine (SVM), margin, and linear separator, Classification accuracy, precision, recall, F measure, macro-averaging, and micro-averaging, Opinion holder, opinion target, sentiment, opinion representation, Sentiment classification, Features, n-grams, frequent patterns, and over-fitting, Ordinal logistic regression, Rating prediction	12
6	Aspect rating and aspect weight, Latent aspect rating analysis (LARA), Latent rating regression model, Generative model, Rating prediction, Normal/Gaussian distribution, Prior vs. posterior probability, Text-based prediction, The “data mining loop”, Context (of text data) and contextual text mining, Contextual probabilistic latent semantic analysis (CPLSA): views of a topic and coverage of topics, Spatiotemporal trends of topics, Event impact analysis, Network-regularized topic modeling, NetPLSA, Causal topics, Iterative topic modeling with time series supervision	12
Total		45
Text Books:		
1. 1C. Zhai and S. Massung, <i>Text Data Management and Analysis: A Practical Introduction to Information Retrieval and Text Mining</i> . ACM and Morgan & Claypool Publishers, 2016		



Signature
(Prepared by Concerned Faculty/HOD)

2. Manning, Chris D., Prabhakar Raghavan, and Hinrich Schütze. *Introduction to Information Retrieval*. Cambridge: Cambridge University Press, 2007

Reference Books/Materials:

1. Chris Manning and Hinrich Schütze, *Foundations of Statistical Natural Language Processing*. MIT Press. Cambridge, MA: May 1999. (Chapter 5 on collocations)
2. Chengxiang Zhai, *Exploiting context to identify lexical atoms: A statistical view of linguistic context*. Proceedings of the International and Interdisciplinary Conference on Modelling and Using Context (CONTEXT-97), Rio de Janeiro, Brazil, Feb. 4-6, 1997. pp. 119-129.
3. Shan Jiang and ChengXiang Zhai, *Random walks on adjacency graphs for mining lexical relations from big text data*. Proceedings of IEEE BigData Conference 2014, pp. 549-554.
4. Blei, D. 2012. *Probabilistic Topic Models*. Communications of the ACM 55 (4): 77-84. doi: 10.1145/2133806.2133826.
5. Qiaozhu Mei, Xuehua Shen, and ChengXiang Zhai. *Automatic Labeling of Multinomial Topic Models*. Proceedings of ACM KDD 2007, pp. 490-499, DOI=10.1145/1281192.1281246.
6. Yue Lu, Qiaozhu Mei, and Chengxiang Zhai. 2011. *Investigating task performance of probabilistic topic models: an empirical study of PLSA and LDA*. Information Retrieval, 14, 2 (April 2011), 178-203. doi: 10.1007/s10791-010-9141-9.
7. Yang, Yiming. *An Evaluation of Statistical Approaches to Text Categorization*. Inf. Retr. 1, 1-2 (May 1999), 69-90. doi: 10.1023/A:1009982220290
8. Yang, Yiming. *An Evaluation of Statistical Approaches to Text Categorization*. Inf. Retr. 1, 1-2 (May 1999), 69-90. doi: 10.1023/A:1009982220290
9. Bing Liu, *Sentiment analysis and opinion mining*. Morgan & Claypool Publishers, 2012.
10. Bo Pang and Lillian Lee, *Opinion mining and sentiment analysis, Foundations and Trends in Information Retrieval* 2(1-2), pp. 1-135, 2008.
11. Hongning Wang, Yue Lu, and ChengXiang Zhai, *Latent aspect rating analysis on review text data: a rating regression approach*. In Proceedings of ACM KDD 2010, pp. 783-792, 2010. doi: 10.1145/1835804.1835903
12. Hongning Wang, Yue Lu, and ChengXiang Zhai. 2011. *Latent aspect rating analysis without aspect keyword supervision*. In Proceedings of ACM KDD 2011, pp. 618-626. doi: 10.1145/2020408.2020505
13. ChengXiang Zhai, Atulya Velivelli, and Bei Yu. *A cross-collection mixture model for comparative text mining*. In Proceedings of the 10th ACM SIGKDD international conference on knowledge discovery and data mining (KDD 2004). ACM, New York, NY, USA, 743-748. doi: 10.1145/1014052.1014150
14. Qiaozhu Mei, [Contextual Text Mining](#), Ph.D. Thesis, University of Illinois at Urbana-Champaign, 2009.



