

SHRI VISHWAKARMA SKILL UNIVERSITY
(Enacted by the Act 25 of 2016, State of Haryana)
DUDHOLA, PALWAL



MBA (Business Analytics)
NSQF Level 9
Batch 2021-2023 and Onwards

MBA (Business Analytics) Scheme and Syllabus - For Academic Session 2021 and Onwards

Semester 1: (12+18)

Semester 2: (12+18)

Semester 3: (12+18)

Semester 4: (12+18)

Semester 1

Code	Subject	Credits			Hours			Theory (Marks)			Practical (Marks)			Total
		T	Tu	To	T	P	To	I	E	To	I	E	To	
MAN801	Data Modelling	2	2	4	30	60	90	30	70	100				100
MAN802	Statistical Analysis	3	1	4	45	30	75	30	70	100				100
MFM805	Accounting and Financial Management	3	1	4	45	30	75	30	70	100				100
MAN803	Managerial Economics	3	1	4	45	30	75	30	70	100				100
AEC801	Viva-Voce	0	2	2							50	50	100	100
SEC Total		12	6	18	165	150	315	120	280	400	50	50	100	500
MGM801	Fundamentals of Management and Organizational Behaviour	3	1	4	45	30	75	30	70	100				100
MGM804	Professional Communication	3	1	4	45	30	75	30	70	100				100
MMK804	Marketing Management	3	1	4	45	30	75	30	70	100				100
GEC Total		9	3	12	135	90	225	90	210	300				300
Total		21	9	30	300	240	540	210	490	700	50	50	100	800

Semester 2

Code	Subject	Credits			Hours			Theory (Marks)			Practical (Marks)			Total
		T	Tu	To	T	P	To	I	E	To	I	E	To	
MAN804	Introduction to Data Science	1	2	3	15	60	75	30	70	100				100
MAN805	Business Analytics	1	2	3	15	60	75	30	70	100				100
MAN806	Econometrics	1	2	3	15	60	75	30	70	100				100
AEC802	Industry Project	0	7	7	0	210	210				100	100	200	200
OMS802	Entrepreneurship	2	0	2	30	0	30	30	70	100				100
SEC Total		5	13	18	75	390	465	120	280	400	100	100	200	600
MAN807	Optimization Analytics	2	2	4	30	60	90	30	70	100				100
MGM803	Research Methodology	3	1	4	45	30	75	30	70	100				100
MHR803	Human Resource Management	2	2	4	30	60	90	30	70	100				100
GEC Total		7	5	12	105	150	255	90	210	300				300
Total		12	18	30	180	540	720	210	490	700	100	100	200	900

Semester 3

Code	Subject	Credits			Hours			Theory (Marks)			Practical (Marks)			Total
		T	Tu	To	T	P	To	I	E	To	I	E	To	
-	Elective 1	2	2	4	30	60	90	30	70	100				100
-	Elective 2	2	2	4	30	60	90	30	70	100				100
-	Elective 3	2	2	4	30	60	90	30	70	100				100
AEC909	Industry Project-Summer Internship	0	6	6	0	180	180				100	100	200	200
SEC Total		6	12	18	90	360	450	90	210	300	100	100	200	500
MAN902	Business Data Mining	2	2	4	30	60	90	30	70	100				100
MAN903	Simulation Modelling	2	2	4	30	60	90	30	70	100				100
MGM915	Project Management	2	2	4	30	60	90	30	70	100				100
GEC Total		6	6	12	90	180	270	90	210	300				300
Total		12	18	30	180	540	720	180	420	600	100	100	200	800

Semester 4

Code	Subject	Credits			Hours			Theory (Marks)			Practical (Marks)			Total
		T	Tu	To	T	P	To	I	E	To	I	E	To	
AEC907	Industry Project	0	18	18	0	540	540				200	200	400	400
SEC Total		0	18	18	0	540	540				200	200	400	400
-	Elective 4	2	1	3	30	30	60	30	70	100				100
-	Elective 5	2	1	3	30	30	60	30	70	100				100
AEC908	Seminar Research	0	4	4	0	120	120				100	100	200	200
OAE101	Human Values & Professional Ethics	2	0	2	30	0	30	30	70	100				100
GEC Total		6	6	12	90	180	270	90	210	300	100	100	200	500
Total		6	24	30	90	720	810	90	210	300	300	300	600	900

Syllabus

SEMESTER I

DATA MODELLING

Course Code: MAN801

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Course Objective

The aim of the course is to make students learn and practice about data modelling using the entity relationship and developing database designs.

Learning Outcomes

L01: Understand the fundamentals of database systems.

L02: Design and draw ER and EER diagram for the real life problem.

L03: Apply normalization techniques to normalize the database.

L04: Understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access.

L05: Convert conceptual model to relational model and formulate relational algebra queries.

Unit	Topics
I (LO 1, 2)	Data Modelling – meaning and concept – Data modelling objects – data modelling development cycle – Steps to create a data model – Data modeller role – model versioning – modelling standards – Data modelling reports – data modelling relationships – types.
II (LO 2, 3)	The Entity-Relationship Model; Data Modelling As Part of Database Design; Identifying Data Objects; Developing the Basic Schema; Refining the Entity-Relationship Diagram; Primary and Foreign Keys; Adding Attributes to the Model; Generalization Hierarchies; Adding Integrity Rules.
III (LO 3, 4)	Overview of the Relational Model: Data Structure and Terminology; Notation; Properties of Relational Tables; Relationships and Keys; Data Integrity; Relational Data Manipulation; Normalization; Advanced Normalization.
IV (LO 2, 4)	MS-Access Database- Screen Layouts; Creating Tables; Database Records; Table Relationship; Queries; Introduction to expression; Window Control and expression; Time series based functions; Forms; Reports; Importing, Exporting, and Linking.
V (LO 4, 5)	Transforming a logical data model into a physical model, including designing database-specific features and constraints. Explore the process of data modelling on modern development projects, including planning, continuous delivery, test driven development, continuous integration.

Recommended Books

1. Michel Berry and Gordon Linoff, Mastering Data mining, John Wiley and Sons Inc 2nd Edition, 2011

2. Michel Berry and Gordon Linoff, Data mining techniques for Marketing, Sales and Customer support, John Wiley, 2011
3. G. K. Gupta, Introduction to Data mining with Case Studies, Prentice hall of India, 2011.

STATISTICAL ANALYSIS

Course Code: MAN802

Course Credit: 04 (3-1-0)
Max. Marks: 100 (30I+70E)

Course Objective

The basic aim of this course is to impart knowledge of basic statistical tools & techniques with emphasis on their application in Business decision process and Management

Learning Outcomes

L01: To enhance knowledge in probability theory

L02: To understand normality and its distribution concepts.

L03: To stress the need for collection of data and its dispersion techniques.

L04: To draw conclusions over the hypothetical situations.

L05: To determine the relationship between dependent and independent variables.

L06: To apply time series analysis in market prediction rates.

L07: To measure the trend setting factors for projection of sales and demand curves.

L08: To extract the variance among the factors of study concerned.

Unit	Topics
I L01 L02	Introduction to Statistics - Collection of Data - Measures of Central Tendency & Dispersion in Frequency Distribution; Probability Theory- Addition, Multiplication & Baye's Theorem. Test for Normality. Skewness & Kurtosis; Clean Data; z-scores, measuring performance
II L03 L04	Distributions and confidence intervals; One sample tests and Bivariate Analysis; Visually represent descriptive statistics; Hypothesis Testing -Test for Single Mean & Two Mean- Chi-Square test, F test - ANOVA
III L04 L05 L06	Chi-square test for single sample standard deviation. Chi-square tests for independence of attributes and goodness of fit. Sign test for paired data. Rank sum test. Kolmogorov-Smirnov - test for goodness of fit, comparing two populations. Mann - Whitney U test and Kruskal Wallis test. One sample run test, rank correlation.
IV L06 L07	Linear and Logistic Regression; Dummy Variable; Bivariate analysis; Selecting the best model and reporting results; Multivariate analysis
V L07 L08	Time Series Analysis , Components Business Forecasting - Objectives of forecasting in business - Prediction, projection and forecasting - Characteristics of business forecasting - Steps in forecasting , Methods of Business Forecasting.

Recommended Books

1. R.S.N. Pillai, V. Bagavathi," Statistics", S.Chand Limited, latest Ed,
2. N.D. Vohra, "Business Statistics", Tata McGraw-Hill Education, latest Ed.
3. G. V. Shenoy, Uma K. Srivastava, S. C. Sharma," Business Statistics", New Age International, latest Ed.
4. Beri," Business Statistics" TataMcGraw Hill, latest Ed.
5. Keller. G," Statistics for Management", Cengage Learning, latest Ed.

6. J. K Sharma, "Business Statistics", Pearson, latest Ed.

7. Arora PN & others, " Complete Statistical Methods", S. Chand, latest Ed.

ACCOUNTING AND FINANCIAL MANAGEMENT

Course Code: MFM805

Course Credit: 04 (3-1-0)
Max. Marks: 100 (30I+70E)

Course Objectives:

The basic purpose of this course is to develop a strategic and policy perspective with respect to the principles of accounting and utilization of accounting information for general purpose decision making in an organisation. The emphasis is on core ideas and techniques with reinforced understanding using practical examples.

Learning Outcomes:

L01: Understanding how accounting decisions affect real company practices.

L02: Understand the concepts of Depreciation, Inventory valuation and the methods employed by Indian Companies.

L03: Strengthening the foundations of the analytical approach to Managerial decision-making.

L04: Understanding the production problem and how managers make input purchase decisions.

Unit	Topics
I L01	Accounting Theory: Concept, Importance, Scope of Accounting, Generally Accepted Principles of Accounting, Indian Accounting Standards, IFRS, Preparation of Financial Statements, Corporate Balance Sheet – Terms, Contents, Format and Analysis.
II L02 L03	Presentation and Disclosure of Accounting Information: Presentation of Financial Position. Financial Statements of Companies, Analysis of Accounting Information: Financial Statement Analysis. Interpretation of Accounting information,
III L01 L03 L04	Cash Flow Statement, Preparing a statement of Cash Flows. Responsibility Accounting and Divisional Performance Measurement, Transfer Pricing: Definition, Objectives and Methods of Transfer Pricing, Recent developments in the field of Accounting.
IV L03 L04	Introduction to Financial Management: Meaning & Scope. Long term sources of funds, cost of capital and its computation, leverage, EBIT & EPs Analysis; Capital Structure – Theories & Determinants.
V L03 L04	Investment Decisions: Conventional and DLF Methods, Risk Analysis and Capital Budgeting, Introduction to Financial Analysis. Walter Model, Gordon Model, MM Approach. Factors affecting Dividend Policy, Forms of Dividend.

Recommended Readings:

1. Anthony, R.N., Hawkins, F.D., & Merchant, K.A. Accounting: Text and Cases (latest ed.). Tata McGraw Hill.
2. Needles B.E., Powers, M., & Crosson, S.V. Principles of Financial Accounting (12th ed.). South-Western College/West.
3. Hilton, R.W., & Platt, D.E. Managerial Accounting (latest ed.). **Tata McGraw Hill.**

MANAGERIAL ECONOMICS

Course Code: MAN803

Course Credit: 4 (3-1-0)
Max. Marks: 100 (30I + 70E)

Course Objective:

The objective of this course is to familiarize the students with the concepts and techniques used in micro-economic theory and to develop managerial capabilities for effective decision-making in a variety of different business situations and market conditions. Managerial Economics provide the students with the basic tools to fundamentally deal with achieving a set of goals in a situation where resources are limited and choices must involve trade-offs, taking into account the external environment. This course provides the foundation for a variety of other courses, like finance, marketing and strategy.

Learning Outcomes:

- L01: Strengthening the foundations of the analytical approach to Managerial decision-making.
- L02: Understanding Consumer Behaviour.
- L03: Understanding the production problem and how managers make input purchase Decisions.
- L04: Understanding the various market structure and how supply is determined in each.
- L05: Understanding the external environment, common information problems faced/created by managers.

Unit	Topics
I L01 L02	Introduction to Microeconomics. Objectives, Marginal Analysis and its uses in the Business Decision- Making.
II L0 L02 L03	Theories of Demand: Preference, Utility Function, Indifference Curve, Revealed Preference Approach, Income and Substitution effects, Demand functions, Demand Forecasting; Managerial Applications.
III L03 L04	Production and Cost: The Production Function, Returns to Scale, Profit Maximization Constrained Optimization Approach to Developing Optimal Input Combination, Relationships, Input Demand Function.
IV L04 L05	Market Structure: Profit Maximization under Different Market Structures, Perfect Competition, Monopoly, Price Discrimination, Other Pricing Strategies of Firms, Monopolistic Competition, Game Theory.
V L04 L05	Models of oligopoly, economics of information.

Suggested Readings:

1. Allen, W. B., Doherty N. A., Weigelt, K., & Mansfield E. *Managerial Economics: Theory, Applications and Cases* (latest ed.). W. W. Norton & Company.
2. Bernheim, B. D., Winston, M., & Sen, A. . *Microeconomics*. McGraw Hill Education.
3. Geetika, Ghosh P., & Roy Chowdhury, P. (2017). *Managerial Economics* (latest ed.). McGraw Hill Education.
4. Hirschey, M. . *Managerial Economics: An Integrative Approach*. Cengage Learning.

5. Koutsoyiannis, A. *Modern Microeconomics* (latest ed.). Palgrave, McMillan.
6. Mark, H. (2009). *Fundamentals of Managerial Economics* (latest ed.). Cengage Learning.

VIVA-VOCE

Course Code: AEC801

Course Credit: 02 (0-0-2)
Max. Marks: 100 (50I+50E)

FUNDAMENTALS OF MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR

Course Code: MGM801

Course Credit: 04 (3-1-0)
Max. Marks: 100 (30I+70E)

Course Objectives:

The objective of the course is to help students develop an understanding of the basic management concepts and behavioral processes in organizations which are important for them to adapt to the changing corporate environment.

Learning Outcomes:

L01: Understanding the concept of organizational behavior and developing an understanding of managerial functions, skills and roles.

L02: Understanding the various organization structures and their usefulness

L03: Strengthening the foundations of individual behavior with an understanding of human personality, perception, learning and emotions.

L04: Understanding the basic process of interpersonal relationship and the behavioral approach to Managerial decision-making.

L05: Understanding how managers can use the models to enhance motivational levels of employees.

L06: Develop an understanding of leadership and teams building in organizations.

Unit	Topic
I L01	Basics of Management: Concept, nature, process and significance of management; Managerial levels, skills, functions and roles (with special reference to BFSI); Management Vs. Administration; Contingency Management theories by - F. W. Taylor, Henry Fayol and Elton Mayo.
II L01 L02	Managerial Skill and Functions: Level of Management- Functions of Management; Centralization - Decentralization; Managerial Planning; Organising and Organization structures - Line & Staff - functions, Leading and Staffing; Controlling - Definition, Nature, Importance, Steps, Techniques
III L03 L04	Organisation Behaviour: Definition, Scope, Importance, Concepts of Organisation Behaviour; Values, Attitude and Perception; Perceptual Process, Social perception (stereotyping and halo effect).
IV L04 L05	Motivation- Definition, Theories of motivation, Mc Gregor, A.H. Maslow, Herzberg; Learning- Meaning & Theories.
V L05 L06	Leadership & Team Building -Definition, Importance, qualities of leaders, types of leaders; Success stories of today's Global and Indian leaders ; Interpersonal and Group Dynamics; Team Building; Personality- Attributes of personality, Type, Ego state, Johari window.

Books Recommended

Text Books

1. Management by Stomen and Jane
2. Organisational behaviour by Stephen Robbins

Reference Books

1. Principles and Practices of management by Shejwalkar
2. Essential of management by Koontz H and Weitrich
3. Principles and Practices of Management by T. N. Chabra
4. Organisational behaviour by Keith & Davis
5. Organisational behaviour by Fred and Luthans
6. Organisational behaviour by K. Ashwatthapa

Web Links

<https://www.swayamprabha.gov.in/index.php/program/archive/16>
<https://www.swayamprabha.gov.in/index.php/program/archive/5>
<http://cec.nic.in/E-Content/Pages/default.aspx>

PROFESSIONAL COMMUNICATION

Course Code: MGM804

Course Credit: 04 (3-1-0)
Max. Marks: 100 (30I+70E)

Course Objectives:

The aim of the course is to develop skills and competencies in participants to be able to communicate effectively through written, oral and social medium. This course will make students conversant with the basic forms, formats and techniques of business writing so that they would be thoroughly prepared to communicate effectively in all contexts. Sensitivity towards cross-cultural communication will be developed with familiarity with global business etiquette and protocols. The pedagogical focus of the course will be lecture cum workshop-based format with emphasis on practice and skills development.

Learning Outcomes:

L01: Understanding the role of communication in the organizational and Global Context

L02: Understanding the basics of effective written and verbal communication

L03: Understanding the theoretical models of communication and development in communication research

L04: Analysing one's own communication style in different contexts and mediums

L05: Exposure and training of technical writing, responsibilities of a communicator, Ethical Issues and Legal Issues

Unit	Topics
I L01 L02	Concepts of Communication in Business: Introduction to Business Communication, Components of Communication (7Cs), Listening Skills , Verbal and Non-Verbal Skills and Presentation Skills., Legal issues in Communication
II L02 L03	Formal Communication: Planning and executing different types of messages, writing reports, proposals and Business plans, Improving personal writing skills
III L03 L04	Interpersonal Communication Skills: Communicating in teams, Negotiation Skills, Communication skills during a conflict, Mentoring and Appraisals, Communication in Social Media and Digital Communication
IV L04 L05	Cross Cultural Communication: Theoretical Framework of Cross-Cultural Communication, Communication across cultures through different mediums, Business Etiquettes across cultures
V L04 L05	Communication for career: Resume writing and cover letters, Group Discussions and Interviews, Communication during Exit Interviews, Ethics and Communication

Recommended Readings:

- Lehman, C. M., Dufrene D. D., & Sinha, M. *BCOM: The South Asian Perspective on Business Communication* (latest ed.). New Delhi: Cengage Learning.
- Murphy, H. A., Hildebrandt, H.W., & Thomas, J.P. *Effective Business Communication* (latest ed.). Boston: McGraw-Hill Companies.
- Bovee, C., & Thill, J.V., & Raina, R.L. . *Business Communication Today* (latest ed.). Pearson

- Mukerjee, H. S. *Business Communication* (latest ed.). New-Delhi: Oxford University Press
- Post Emily. *The Etiquette Advantage in Business* (latest ed.). New York: Collins.
- Sandra, M. O. *Handbook of Corporate Communication and Strategic Public Relations: Pure and Applied*. Routledge.

MARKETING MANAGEMENT

Course Code: MMK804

Course Credit: 04 (3-1-0)
Max. Marks: 100 (30I+70E)

Course Objective:

To introduce the students to the concepts, strategies and contemporary issues involved in the marketing of products and services.

Course Learning Outcomes:

- L01: Understanding the nature and scope of marketing
- L02: Develop an understanding of various marketing philosophies
- L03: Understanding the marketing mix and marketing environment
- L04: Understanding segmentation, targeting and positioning
- L05: Understanding consumer behaviour and its application in marketing
- L06: Develop an understanding of decisions concerning 4 P's – product, price, place and promotion
- L07: Understanding contemporary issues in marketing

Unit	Topics
I L01 L02 L03	Introduction to Marketing: Nature and Scope of Marketing, Marketing Concepts, Marketing Philosophies, Customer Value, Holistic Marketing, Marketing Environment: Environmental monitoring, Understanding the impact of Macro and Micro environment on Marketing, Global Marketing.
II L03 L04	Identifying and Selecting Markets: Consumer Buying Behaviour, Organizational Buying Behaviour, Market Segmentation, Targeting and Positioning, Marketing Research and Market Information, Strategic Marketing Planning Process: Competitor analysis, Marketing Warfare Strategies, Marketing Planning Process
III L04 L05	Product Mix Strategies: Product, Planning and Development, Product Life Cycle, New Product development, Brands, Packaging and Labelling, Developing Pricing Strategies: Setting Price, Factors influencing Price Determination
IV L05 L06	Channels of Distribution: Designing Distribution Channels, Managing Conflicts and Controls in Channels, Retailing, Wholesaling and Logistics, Marketing Communication: Role of Promotion in Marketing, Integrated Marketing Communication, Determining Promotional Mix, Advertising, Sales Promotion Public Relations, Personal Selling and Sales Management.
V L06 L07	Trends in Marketing: Service Marketing, Social Media Marketing, Green Marketing, Customer Relationship Management, Rural marketing, other emerging trends.

Recommended Readings:

- Etzel, M. J., Bruce, J. W., Stanton, W. J., & Pandit, A. *Marketing* (latest ed.). New Delhi: Tata McGraw-Hill.
- Kotler, P. & Armstrong, G. *Principles of Marketing* (latest ed.). Pearson.
- Kotler, P., Keller, K., Koshy, L., & Jha, M. *Marketing Management: A South Asian Perspective* (latest ed.). New Delhi: Pearson.

- Perrault, W.D (Jr.), Cannon, J.P., & McCarthy, E.J. *BasicMarketing*. New Delhi: Tata McGraw-Hill.
- Ramaswamy, V. S. & Namakumari, S. *Marketing Management: Global perspective Indian context* (latest ed). New Delhi: Macmillan.
- Saxena, R. *Marketing Management* (latest ed.). New Delhi: Tata McGraw Hill.