Signature

(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

15. Hyun Duk Kim, Malu Castellanos, Meichun Hsu, ChengXiang Zhai, Thomas Rietz, and Daniel Diermeier. *Mining causal topics in text data: Iterative topic modeling with time series feedback*. In Proceedings of the 22nd ACM international conference on information & knowledge management (CIKM 2013). ACM, New York, NY, USA, 885-890. doi: 10.1145/2505515.2505612
16. Noah Smith, *Text-Driven Forecasting*. Retrieved May 31, 2015 from <http://www.cs.cmu.edu/~nasmith/papers/smith.whitepaper10.pdf>

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	20
Term Work Marks	30
Total Marks :	50

Details of Term work:

1. Practical based on 10 Experiments
2. Two class tests.
3. Minimum two assignments



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester :III	
Course/ Module: Advanced Financial Analytics				Module Code : MTDS03005	
Teaching Scheme			Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50) Scaled to 50 marks	Term End Examinations (TEE) (Marks -- in Question Paper)
4	0	0	4		-

Pre-requisite: Financial Analytics

Objectives:

Students should be able to handle a large amount of data from financial sectors like banking, insurance and stock market, process it using various tools and analytical software and find insight for business impact

Outcomes:

After completion of the course, students would be able to:
Students will be familiar using different analytical tools and software to handle, process data. Apply various statistical, mathematical and computational algorithm to find insight for better decision and positive business impact

Detailed Syllabus:

Unit	Description	Duration
1	Identify and define a financial business problem	8
2	Identify tool and software to handle data for processing Gather data as appropriate from industries (Banking, Insurance or stock market)	8
3	Identify and study different statistical methods and tools in detail for application. Design the frame work	7
4	Apply various statistical methods and syudy the erro pattern and analyze	7
5	Select a methods and study it in more detal and do a detailed error analysis with various information criterion. Study the accuracy of method. Write a detail project report on problem and its solution.	15
6	Publish a paperin selected journal	15
Total		60

Text Books:

- This is compete freehand case study defined and solved by industry expert and student will go step by step to understand detail of the solution. Hence no prescribed text book is defined for this course



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	--
Term Work Marks	50
Total Marks :	50

Details of Term work:

- Practical based on 10 Experiments
- Minimum two assignments
- A paper to be published



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester :III	
Course/ Module : Advanced Marketing Analytics				Module Code : MTDS03006	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50) Scaled to 50 marks	Term End Examinations (TEE) (Marks -- in Question Paper)
4	0	0	4		-
Pre-requisite: Financial Analytics					
Objectives: Handling real life data to find insight and then a solution					
Outcomes: After completion of the course, students would be able to: A real life capston project to simulate a real life data project in either finance, marketing or supply chain data					
Detailed Syllabus:					
Unit	Description				Duration
1	Understand the given data in detail. Discuss to define a problem and find a solution				8
2	Identify tool and software to handle data for processing Gather data as appropriate from industries (Banking, Insurance or stock market)				8
3	Identify and study different statistical methods and tools in detail for application. Design the frame work				7
4	Apply various statistical methods and syudy the erro pattern and analyze				7
5	Select a methods and study it in more detal and do a detailed error analysis with various information criterion. Study the accuracy of method. Write a detail project report on problem and its solution.				15
6	Publish a paperin selected journal				15
Total					60
Text Books: <ul style="list-style-type: none"> This is compete freehand case study defined and solved by industry expert and student will go step by step to understand detail of the solution. Henvce no prescribed text book is defined for this course 					



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	--
Term Work Marks	50
Total Marks :	50

Details of Term work:

- Practical based on 10 Experiments
- Minimum two assignments
- A paper to be published



Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: M. Tech. - Data Science (Business Analytics)				Semester :III	
Course/ Module: Advanced Operations and Supply Chain Analytics				Module Code : MTDS03007	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50) Scaled to 50 marks	Term End Examinations (TEE) (Marks -- in Question Paper)
4	0	0	4		-
Pre-requisite: Marketing Analytics					
Objectives: Students should be able to handle a large amount of data from operation and supply chain sectors like airline, automobiles, inventory etc. from operation and supply chain space, process it using various tools and analytical software and find insight for business impact					
Outcomes: After completion of the course, students would be able to: Students will be familiar using different analytical tools and software to handle, process data. Apply various statistical, mathematical and computational algorithm to find insight for better decision and positive business impact					
Detailed Syllabus:					
Unit	Description				Duration
1	Identify and define a operation and supply chain business problem				8
2	Identify tool and software to handle data for processing Gather data as appropriate from industries (airline, automobile, inventory management or educational sector)				8
3	Identify and study different statistical methods and tools in detail for application. Design the solution frame work				7
4	Apply various statistical methods and study the error pattern and analyze				7
5	Select a methods and study it in more detail and do a detailed error analysis with various information criterion. Study the accuracy of method. Write a detail project report on problem and its solution.				15
6	Publish a paper in selected journal				15
	Total				60
Text Books:					

Goray

Signature
(Prepared by Concerned Faculty/HOD)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

- This is complete freehand case study defined and solved by industry expert and student will go step by step to understand detail of the solution. Hence no prescribed text book is defined for this course

Any other information: NIL

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Test Marks	--
Term Work Marks	50
Total Marks :	50

Details of Term work:

- Practical based on 10 Experiments
- Minimum two assignments
- A paper to be published



Signature
(Prepared by Concerned Faculty/HOD)