SEMESTER II

INTRODUCTION TO DATA SCIENCE

Course Code: MAN804

Course Credit: 03(1-2-0)
Max. Marks: 100(30I+70E)

Course Objectives

- To understand the basic concepts of Data science
- Classification and clustering process
- Data Visualization Techniques

Learning Outcome

1. Ability to analyse the data and carry out supervised, un-supervised Learning processes
2. Ability implement Data Visualization Techniques
3. Ability to do regression, correlation and knowledge discovery of the data
4. Explore the fundamental concepts of data science
5. Understand data analysis techniques for applications handling large data

Unit	Topics
I (LO 1,2)	Introduction and Data Pre-processing: Why Data Mining? What Is Data Mining? What Kinds of Data Can Be Mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted?, Major Issues in Data Mining, Data Pre-processing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization
II (LO 2,3)	Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and Methods Basic Concepts, Frequent Itemset Mining Methods, Which Patterns Are Interesting? — Pattern Evaluation Methods, Advanced Pattern Mining: Pattern Mining: A Road Map, Pattern Mining in Multilevel, Multidimensional Space, Constraint-Based Frequent Pattern Mining, Mining High-Dimensional Data and Colossal Patterns, Mining Compressed or Approximate Patterns
III (LO 2,4)	Classification Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy, Support Vector Machines, Lazy Learners (or Learning from Your Neighbors)
IV (LO 3,4)	Cluster Analysis: Basic Concept and Methods Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering, Clustering High-Dimensional Data, Clustering Graph and Network Data
V (LO 4,5)	Data Mining Trends and Research Frontiers Mining Complex Data Types, Other Methodologies of Data, Mining, Data Mining Applications, Data Mining and Society, Data Mining Trends

Recommended Books:

- Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Morgan Kaufmann, 2011.
- Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Person Education, 2007.
- K.P. Soman, Shyam Diwakar and V. Ajay ", Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2016.

- Gupta, “ Introduction to Data Mining with Case Studies”, EasterEconomyEdition, Prentice Hall of India, 2006.
- IEEE Resources on Data Science

BUSINESS ANALYTICS

Course Code: MAN805

Course Credit: 03(1-2-0)
Max. Marks: 100(30I+70E)

Course Objective

The course is to understand the management and administration, functions of management, formal and informal organization, staffing, creativity and innovation, process of communication. The objective of the course is partly to give an introduction to the software R and how to write elementary programs and partly to demonstrate how statistical models are implemented and applied.

Learning Outcomes

1. Evaluate the key concepts of business analytics
2. To integrate very large data sets to make business decisions
3. Recognise and make appropriate use of different types of data structures
4. Outline the relationship of the business analytics process within the organisation's
5. Decision-making process.
6. Examine and apply appropriate business analytic techniques and methods
7. To critically analyse the predictive analysis methods.
8. Design and write functions in R and implement simple iterative algorithms
9. Outlines the application of R in real world situations

Unit	Topics
I (LO 1,2)	Definition of Business Analytics, Categories of Business Analytical methods and models, Business Analytics in practice, Big Data - Overview of using Data, Types of Data.
II (LO 2,3)	Over view of Description Statistics (Central Tendency, Variability), Data Visualization-Definition, Visualization Techniques – Tables, Cross Tabulations, charts, Data Dashboards using Ms-Excel or SPSS.
III (LO 3,4)	Predictive Analytics- Trend Lines, Regression Analysis –Linear & Multiple, Forecasting Techniques, Data Mining -Definition, Approaches in Data Mining-Data Exploration & Reduction, Classification, Association, Cause Effect Modelling.
IV (LO 5,6,7)	Prescriptive Analytics-Overview of Linear Optimization, Non Linear Programming Integer Optimization, Cutting Plane algorithm and other methods, Decision Analysis – Risk and uncertainty methods.
V (LO 8,9)	R Environment, R packages, Reading and Writing data in R, R functions, Control Statements, Frames and Subsets, Managing and Manipulating data in R.

Recommended Books

1. Camm, Cochran, Fry, Ohlmann, Anderson, Sweeney, Williams- Essentials of Business Analytics, Cengage Learning.
2. James Evans, Business Analytics, Pearson, Second Edition, 2017.
3. Albright Winston, Business Analytics- Data Analysis-Data Analysis and Decision Making, Cengage Learning, Reprint 2016.
4. Sahil Raj, Business Analytics, Cengage Learning.

ECONOMETRICS

Course Code: MAN806

Course Credit: 03(1-2-0)
Max. Marks: 100(30I+70E)

Course Objectives:

To provide the basic knowledge of econometrics. While the course is ambitious in terms of its coverage of technical topics, equal importance is attached to the development of an intuitive understanding of the material that will allow these skills to be utilised effectively and creatively, and to give participants the foundation for understanding specialized applications through self-study with confidence when needed.

Learning Outcomes

Students who successfully complete the course:

1. Should be comfortable with basic statistics and probability.
2. Able to use a statistical/econometric computer package to estimate an econometric model and be able to report the results of their work in a non-technical and literate manner.
3. Able to estimate and interpret linear regression models and be able to distinguish between economic and statistical importance.
4. Able to critique reported regression results in applied academic papers and interpret the results for someone who is not trained as an economist.

Unit	Topics
I (LO 1)	Introduction: Nature and scope of Econometrics. Data-Types of data
II (LO 2)	Statistical Inference Normal distribution; chi-sq, t- and F-distributions- Estimation of parameters-Testing of hypotheses-Defining statistical hypotheses-Distributions of test statistics-Testing hypotheses related to population parameters Type-I and Type-II errors; Power of a test Tests for comparing parameters from two samples.
III (LO 3)	Simple Linear Regression Model: Two Variable Case Estimation of model by method of ordinary least squares-Properties of estimators Goodness of fit- Testing of Hypotheses-Scaling and units of measurement-Confidence intervals-Gauss Markov Theorem-Forecasting
IV (LO 3)	Multiple Linear Regression Model Estimation of parameters-Properties of OLS estimators-Goodness of fit- R^2 and Adjusted R^2 -Partial regression coefficients-Testing Hypotheses: Individual and Joint-Functional Forms of Regression Models-Qualitative (dummy) independent variables
V (LO 4)	Violations of Classical Assumptions: Consequences, Detection and Remedies Multicollinearity-Heteroscedasticity-Serial Correlation-Omission of a relevant variable Inclusion of irrelevant variable-Tests of specification

Recommended Books:

- D. N. Gujarati and D.C.Porter, Essentials of Econometrics, 4th Edition, McGraw Hill International Edition, 2010.
- Christopher Dougherty, Introduction to Econometrics, 4th edition, OUP, Indian edition, 2011.
- Jay L. Devore, Probability and Statistics for Engineers, Cengage Learning, 2010.
- John E. Freund, Mathematical Statistics, Prentice Hall, 2011.
- Irwin Miller and Marylees Miller, John E. Freund's Mathematical Statistics with Applications, 8th edition, Pearson.

INDUSTRY PROJECT

Course Code: AEC802

Course Credit: 07(0-7-0)
Max. Marks: 200(100I+100E)

ENTREPRENEURSHIP

Course Code: OMS802

Course Credits: 02(2-0-0)
Max. Marks: 100(30I+70E)

Course Objectives: The objective of this course is to expose the learner to the fields of entrepreneurship development. Focus will be to train the students to develop new projects and encouraging them to start their own ventures.

Units	Topics	Learning outcomes
Unit-1	Introduction to Entrepreneurship	Introduction to Entrepreneurship, , Entrepreneurial Mindset, Characteristic of an Entrepreneur, Advantages and disadvantages of Entrepreneurship
	Recognise Opportunity	Purpose of all businesses, Types of Entrepreneurial organizations, Types of Enterprises
	Creativity & Innovation	Marketing, 4Ps of Marketing, Process of Marketing, Marketing Mix, 7Ps of Marketing
	Conception & Ideation	Business Plan and its elements, Application of Business Plan
	Are you a risk taker?	Entrepreneurs, types of Entrepreneurs, Roles and Responsibilities of Entrepreneurs, Qualities of an Entrepreneur
	Identify Your Customer	Customer segmentation, Criteria for selling customer value proposition, Customer Lifecycle
Unit-2	Self Confidence and Resilience	4 Ps of Entrepreneurship, Qualities of successful entrepreneur, Self-confidence, Positive attitude, Overcoming the fears, Recover from Failure
	Success and Failure Stories of Famous Entrepreneurs – 1	Steve Jobs Success Story, Mumbai Dabbawala delivery success Story
	Never Give Up	Importance of Focusing energy on Business, Importance of Business Networking and its advantages
	Competition Analysis	Competition Analysis, Factors affecting competition strategies, Prerequisites of successful enterprise

	Risks – Identification and Mitigation	Business Risk, Types of Business Risks, Risk Identification, Risk Mitigation,
	Getting Money for Business	Concept Of Funding, Basics terms of Accounting, Types of Funding,
Unit-3	Dream and Achieve	Vision, Mission and Goals, Business Ethics, SMART goals, entrepreneurial work ethics
	Leadership and Team Spirit	Lead by example, Importance of Embracing diversity, Role of Emotional Intelligence to be a leader.
	Success and Failure Stories of Famous Entrepreneurs – 2	
	Serving the Society	Roles of Entrepreneurs in society, Selfless Entrepreneurship,
	Taking Ownership	Taking complete ownership, taking control over the business
	Adapt to Change	Porters competition strategies, Factors affecting business,
	Discover Yourself	Qualities of the successful entrepreneur
Unit-4	Problem Solving: Introduction to Critical Thinking	Critical Thinking, Applying critical thinking, REASON Model of Critical Thinking
	Problem Solving: Introduction to Creative Thinking	Creative thinking, Importance and benefits of Creative thinking, Creative thinking in problem solving
	Problem Solving: Introduction to Decision Making	Decision making, Effective decision making process
Unit-5	4Ps of Marketing - PDF	4Ps- Product, Place, Price, Promotion, Apply 4Ps to marketing Strategy into action
	Costs in Entrepreneurship - PDF	Cost, types of Costs, Introduction to Accounting Basics, main methods of Accounting, Financial Documents, P&L statements, Working capital
	Applicable Sources of funding and Regulatory and Statutory rules - PDF	Regulatory and statutory rules for an Entrepreneur, Business Loans for startups and MSMEs by Indian Government
	Analysis of success and failure stories - PDF	Analysis of success and failure stories, Key skills involved in the successes of entrepreneurs
	Identification of one's entrepreneurial skills and knowledge - PDF	Identify various skills and characteristics o be an entrepreneur, Effective Ways to Build Entrepreneurial Skills, Develop or Improve your Entrepreneurial Skills ,
	Legal Issues	Intellectual Property Rights, patents, trademarks, copyrights, trade secrets, licensing, franchising

Books Recommended

1. NVR Naidu and T.Krishna Rao, Management and Entrepreneurship, JK Int Pub House, New Delhi
2. S Anil Kumar, Small Business and Entrepreneurship, IK Int Pub House, New Delhi
3. Balraj Singh, Entrepreneurship Development, Wisdom, New Delhi
4. Timmons and Spinelli, New Venture Creation:Entrepreneurship for 21st Century,Tata McGraw Hill Publishing Company New Delhi
5. C.V. Bakshi, Entrepreneurship Development, Excel Publications.
6. Vasant Desai, Dynamics of Entrepreneurial Development and Management,Himalaya Publishing House, Mumbai.
7. Arora M., Natarajan K. and Gordan E., Entrepreneurship Development, 1st ed; Himalaya Publishing House Pvt Ltd, 2009.

Reference Books

1. Hisrich, Robert D., Michael Peters and Dean Shepherd, Entrepreneurship, Tata McGraw Hill, New Delhi
2. Barringer, Brace R., and R. Duane Ireland, Entrepreneurship, Pearson Prentice Hall, New Jersey (USA)
3. Lall, Madhurima, and Shikha Sahai, Entrepreneurship, Excel Books, New Delhi
4. Charantimath, Poornima, Entrepreneurship Development and Small Business Enterprises, Pearson Education, New Delhi.
5. Forbat John, "Entrepreneurship" 1st Edition, New Age International, 2008.
6. Havinal, Veerbhadrappa, "Management and Entrepreneurship", 1st Edition, New Age International Publishers, 2008.
7. John S.M., rural women Entrepreneurship, 6th ed; Discovery Publishing House, 2004. □ Janakiram B., Management & Entrepreneurship, Excel Books India, 2009.
8. Prahlad, CK., Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits, 1st Edition; Dorling Kindersley Ltd, 2006.

Web Links

1. https://www.tutorialspoint.com/entrepreneurship_development/entrepreneurship_development_tutorial.pdf
2. <https://www.bing.com/videos/search?q=entrepreneurship+development+videos&qvvt=entrepreneurship+development+videos&view=detail&mid=2F136B2E6941D1F8DB4E2F136B2E6941D1F8DB4E&&FORM=VRDGAR>
3. <https://www.bing.com/videos/search?q=entrepreneurship+development+videos&qvvt=entrepreneurship+development+videos&view=detail&mid=01D578B93003F888E6DF01D578B93003F888E6DF&&FORM=VRDGAR>

OPTIMIZATION ANALYTICS

Course Code: MAN807

Course Credit: 4(2-2-0)
Max. Marks: 100(30I+70E)

Course Objective

The objective of this course is to acquaint the learner with the applications of some important Operations Research techniques. Focus will be on understanding the use of these techniques in solving business problems.

Learning Outcomes

After successful completion of this course, students shall be able to;

1. Are exposed to the various issues related to qualitative and quantitative techniques of optimization.
2. Develop skills to formulate and apply the techniques of optimization and simulation to solve problems of business world.
3. Able to formulate decision models to solve real life problem and proficiently allocating scarce resources to optimize the objective function.
4. Are exposed to the strategies to be played to compete in competitive business world.

Unit	Topics
I (LO 1,2)	Linear programming: general structure, formulation of product mix problems. Graphical and Simplex algorithm application for optimum solutions, Duality & Sensitivity analysis. Marketing applications, financial applications, production management applications, Data Envelopment Analysis. Transportation models and optimum solution: Transshipment Problems, Assignment models: Hungarian algorithm.
II (LO 2,3)	Non-Linear Programming, Optimization Models: Quadratic Programming, Integer Linear Programming-problems & applications. Goal Programming, Weighted and pre-emptive goal programming, Formulation of Goal programming problem and solutions. Queuing system and introduction to stochastic processes, Measures of performance, Arrival and Service processes, Single server and multi-server models, channels in parallel with limited applications of Simple Queuing Decision Models.
III (LO 3,4)	Network Models: Shortest Path Models Project Scheduling Models, Minimum Spanning Tree Model, Maximal Flow Problem. Decision Analysis: Decision-making process, types of decision making environment: under certainty, under risk, under uncertainty, criteria of decision-making under uncertainty: criteria of decision-making under risk; Decision tree; Precision Tree, Add-in Decision making under risk; Expected value, multistage decision problems.
IV (LO 4,5)	Game theory: two-person zero sum and constant sum games, saddle point, probability, nature as a player, two-person zero sum games: mixed or randomized strategy equilibria, domination, Graphical solution, Strategic form of prisoner's dilemma. Simulation and Optimization and applications. Simulation, Nature of simulation, simulation process, random number generation, applications of process to business related problems, decision noise and biasness.
V (LO 4,5)	Dynamic Programming: Production and Inventory control Problems, Shortest route problems and applications, multistage decision processes, Bellman's principle of optimality, Selective dynamic programming applications. Inventory Models: Economic order quantity and Economic production lot size. Forecasting Models: Overview of Time Series Models, Moving Averages Models, Delphi

Method, Expert Judgment Method, Exponential Smoothing Models, Econometric forecasting modeling.

Recommended Books

- Anderson, D.R. Sweeney, D.J. and Williams, T.A. An Introduction to Management Science, Thomson Publisher
- Ravindran, D. T. Phillips and James J. Solberg, Operations Research- Principles and Practice, John Wiley & Sons.
- Hamdy A. Taha, Operations Research-An Introduction, Prentice Hall,
- F.S. Hillier. G.J. Lieberman, Introduction to Operations Research- Concepts and Cases, Tata McGraw Hill.
- Vohra N.D, Quantitative Techniques in Management, Tata McGraw Hill
- Wayne Winston and Chris, Albright Practical Management Science.
- Stephen G. Powell, Kenneth R. Baker, Management Science, The Art of Modeling with Spreadsheets, John Wiley and Sons Inc.
- S. Chandra, Jayadeva, Aparna Mehra, Numerical Optimization with Application, Narosa Publishing House.

RESEARCH METHODOLOGY

Course Code: MGM803

Course Credit: 04 (3-1-0)
Max. Marks: 100 (30I+70E)

Objective

To equip the students with the basic understanding of research methodology and to provide insight into the application of modern analytical tools and techniques for the purpose of management decision making.

Learning Outcome

1. Understand the various aspects of research methods.
2. Ability to collect the data from primary and secondary source.
3. Application of various tools to conduct research.
4. Ability to prepare a research report.
5. Demonstrate familiarity with major concepts, theoretical perspectives, empirical findings, and historical trends
6. Understand and apply basic research methods including research design, data analysis, and interpretation.
7. Development of testable hypotheses, differentiate research design and/or statistics, evaluate aptness of research conclusions, and generalize them appropriately.
8. Use research data to formulate or evaluate new research questions, using reason and persuasion in a logical argument.

Unit	Topic
I (LO 1)	Introduction: Meaning of research; Types of research- Exploratory research, Conclusive research; The process of research; Research applications in social and business sciences; Features of a Good research study, Research Problem and Formulation of Research Hypotheses, Writing a research proposal- Contents of a research proposal and types of research proposals.
II (LO 2, 3)	Primary and Secondary Data: Classification of Data; Secondary Data: Uses, Advantages, Disadvantages, Types and sources; Primary Data Collection: Observation method, Focus Group Discussion, Personal Interview method. Attitude Measurement and Scaling, Criteria for Good Measurement.
III (LO 4,5)	Questionnaire Design and Sampling: Types of Questionnaires; Process of Questionnaire Designing; Advantages and Disadvantages of Questionnaire Method., Sampling concepts- Sample vs Census, Sampling vs Non Sampling error; Sampling Design- Probability and Non Probability Sampling design; Determination of Sample size- Sample size for estimating population mean, Determination of sample size for estimating the population proportion, Data Processing.
IV (LO 6,7)	Univariate and Bivariate Analysis of Data: Descriptive Analysis of Univariate data- Analysis of Nominal scale data, Analysis of Ordinal Scaled Questions, Measures of Central Tendency, Measures of Dispersion; Descriptive Analysis of Bivariate data, Correlation and Regression Analysis, Testing of Hypotheses
V (LO 4,8)	Chi-square Analysis & Report Writing: Chi square test for the Goodness of Fit; Chi square test for the independence of variables; Chi square test for the equality of more than two population proportions, Analysis of Variance, Research Report Writing, Ethics in Research

Books Recommended

1. Mark Saunders, Philip Lewis, Adrian Thornbill, Research Methods for Business Students, Pearson,ND

2. Churchill, Iacobucci & Israel, Marketing Research: A South Asian Perspective, Cengage, New Delhi
3. C.R. Kothari, Research Methodology, New Age International.
4. Carver & Nash, Data Analysis with SPSS, Cengage, New Delhi
5. Alan Bryman & Emma Bell, Business Research Methods, Oxford University Press.
6. Donald R. Cooper & Pamela S. Schindler, Business Research Methods 8th Edition, Tata McGraw Hill.
7. K.V.S. Sarma, Statistics made simple, do it yourself on PC, Prentice Hall.
8. V P Michael, Research Methodology in Management, Himalaya, Mumbai

HUMAN RESOURCE MANAGEMENT

Course Code: MHR803

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objectives

To introduce the concepts, theoretical frameworks, issues in HRM and make participants understand the role of HRM in organizations.

Learning Outcomes

1. The students will be able to develop their interpersonal skills.
2. The students will be able to understand the effectiveness of work as managers or professionals in a team.
3. Will be able to manage their work to meet requirements.

Unit	Topic
I (LO 1)	Introduction: Understanding the nature and scope of Human resource management, Functions and objectives of HRM, Role of HR, HR department structure & HR strategy
II (LO 2)	HRP, Recruitment & Selection: Nature and importance of Human resource planning, Recruitment & Selection process in BPS, Meaning and importance placement and induction
III (LO 2)	Training, Development & Job Analysis: Training & human resource development, Performance appraisal, career development and planning, Job analysis, job description and job design, job specification, job simplification and quality of work life (QWL).
IV (LO 1, 2, 3)	Remunerations & Benefits: Managing basic remunerations, Basic concepts & Importance of compensation plan, fringe benefits, incentives, and social security schemes.
V (LO 1, 2, 3)	Job Evaluation & Ethical Issues: Significance of Job evaluation, Methods of Job evaluation, managing ethical issues in human resource management

Books Recommended

1. Armstrong, M. & S. Taylor. (2017). Armstrong's Handbook of Human Resource Management Practice (14th ed.). London: Kogan Page.
2. Aswathappa, K. (2017) Human Resource Management: Text and Cases. (8th ed.) New Delhi: McGraw Hill.
3. Bohlander, G.W., & Snell, S.A. (2016) Principles of Human Resource Management (16th ed.). New Delhi: Cengage India.
4. Carbonara, S. (2013) Manager's Guide to Employee Engagement. New York: McGraw Hill.
5. Cascio, W. (2015). Managing Human Resources: Productivity, Quality of Work Life, Profits (10th ed.). New York: McGraw Hill.
6. DeCenzo, D.A., Robbins, S.P., & Verhulst, S.L. (2016) Human Resource Management (12th ed.). Wiley.
7. Dessler, G. & Varkkey, B. (2015). Human Resource Management (14th ed.). New Delhi: Pearson.
8. Espinoza, C. & Ukleja, M. (2016). Managing the Millennials: Discover the Core Competencies for Managing Today's Workforce (2nd Ed.). New Jersey: Wiley.
9. Gomez-Mejia, L.R., Balkin, D.B., & Cardy, R.L. (2016). Managing Human Resources (8th ed.). Essex: Pearson.
10. Ivancevich, J.M. (2017). Human Resource Management (11th ed.). New York: McGraw Hill.

11. Muller-Camen, M., Croucher, R., & Leigh, S. (2016). Human Resource Management: A Case Study Approach. CIPD. New Delhi: Viva Books.
12. Sharma, R.C. (2016). Industrial Relations and Labour Legislation. New Delhi: Prentice Hall.
13. Venkat Ratnam, C.S., & Dhal, M. (2017). Industrial Relations (2nded.). New Delhi: Oxford University Press.

Web Links

<https://www.swayamprabha.gov.in/index.php/program/archive/16>
<https://www.swayamprabha.gov.in/index.php/program/archive/5>
<http://cec.nic.in/E-Content/Pages/default.aspx>
<https://www.youtube.com/watch?v=f60dheI4ARg>
<https://www.youtube.com/watch?v=7wnpfZRPkNU>

SEMESTER III

INDUSTRY PROJECT -SUMMER INTERNSHIP

Course Code: AEC909

Course Credit: 06 (0-6-0)
Max. Marks: 200 (100I+100E)

All the students will submit their Summer Training Reports (in duplicate) within a period of one month; this period shall be counted from the last date of completion of their Summer Training. The supervisor in the organization under whose guidance the summer training is carried out will be required to grade the student's report in the format prescribed by the university. Each student will be attached with one internal faculty guide; with whom they shall be in continuous touch during the training period. The internal faculty guide will be required to evaluate (out of 100 marks) on the basis of the assessment report provided by the organization where the Summer Training has been completed and his/her own assessment about the work done by the student.

BUSINESS DATA MINING

Course Code: MAN902

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objective

The aim of the course is to make the students proficient in the data mining knowledge and techniques and its application in the business environment. This course will equip the students with abilities to solve the business problem by uncovering the usable information from the big datasets.

Learning Outcomes

L01: Understand the fundamentals of a data-mining

L02: Apply data mining and its classification concepts to the real business problem

L04: Make use of data mining association for business application.

L05: Data Mining application in detection & prevention of the intrusion.

Unit	Topic
Unit I L01	Data Mining: Meaning and concept; Requirement for Data Mining; Parameters & Functionalities of Data Mining; Data Mining system & its classification; advantages & disadvantages of data mining;
Unit II L02	Data Mining: Statistical Perspective; Data processing and pre-processing; Data Cleaning: Missing data, Noisy Data; Process of Data Mining; Application of data mining to business; Introduction of Data Mining Tasks- Classification, Clustering, Association, Abnormality Detection
Unit III L03	Data Mining Classification: Decision Tree based, Rule based, Instance-based approaches and application on predication & recommend-er system; Clustering: Partitional & Hierarchical Methods, Graph-based Methods, Density-based Methods; Validation Applications to Business.
Unit IV L04	Data Mining Association: “Apriori Algorithm & Extensions- Association Pattern Evaluation- Sequential Patterns and Frequent Subgraph Mining, Parallel & distributed algorithm, understanding results, Business Applications.
Unit V L05	Abnormality: Uncovering using statistical & Density based techniques; Risk involved & ethical consideration in Data Mining, privacy “what can/do firms know”? Big Data Analytics in “Mobile Environments”, “Detecting & preventing Fraud using Data Mining Techniques”.

Recommended Readings

- Michel. B., Gordon L., *Mastering Datamining*, John Wiley and Sons Inc (Latest Edition)
- Shmueli P. Bruce, *Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner*, John Wiley & Sons, (Latest Edition)
- Miche.B, Gordon L., *Data mining techniques for Marketing, Sales and Customer support*, John Wiley, (Latest Edition)
- G. K. Gupta, *Introduction to Data mining with Case Studies*, Prentice hall of India, (Latest Edition)
- Pang-Ning T., Michael S., Vipin K., *Introduction to Data Mining*, Pearson Education India, (Latest Edition).

SIMULATION MODELLING

Course Code: MAN903

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objective

The aim of the course is to study and develop and understand various aspects, techniques, tools for modeling and simulation models.

Learning Outcomes

L01. Develop understanding about simulation models and their methodology.

L02. To understand the methods, principle and techniques adopted to generate the random numbers and apply them to develop simulation models

L03. To construct a model for a given set of data and analyze its output and test its validity.

L04. To classify and verify various simulation models with practical examples.

Unit	Topic
I L01	Introduction: Introduction to simulation, Discrete and Continuous simulation, Simulation models, Types of Models, Steps in Simulation study.
II L02	Random Numbers: Properties of Random Numbers, Generation of Random number, Testing for Random numbers, Techniques for generating RandomNumbers, Random Variate Generation.
III L03	Input & Output Modeling Analysis: Input modeling, Data collection, Identifying the distribution with data, Parameter estimation, Goodness of fit tests, Output analysis for a Single model.
IV L04	Verification & Validation Analysis: Model Building, Verification of Simulation Models, Validation of Simulation Models.
V L04	Languages & Applications: Simulation Languages and Simulators, Simulation of Queuing system, Simulation of Inventory system –Simulation of Manufacturing.

Recommended Readings

- Banks, J., Carson, J. S. and Nelson, B. L., Discrete Event System Simulation, (Latest Edition), Pearson Education Asia.
- Averill, M. L. and David, W. K., Simulation Modeling and Analysis, (Latest Edition), McGraw Hill.
- David W. K., Sadowski, R. P. and Sasowski, D. A., Simulation with ARENA, McGrawHill, (Latest Edition).
- Gordon, G., Systems Simulation, Prentice Hall, (Latest Edition).

PROJECT MANAGEMENT

Course Code: MGM915

Course Credit: 04 (2-2-0)

Max. Marks: 100 (30I+70E)

Course Objectives: The aim is to provide a suitable framework for looking insight into the process of preparation, appraisal, monitoring and control of a project. The course provides an understanding of the role of project management technique.

Learning Outcomes:

L01: Understand the foundations of Project Planning & Management.

L02: Make use of project management tools and templates for business

L03: Construct framework of projects and adapt project appraisal techniques for investment in projects.

L04: Apply the project financing and implementation techniques in business

Unit	Topics
I L01	Concept of Project Preparation: Meaning and importance of Project; Types of project; Project life cycle; Project planning & implementation; Management action; Investment returns; Corporate strategy; Objectives of Project Planning, monitoring and control of investment projects. Project Preparation: Technical feasibility, estimation of costs, demand analysis and commercial viability, risk analysis, collaboration arrangements,
II L02	Project management tools, process, plans and project planning tips; balanced scorecard, design project management; Project Management Templates; Project management approaches: Traditional Approach, Critical Chain Project Management, Extreme Project Management, Event Chain Methodology; Process-based management; Project development stages; Project control systems
III L03	Project Management Framework; International Project Management Standards; Project Planning Strategies and Tools; Project Management Frameworks; Project Phases and Milestones; Project Goals; Project Processes.
IV L03	Project Appraisal: Business criterion of growth, liquidity and profitability, social cost benefit analysis in public and private sectors, investment criterion and choice of techniques: Estimation of shadow prices and social discount rate. Financial evaluation: Project rating index; Time Value of Money; Investment Criteria; Project Cash Flows; Cost of Capital; Project Risk Analysis; Project Rate of Return; Special Decisions Situations.
V L04	Project Financing and Implementation: Judgmental, Behavioral, Strategic and organizational Considerations; Financing of Project: Raising finance in domestic market and international market; Infrastructure financing; Tax planning while financing for projects; Implementation

Recommended Readings:

Shenhar, A. J., & Dvir, D. (2007). *Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation*. Harvard Business School Publishing.

Chandra, P. (2014). *Projects: Planning analysis, selection, financing, implementation and review* (8thed.). McGrawHill.

Clifford, F. G., & Larson, E. W. (2018). *Project management the managerial process*. (7thed.). McGraw-Hill.

Clifford, F. G., & Larson, E. W. *Project management the managerial process with MS Project* (6thed.). McGraw-Hill.

Mantel, S. J., Meredith, J. R., Shafer, S. M., & Sutton, M. M. (2011). *Project management* (4thed.). John Wiley & Sons.

SEMESTER-IV

INDUSTRY PROJECT

Course Code: AEC907

Course Credit: 18 (0-18-0)
Max. Marks: 400 (200I+200E)

Every student will be assigned a project topic in the third semester and it will be pursued by him/her under the supervision of an internal supervisor. The dissertation along with soft copy will be submitted by the students in the fourth semester.

The internal assessment shall be done on the basis of a presentation by the student as per the assessment schedule to be decided and announced by the School/Institution. The external assessment shall be done on the basis of Viva Voce and the report by an examiner to be appointed from the Panel of Experts as recommended by the BOS of the University School of Management.

SEMINAR RESEARCH

Course Code: AEC908

Course Credit: 4 (0-4-0)
Max. Marks: 200 (100I+100E)

This course provides students with opportunity to learn new concepts and skills and further develop concepts and skills acquired in core courses. The course is specifically intended to meet the needs of students planning a career in business administration. However, the flexible design of the course accommodates students having diverse career plans and interests. Because the curriculum is individualized no specific program-level learning outcomes can be, or are, established. Students can pursue as a review of papers/books as per the discretion of faculty mentors.

HUMAN VALUES & PROFESSIONAL ETHICS

Course Code: OAE101

Course Credit: 02 (2-0-0)
Max. Marks: 100 (30I+70E)

Objectives

It is practice to introduce this topic with western perspective. The normal practice is to define, as Human values are the virtues that guide us to take into account the human element when we interact with other human beings. Human values are, for example, respect, acceptance, consideration, appreciation, listening, openness, affection, empathy and love towards other human beings.

Learning Outcomes

L01: Understanding of Human values for self (NiYama), and for interaction with outer world (Yama).

L02: Ability to exhibit Professional Ethics in performing a professional task with excellence

L03: Understanding of Professional Ethics that demands to see the unseen with emphasis on Sustainable development / eco-friendly implementation of the task.

L04: Ability to work in team with human values and professional ethics.

Unit	Topics
I LO1	Human Value-1: Morals, Values (Niyam): -Understanding values, Types of values, Role of tracking values for individual & social wellbeing. And Ethics (Yama): Integrity: - Understanding integrity and role of integrity in social harmony – Trustworthiness Work Ethics – Service-Learning – Civic Virtue – Respect for others – Living Peacefully–Caring – Sharing. Honesty: -Understanding honesty and its role in personal and social – Courage – Value Time. Cooperation: -Understanding cooperation and significance of cooperation its family, work team and social cohesiveness, wellbeing and development – Commitment. Tutorial Module: Rational Behaviour versus Ethical Behaviour: Case Studies (from Yoga-Sutra, BhagwatGeeta, Panchatantra, Autobiography of Mahatma Gandhi) or any other literatures.
II LO 1	Human Value-2: Empathy: Basic Concept on Empathy– Self- confidence – Spirituality- Character. Truthfulness: - Understanding truthfulness, need for truthfulness and role of truthfulness in relationship, social interaction, integrity, faiths & dependence – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties – Aspirations and Harmony (I, We & Nature) – Gender Bias – Emotional Intelligence– Emotional Competencies – Conscientiousness. Being, body, brain & mind: - Effective & efficient use of body, brain and mind is personal and social well being Value Judgments, Facts & Values, how values are justified, Aesthetics, Selection of Values, Universal Values, Human Values, Value Education Tutorial Module: Empathy and its types: Case Studies from Yoga-Sutra, BhagwatGeeta, Panchatantra, Autobiography of Mahatma Gandhi or any other literature.
III LO2 LO3	Professional Ethics aiming at excellence and Harmony: Value Based Life and Profession, Professional Ethics and Right Understanding, Competence in Professional Ethics, Issues in Professional Ethics – The Current scenario. Positive and constructive dynamism of power, politics and leadership. Tutorial Module: Ethical decision making: Case Studies (from Yoga-Sutra, BhagwatGeeta, Panchatantra, Autobiography of Mahatma Gandhi or any other literature)
IV LO 4	Professional Ethics: Global Prospective. Globalization and MNCs – Cross Culture Issues – Business Ethics – Media Ethics – Environmental Ethics – Endangering Lives – Bio Ethics – Computer Ethics – War Ethics Tutorial Module: Ethics and Social Networks:

	Case Studies (from Yoga- Sutra, BhagwatGeeta, Panchatantra, Autobiography of Mahatma Gandhi or any other literature)
V L04	Duties and Rights in Profession Concept of Duty – Professional Duties Collegiality – Techniques for Achieving Collegiality – Senses of Loyalty Consensus and Controversy – Professional and Individual Rights – Confidential and Proprietary Information – Conflict of Interest-Ethical egoism – Collective Bargaining – Confidentiality – Gifts and Bribes, Plagiarism Tutorial Module: Ethics in Corporate: Case Studies (from Yoga-Sutra, BhagwatGeeta, Panchatantra, Autobiography of Mahatma Gandhi or any other literature)

Recommended Readings

- New Approaches in Ethics for the Caring Professions: Taking Account of Change for Caring Professions (Lt. Ed.), by Richard Hugman Publisher: Red Globe Press; 2005 edition (9 July 2018)
- Rethinking Values and Ethics in Social Work 1st ed. 2017 Edition, Kindle Edition by Richard Hugman (Author), Jan Carter (Author) Publisher: Red Globe Press; (Lt. Ed.) (16 September 2017)
- Professional Ethics and Human Values Paperback – 2015 by A. Alavudeen (Author), R. KalilRahman (Author), M. Jayakumaran (Author) Publisher: Laxmi Publications; (Lt. Ed.) (2015)
- A Foundation Course in Human Values and Professional Ethics Paperback – 30 Apr 2010 by R.R. Gaur (Author), R. Sangal (Author), G.P. Bagaria (Author) Publisher: Excel Books (30 April 2010)
- Living Issues in Philosophy ((Lt. Ed.)) (1995) By: Titus, Smith and Nolan Publisher: Oxford University Press, New York
- Foundation of Ethics and Management By: B P Banerjee Publisher: Excel Books, 2005
- Case Study: <https://whitneyhess.com/blog/2012/08/21/on-empathy-and-apathy-two-casestudies/> Book: De Gruyter - Speaking of Emotions: Conceptualisation and Expression (edited by AngelikiAthanasidou, ElzbietaTabakowska)
- Book: To Kill a Mockingbird - Lee Harper
- Book: Take A Walk In Someone Else's Shoes by Bethany Morlan
- A paper on 'University Students' Value Priorities and Emotional Empathy': [file:///C:/Users/Dell/Desktop/University Students Value Priorities and Emotiona.pdf](file:///C:/Users/Dell/Desktop/University%20Students%20Value%20Priorities%20and%20Emotiona.pdf)
- Research paper on 'Empathy as Added Value in Predicting Donation Behavior': file:///C:/Users/Dell/Desktop/wp_10_692.pdf
- Decety J and Jackson PL. 2004. The functional architecture of human empathy. Behavioral and cognitive neuroscience reviews 3(2):71-100.
- Klimecki OM1, Leiberg S2, Ricard M2, Singer T3. Differential pattern of functional brain plasticity after compassion and empathy training. SocCogn Affect Neurosci. 2014 Jun; 9 (6): 873-9.
- A paper on 'The Science of Empathy' - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5513638/> 9. A paper on 'The Psychology of Emotional and Cognitive Empathy' - <https://lesley.edu/article/the-psychology-of-emotional-and-cognitive-empathy>.

ELECTIVES (SEMESTER III)

CODES	SUBJECTS
MAN905	Business Intelligence
MAN906	Financial Analytics
MAN907	HR Analytics
MAN908	Marketing Analytics
MAN909	Operations Analytics
MAN910	Supply Chain Analytics
MAN911	Perspective Analytics
MAN912	Banking Analytics

ELECTIVES (SEMESTER IV)

CODES	SUBJECTS
MAN913	Machine Learning for Data Science
MAN914	Advanced Financial Modeling
MAN915	Data Visualization
MAN916	Cloud Computing

ELECTIVES (SEMESTER III)

BUSINESS INTELLIGENCE

Course Code: MAN905

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objective

The objective of business intelligence in a business is to help executives, business managers, and other operational workers make better and more informed business decisions.

Learning Outcomes

L01: Understand the major framework of Business intelligence (BI)

L02: Develop the major frameworks of decision support systems (DSS)

L03: Apply information for decision making

L04: Understand the concepts and architectures of data warehousing and analyze the BI strategy for decision making

Unit	Topics
I (L01)	Introduction of Business Intelligence: Introduction of BI, Difference between Information and Intelligence, Factors of Business Intelligence System, Real time Business Intelligence, Business Intelligence Lifecycle.
II (L03)	Architecting the Data: Introduction, Types of Data, Difference between Data and Information, Distributed Database, Data Modeling, ER Model, Data Normalization, Data Reporting and Query Tools, Data Partitioning, Metadata
III (L03)	Business Intelligence Applications: Roles of Business Intelligence in Modern Business, Challenges of BI, Business Intelligence Tools, DSS (Decision Support System), steps in constructing a DSS, Role in business, Group decision support system.
IV (L04)	Introduction to Data Warehousing: Introduction of Data Warehousing, Advantages and Disadvantages of Data Warehousing, Data Mart, Aspects of Data Mart, Online Analytical Processing, OLAP, OLTP, OLAP Tools, OLAP Data Modeling, Difference between OLAP and OLTP, Multidimensional Data Model, Data Modeling using Star Schema and Snowflake Schema.
V (L01-4)	Case study: Analyze a BI strategy for an emergency healthcare company ; Analysis of BI implementation for a US-based machinery maintenance entity with 25K employees

Recommended Readings

- "Successful Business Intelligence, Second Edition: Unlock The Value Of BI & Big Data" by Cindi Howson. (Latest Edition)
- "Business Intelligence Roadmap: The Complete Project Lifecycle For Decision-Support Applications" by Larissa T. Moss & Shaku Atre. (Latest Edition)
- "Business Intelligence Guidebook: From Data Integration To Analytics" by Rick Sherman. (Latest Edition)

FINANCIAL ANALYTICS

Course Code: MAN906

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objective

This course shall provide hands on learning to students with financial data handling and utilizing the data for financial decision making. This course shall also emphasize on providing experience to students with developing models and checking their applications.

Learning Outcome

L01: To analyse data and get equipped with its basic characteristics.

L02: To learn cause and effect relationship and choice of models in appropriate way.

L03: To understand volatile behaviour of financial data series and model accordingly.

L04: To establish co-movements between data series and forecasting data.

Unit	Topics
I L01	Introduction to Eviews. Understanding formats of time series, cross sectional and panel data. Cleaning and filtering data in excel files. Basic characteristics of time series analysis. Trend analysis and descriptive analysis of data.
II L02	Assumptions of time series modelling. Time Series forecasting with ARIMA model. Visualization of deterministic trends, univariate, bivariate and multivariate analysis. Correlation and causation analysis.
III L03	Regression analysis; Ordinary Least Square, volatility models (ARCH and GARCH), Event study analysis (GARCH family).
IV L04	Cointegration analysis and its assumptions, Vector error correction model, vector autoregressive model and Granger Causal linkages.
V L01 L04	Developing models with real time data and forecasting with time series. Basics of R-Studio (to be covered by a workshop).

Recommended Readings

- Damodar N. Gujarati, Dawn C. Porter, & Sangeetha Gunasekar [GUJ], *Basic Econometrics*, 5th Edition, McGraw-Hill, 2015.
- Ramu Ramanathan [RAM], *Introductory Econometrics with Applications*, 2nd Edition, Cengage, 2014.
- Chris Brooks [CB], *Introductory Econometrics for Finance*, 2nd Edition, Cambridge University Press, 2008.
- Makridakis, Spyros, Steven C. Wheelwright, and Rob J. Hyndman, [MAK], *Forecasting: Methods and Applications*, Third edition. John Wiley and Sons, 1998
- J. M. Woolridge *Introductory Econometrics- A Modern Approach*, 6th Edition, Cengage, 2009.
- Frank Fabozzi, Sergio M. Focardi, Svetlozar C. Rachev, Bala G. Arshanapalli [FAB], *The Basic Handbook of Financial Econometrics*, Wiley, 2014.
- Walter Enders [WE], *Applied Econometric Time Series*, 3rd Edition, Wiley India, 2010

HR ANALYTICS

Course Code: MAN907

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objective

The course aims to comprehend as to how HR and business leaders can take decisions about their people based on deep analysis of facts and data.

Learning Outcomes

L01. Develop an understanding of the role and importance of HR analytics, and the ability to track, store, retrieve, analyse and interpret HR data to support decision-making.

L02. Use applicable benchmarks/metrics to conduct research and statistical analyses related to Human Resource Management

L03. Employ appropriate software to record, maintain, retrieve and analyse human resources information (e.g., staffing, skills, performance ratings and compensation information).

L04. Apply quantitative and qualitative analysis to understand trends and indicators in human resource data; understand and apply various statistical analysis methods.

Unit	Topics
I (L01)	Introduction to HR Analytics: Evolution of HR Analytics, HR information systems and data sources, Introduction to HR Analytics, People Analytics & Workforce Analytics; HR Analytics & the Organizational Structure; Types of Data; HR Analytics and Metrics, Case Discussion
II (L01)	Diversity Analysis: Equality, diversity and inclusion; Workforce segmentation and search for critical job roles; Sentiment and trend analysis; Cost modelling; HR data warehousing; Decision tree; Case discussion - Heroes of the Taj
III (L02)	Recruitment and Talent Acquisition, Talent Acquisition and Analytics Trend; Analytics for Efficiency; Analytics for Effectiveness; Metrics, segmentation and impact; Case Discussion; HRP & Resource Planning; Manpower Planning; Optimization of workforce; Lead Time Analysis
IV (L03)	Predicting employee performance; Training requirements; evaluating training and development; Optimizing selection and promotion decisions; KPI vs metrics; Creating metrics
V (L04)	Tracking impact interventions; Evaluating stress levels and value-change; Formulating evidence based practices and responsible investment; Evaluation mediation process, moderation and interaction analysis

Recommended Readings

- Edwards Martin R, Edwards Kirsten (Latest Edition), "Predictive HR Analytics: Mastering the HR Metric", Kogan Page Publishers, ISBN-0749473924
- Fitz-enz Jac (Latest Edition), "The new HR analytics: predicting the economic value of your company's human capital investments", AMACOM, ISBN-13: 978-0-8144-1643-3
- Fitz-enz Jac, Mattox II John (Latest Edition), "Predictive Analytics for Human Resources", Wiley, ISBN- 1118940709 Session Plan (please add rows and columns as per your course
- Predictive HR Analytics-Mastering the HR Metric, By: Martin R. Edwards & Kristen Edwards, Kogan Page, Latest Edition.
- Predictive Analytics for HR, By: Jac Fitz-Enz & John R. Mattox II, Wiley Publication, Latest

MARKETING ANALYTICS

Course Code: MAN908

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objective

The aim of the course is to make the students proficient in the marketing analysis and techniques and its application in the business environment. The course explores customer data analysis techniques and their theoretical foundations to help students acquire analytic skills that can be applied to real world marketing problems.

Learning Outcomes

L01: Understand the use of marketing analytics in business

L02: Use analytical tools for analysis and decision-making

L03: Transform and translate data into insights

L04: Apply the insights for business actions

Unit	Topic
I L01	Introduction: Marketing analytics, Segmentation and targeting, positioning, customer churn and life time value, Data Preparation, Summarizing with Excel; Pivot Table and Charts.
II L02	Introduction to Various Tools: Statistical distribution, non-parametric tests, Factor analysis, Logistic Regression, Decomposition method, Moving Average. Time Series Analysis.
III L02	Data Analysis: Conjoint analysis, Text analytics, Search analytics, Cluster Analysis, Sentiment Analysis, Demand Forecasting and projections with real corporate examples.
IV L03	Data Insights: Data visualization and business Insight, Pricing analytics and Optimisation of prices, Place Analytics, Promotion Analytics
V L04	Business Applications: Big Data Analytics, Company specific cases can be adopted for implementing models learnt on real data. Social Network Analysis with cases.

Recommended Readings

- Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie or Die (2016) – ISBN 978-1119145677 – Author: Eric Siegel, (Lt.Ed.).
- Gandomi, Amir and Murtaza Haider (2015). “Beyond the hype: Big data concepts, methods, and analytics” (Lt.Ed.).
- Allenby & Brazell, Seven Summits of Marketing Research: Decision-Based Analytics for Marketing’s Toughest Problems, (Lt.Ed.).

OPERATIONS ANALYTICS

Course Code: MAN909

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objective

The objective of the course is to make the students proficient in the field of operations analytics for formulating effective operations management strategies and decisions that serve the needs of the customers whilst maximizing overall profitability of an enterprise.

Learning Outcomes

L01: Formulate, implement, and interpret practical operational analytics models in a computing environment.

L02: Describe common concepts and tools used to support operational decision-making

L03: Develop a multi-dimensional approach to problem solving/decision making

L04: Hone analytical skills for effective critical appraisal of operations analytics

Unit	Topic
I L01	Fundamentals of Operations Analytics Definition of Operations Analytics, Evolution of Operations Analytics, Operations Management Strategy, Operations Management Drivers, Operations Planning. Analytics in Operations Management, importance of Operations analytics in the flows involving material, money, information and ownership, Decision Domains in supply chain analytics, Application of Descriptive Analytics, Predictive Analytics and Prescriptive Analytics in a Supply Chain: An overview
II L02	Descriptive Analytics in Operations Management Data aggregation and data mining, insights regarding the company's production, financials, operations, sales, finance, inventory and customers. Applications of Bullwhip Effect and Time Series Analysis, Transportation problems and waiting line theory based problems in Operations.
III L03	Predictive Analytics Predictive Analytics and related technologies: Introduction to machine learning and cloud-based inventory management solutions, Applications in inventory management, pricing and maintenance, Forecasting using multiple characteristics in Demand Data and Inventory Management.
IV L03	Prescriptive Analytics Prescriptive analytics and scenario planning, scenario writing, Design of Logistics Network using Heuristics/optimization, Optimal Level of Product Availability in Supply chain, Using Excel Solver for Network Optimization, Network Design in Uncertain environment and Flexibility.
V L04	Modelling and Operations Analytics Introduction to Modelling, Approaches for Optimization and Simulation, Modelling software, Basics of Modelling, Supply chain applications using R, Trends, Challenges and Future of Supply Chain

Recommended Readings

- Drake, M. J. *The Applied Business Analytics Casebook: Applications in Supply Chain Management, Operations Management, and Operations Research*. Pearson Education. (Lt. Ed.)

- Laursen, G. H., & Thorlund, J. *Business Analytics for Managers: Taking Business Intelligence Beyond Reporting*. John Wiley & Sons. (Lt. Ed.)
- Feigin, G. *Supply Chain Planning and Analytics: The Right Product in the Right Place at the Right Time*. Business Expert Press. (Lt. Ed.)
- Barlow, M. *Learning to Love Data Science: Explorations of Emerging Technologies and Platforms for Predictive Analytics, Machine Learning, Digital Manufacturing and Supply Chain Optimization*. O'Reilly Media, Inc. (Lt. Ed.)
- Plenert, G. *Supply chain optimization through segmentation and analytics*. CRC Press. (Lt. Ed.)

SUPPLY CHAIN ANALYTICS

Course Code: MAN910

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objective

The aim of the course is to make the students proficient in the data mining knowledge and techniques and its application in the business environment. This course will equip the students with abilities to solve the business problem by uncovering the usable information from the big datasets.

Learning Outcomes

L01: Describe the various tools and techniques for implementation of analytics based on the supply chain drivers such as location, logistics and inventory

L02: Use statistical techniques to incorporate historical data with other business and environmental variables to prepare dynamic forecasts.

L03: Describe the various techniques for analytics based on the Multi Attribute Decision Making (MADM) and risk

L04: To provide the applications of analytics in operations and supply chain

Unit	Topic
I LO1	Introduction: Warehousing Decisions, Mathematical Programming Models, P-Median Methods, Guided LP Approach, Balmer – Wolfe Method, Greedy Drop Heuristics, Dynamic Location Models, Space Determination and Layout Methods
II LO1	Inventory Management, Inventory aggregation Models, Dynamic Lot sizing Methods, Multi Echelon Inventory models, Aggregate Inventory system and LIMIT, Transportation Network Models, Notion of Graphs, Minimal Spanning Tree
III LO2	Use of discrete event simulation. Stochastic inventory models. Forecasting. Hierarchical Forecasting Models Top-Down, Bottom-Up, and Middle-Out Approaches to Forecasting Reliability and maintenance of the production line. Review of Multiple Regression and Stepwise Selection of Predictive Variables
IV LO3	Risk Analysis: Analytic Hierarchy Process, Data Envelopment Analysis, Risk Analysis in Supply Chain, Measuring transit risks, supply risks, delivering risks
V LO4	Application in SCM: Risk pooling strategies, Fuzzy Logic and Techniques-Application in SCM

Recommended Readings

- “Operations Management”, Jay Heizer and Barry Render, Pearson Publications. (Latest Edition)
- “Supply Chain Analytics with SAP NetWeaver Business Warehouse”, Amol Palekar and Shreekant Shiralkar. (Latest Edition)
- “Analytics in Operations/Supply Chain Management”, Muthu Mathirajan and Chandra Sekharan Rajendran. (Latest Edition)
- Gerad Feigin, Supply Chain planning and analytics – The right product in the right place at the right time, Business Expert Press.
- Peter Bolstorff, Robert G. Rosenbaum, Supply Chain Excellence: A Handbook for Dramatic Improvement Using the SCOR Model, AMACOM Div American Mgmt Assn, (Latest Edition)
- Robert Penn Burrows, Lora Cecere, Gregory P. Hackett, The Market-Driven Supply Chain: A Revolutionary Model for Sales and Operations Planning in the New On Demand Economy, AMACOM Div American Mgmt Assn, (Latest Edition)

PERSPECTIVE ANALYTICS

Course Code: MAN911

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objective

The aim of the course is to enhance students' ability to obtain actionable decisions in business employing mathematical modelling and simulation in Prescriptive Analytics

Learning Outcomes

L01: Understand how various models are constructed and how prescriptive models can improve business decision making

L02: Analyse solutions applying mathematical modelling and simulation to look beyond simple solutions of models

L03: Identify typical and new problems in different business settings.

L04: Use mathematical modelling tools for conducting business analysis.

Unit	Topic
I L01	Introduction to Perspective Analytics; Introduction to Operations Research/Management Science/Business Analytics, An Introduction to Linear Programming: Graphical method; Linear Programming (Sensitivity Analysis, Budget Allocation, Scheduling, DEA); Application of LPP models using Excel Solver.
II L02	Nonlinear Programming (Pricing, Facility Location, Portfolio Selection); Integer Programming (Logical constraints, Project Selection, Set Covering)
III L02	Network Models (Transportation, Logistic, Supply Chain, Bidding, Shortest Path); Decision Tree analysis; Dynamic Programming; Markov Processes
IV L03	Multi-criteria decision making (MCDM) techniques: Goal Programming (GP) and analytic hierarchy process (AHP) and applications of GP and AHP in solving problems with multiple objectives.
V L04	Simulation Modelling; Game theory; Machine Learning integrated with Modelling; Review of Data Partitioning, Dimension Reduction, Over Fitting, Over Sampling; Logistic Regression and Artificial Neural Networks; Classification (K-NN, DA) and Clustering (K-means)

Software used will include Excel, SAS; Lingo, Management Scientist and IBM CPLEX.

Recommended Readings

- Business Analytics: Data Analysis & Decision Making, 6E, Cengage Publication, Author(s): S. Christian Albright | Wayne L. Winston. (Lt. Ed.)
- H.P. Williams (2013). Model Building in Mathematical Programming, fifth edition, Wiley. (Lt. Ed.)
- Bertsimas, D., & Tsitsiklis, J. N. (1997). Introduction to linear optimization. Belmont, MA: Athena Scientific. (Lt. Ed.)
- Chen, D. S., Batson, R. G., & Dang, Y. (2011). Applied integer programming: modeling and solution. John Wiley & Sons. (Lt. Ed.)
- S. P. Bradley, A. C. Hax, and T. L. Magnanti (1977). Applied Mathematical Programming, Addison-Wesley. (Lt. Ed.)

- Ragsdale, C. T. (2015). Spreadsheet modeling & decision analysis: A practical introduction to business analytics ((Lt. Ed.)). Stamford, CT: Cengage Learning. (ISBN-10: 1-285-41868-9; ISBN-13: 978-1-285-41868-1)
- <https://www.coursera.org/lecture/wharton-operations-analytics/optimizing-with-solver-bG1hh>
- http://www.studentsystems.is.ed.ac.uk/staff/Support/User_Guides/CCAM//Teaching_Learning

BANKING ANALYTICS

Course Code: MAN912

Course Credit: 04 (2-2-0)
Max. Marks: 100 (30I+70E)

Objectives

This course is designed to introduce students to decision making with insights from analytics in banking industry. Banks are the financial backbone and analytics can support to define, identify and ascertain the patterns both for structured and unstructured data.

Learning Outcomes

L01. Understand and Monitor data for regulatory compliance.

L02. Apply approaches for financial management in banks for different products.

L03. Make use of time series analysis to provide insights for decision and good governance.

L04. Reporting the insights from the data for fraud detection and improving relationship of banks with customers

Unit	Topic
I L01	Regulatory compliance in banks, Statistical Methods and Techniques and importance for testing credit score, Relative Frequency, Populations, financial analysis and predictions in the banking sector
II L02	Statistical Processes Design for fraud design, Heuristic Models, Attributes and Responses, Experimental Approach for financial management in banks, pattern analysis on banking dataset
III L03	Hypothesis Testing, Identifying Distributions, time-series analysis and use in banking processes and systems including account management, loan approval
IV L03	Budgeting in bank and use of Predictive Analytics, Likelihood ratio tests for fraud analysis
V L04	Customer relationship management using analytics, Loyalty Management Risk Scoring, Report writing, Performance measurement techniques (DEA, SFA)

Recommended Readings

- Advanced Statistics in Research: Reading, Understanding, and Writing Up Data Analysis Results by Larry Hatcher. (Latest Edition)
- Artificial Intelligence and Machine Learning Solutions for Banking Domain: Business Security Risk analytics for Banking Industry (Anugraha Sinha). (Latest Edition)
- Business Analytics for Banking by Jovan Pehcevski. (Latest Edition)

ELECTIVES (SEMESTER IV)

MACHINE LEARNING FOR DATA SCIENCE

Course Code: MAN913

Course Credit: 03 (2-1-0)
Max. Marks: 100 (30I+70E)

Objective

The objective of the course is to introduce various methods from the domains of machine learning and optimization that will be useful to make business decisions when faced with large amount of data

Learning Outcomes

L01. Handle data using Python and R and to Perform task of classification and predictive modeling

L02. Understand the use of machine learning tools for data analysis and optimization libraries

L03. Construct a solutions using models for business decision making

L04. Classify and solve challenging problems using ML models

Unit	Topic
I LO1	Introduction to Python: Data structures in python; Control structures & functions- Pandas basics -Indexing and selecting data- Grouping and summarizing data frames-Reading delimited and relational databases - Reading data from websites- Getting data from API's- Numpy basics - Creating numpy arrays - Structure and content of arrays-Introducing Scientific Computing with Python SciPy- Basics of visualization- Plotting categorical and time-series data - Plotting data distributions- Hand on practice
II LO1	Basics of R: Data structures and programming constructs in R- Introduction to packages in R -Data frame manipulation in R-Data cleaning in R- Fundamentals of Data Visualization with ggplot2- Hands-on practice
III LO2	Introduction: Machine Learning Foundations –Overview –applications - Types of machine Learning- Descriptive statistics -Linear Models for Regression - Linear Basis Function Models-The Bias-Variance Decomposition–Bayesian Linear Regression - Bayesian Model Comparison
IV LO3	Supervised and Unsupervised Learning: Discriminant Functions-Logistic Regression. Decision Trees- Neural Networks -Feed-forward Network Functions - Error Backpropagation -Clustering- K-means - Expectation Maximization - Mixtures of Gaussians -Model selection for latent variable models - high dimensional spaces - The Curse of Dimensionality – Dimensionality Reduction -Factor analysis – Independent components analysis- Bagging-Boosting
V LO4	Reinforcement Learning: Naive Bayes Classifiers-Markov Models – Hidden Markov Models – Inference – Learning Generalization –Conditional random fields - Structural Support vector machines- K-Armed Bandit- Elements-Model Based Learning Value Iteration- Policy Iteration. Temporal Difference Learning-Computational Learning – Text Mining

Recommended Readings

- Machine Learning (in Python and R) For Dummies. John Paul Mueller, Luca Massaron, Wiley. (Latest Edition)

- Introduction to Machine Learning with Python: A Guide for Data Scientists by Andreas C. Mueller, Sarah Guido, O'Reilly Publishers. (Latest Edition)
- Machine Learning using Python by U Dinesh Kumar Manaranjan Pradhan, Wiley. (Latest Edition)
- <https://www.youtube.com/watch?v=rfscVS0vtbw>
- <https://www.youtube.com/watch?v=WGJJlRtnfpk>
- <https://www.youtube.com/watch?v=TGo9F0QyBuE>

ADVANCED FINANCIAL MODELING

Course Credit: 03 (2-1-0)

Course Code: MAN914

Max. Marks: 100 (30I+70E)

Objectives

In the course, the participants will learn the model building skills required to build powerful models in finance. In the course we will also emphasize on the different model building skills that one should have irrespective of the final use that one is going to make of it.

Learning Outcomes

L01. Understand how to build models in excel to suit one's purpose

L02. Building models in different areas of finance including investments, corporate finance and derivatives

L03. Identifying and controlling the key sensitivities with advanced spreadsheet simulation

L04. Understand how risk can be built into the model to enhance decision making process

Unit	Topic
I L01	Introduction to Modelling: understanding Finance Functions present in Excel, Creating Dynamic Models, Forecasting Financial Statements using Excel, Analysing Financial Statements by using Spreadsheet Model.
II L01	Sensitivity Analysis using Excel: Scenario Manager, Other Sensitivity Analysis Features
III L02	Simulation using Excel: Different Statistical Distributions used in Simulation, Generating Random Numbers that follow a particular distribution, Building Models in Finance using Simulation
IV L03, L04	Excel in Project Appraisal: Determining Project Viability, Risk Analysis in Project Appraisal, Simulation in Project Appraisal
V L04	Excel in Valuation: Determination of Value Drivers, DCF Valuation, Risk Analysis in Valuation, Excel in Portfolio Theory, Determining Efficient Portfolio, Creating Dynamic Portfolios, Portfolio Insurance Excel in Derivatives: Black and Scholes Model in Excel, Greeks in Excel, Real Options Valuation

Recommended Readings

1. Advanced Financial Accounting, TAN, McGraw Hill. (Latest Edition)
2. Financial Modelling, Simon Benninga. (Latest Edition)
3. Financial Analysis and Modeling using Excel and VBA, Chandan Sengupta. (Latest Edition)

DATA VISUALIZATION

Course Credit: 03 (2-1-0)
Max. Marks: 100 (30I+70E)

Course Code: MAN915

Course Objective

This course aims to provide the necessary inputs required on various techniques and methodology of Data Visualizations

Learning Outcomes

L01: Understand the process involved in data visualization

L02: Able to make Presentation with data graphics and Tell stories with data graphics that will resonate with the audience.

L03: Design and use various methodologies present in data visualization

L04: Exposure to common data domains and corresponding analysis

Unit	Contents
I L01	Introduction to data visualization; Methodology, Types of data visualisation; Stages and methods of data visualization, Exploratory vs. explanatory analysis; Tables, Frequency distributions, Types of charts - Bar/Pie Charts - Histogram -Box and Whisker Chart -Scatter Diagram – Introduction to ggplot
II L02	Telling Stories with Data; Data Visualisation Handling; Introduction to data Visualisation Tools; Google Spreadsheet, Google Fusion Tables, Excel/Tableau/R/SAPLumira/COGNOS.
III L03	Visualisation Infrastructure: Animation and Interactivity; Visualising Relationship; Visualizing categories Design principles; Visualizing time Building and using metrics
IV L03	Setting the Business Perspective Five Visual BI Artifacts, Scorecards: Visualizing Performance Improvement, Analytic Patterns: From Time-series to Correlations and beyond, Rules for Visual Insight Designers, Collaborative Analytics.
V L04	Data Visualisation applications using Excel, R, Tableau. Text Analytics Overview, Sentiment Analysis : polarity prediction- review mining- aspect identification, Text visualization; Applications of Text analytic in Business

Software

- R and RStudio (additional libraries required): <http://www.r-project.org/>, <http://www.rstudio.com/> (FREE)
- Microsoft Excel, PowerPoint (Mac users are encouraged to use KeyNote), and a basic text editor such as Notepad or TextEdit.
- Tableau Desktop. • Download the latest version of Tableau Desktop from <https://www.tableau.com/tft/activation>

Recommended Readings

- Scott Murray, “Interactive data visualization for the web”, O’Reilly Media, Inc., 2013 (Lt. Ed.)
- Ben Fry, “Visualizing Data”, O’Reilly Media, Inc., 2007. (Lt. Ed.)

- John Walkenbach, Excel 2012 Bible, Wiley, (Lt. Ed.).
- Microsoft Business Intelligence Tools for Excel Analysts (WILEY) , by Michael Alexander, Jared Decker & Bernard Wehbe , 2016 . (Lt. Ed.)
- Alexander, M., & Walkenbach, J. (2013). Excel dashboards and reports (Vol. 17). John Wiley & Sons.
- Few, S. (2012). Show me the numbers: Designing tables and graphs to enlighten. Burlingame, CA: Analytics Press.
- Few, S. (2006). Information dashboard design: The effective visual communication of data. Sebastopol: O'Reilly.
- Ware, C & Kaufman, M. (2008). Visual thinking for design. Burlington: Morgan Kaufmann Publishers.
- Wong, D. (2011). The Wall Street Journal guide to information graphics: The dos and don'ts of presenting data, facts and figures. New York: W.W. Norton & Company.
- Yau, N. (2011). Visualize This: The FlowingData Guide to Design, Visualization, and Statistics. Indianapolis: O'Reilly.
- Yau, N. (2013). Data Points: Visualization that means something. Indianapolis: O'Reilly
- Sosulski, K. (2018). The Practice of Becoming Visual. Bookdown: New York. (FREE)

CLOUD COMPUTING

Course Code: MAN916

Course Credit: 03 (2-1-0)
Max. Marks: 100 (30I+70E)

Objective

The aim of the course is to understand the current trend and basics of cloud computing which will help students to cloud services from different providers and ways of collaborations.

Learning Outcome

L01: Remember and technologies in cloud computing

L02: Knowledge about the services and security of cloud computing

L03: Design and Implementing cloud computing for the corporation.

L04: Understand and able to collaborate the cloud services to any device.

Unit	Topic
I L01	Cloud Computing; Advantages of Cloud Computing ; Disadvantages of Cloud Computing; Companies in the Cloud Today; Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds
II L02	Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS); Cloud Deployment Models: Public, Community, Private & Hybrid Models
III L03	Organisational Readiness for Cloud, Components of a cloud computing architecture; Collaborating on Calendars, Schedules, Event Management, Word Processing, Storing and Sharing Files; Designing Cloud Based Business Solutions
IV L04	Emergent trends in cloud computing; Collaborating via Web-Based Communication Tools; Evaluating Web Mail Services; Web Conference Tools; Collaborating via Social Networks and Groupware; Collaborating via Blogs and Wikis
V L01, L02	Cyber Threats in Cloud Computing, Application Security Web Application, Attack methods, Web Application Security, Application Security Layer, Security Solutions

Recommended Readings

- Mulholland, Andy, Pyke, Jon, and Finger, Peter; Enterprise Cloud Computing: a strategy guide for business and technology leaders; Meghan Kiffer Press (Lt. Ed.)
- Linthicum, David S.; Cloud Computing and SOA Convergence in your Enterprise: A StepbyStep Guide; Addison Wesley Information Technology Series. (Lt. Ed.)
- Rhoton, John; Cloud Computing Explained: Implementation Handbook for Enterprises; Kindle Edition. (Lt. Ed.)
- Reese, George; Cloud Application Architectures: Building Applications and Infrastructure in the Cloud; O'reilly publication. (Lt. Ed.)
- Cloud Computing: Principles and Paradigm-RajkumarBuyya, James Broberg, AndrzejGoscinski (Wiley) (Lt. Ed.)

- Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008. (Lt. Ed.)
- Kumar Saurabh, “Cloud Computing – Insights into New Era Infrastructure”, Wiley Indian Edition, 2011. (Lt. Ed.)
- Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for Ondemand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008. (Lt. Ed.)