

PONDICHERRY UNIVERSITY

**Ramanujan School of Mathematical Sciences
&
School of Management**



Syllabus for M.Sc Quantitative Finance

(Under UGC Innovative Programme)

(CBCS Pattern)

Effective from the Academic Year 2013 onwards

PONDICHERY UNIVERSITY

Ramanujam School of Mathematical Sciences & School of Management M. Sc (Quantitative Finance)

CURRICULUM & COURSE STRUCTURE

Eligibility Criteria:

Any degree with 55% marks and Mathematics/Business Maths/Statistics at plus two level.

Selection Procedure:

Candidates are admitted for M. Sc Quantitative Finance programme is based on an All India level entrance examination conducted by the University. The entrance test for M. Sc is similar to that of any standard All India Management Admission (on lines of GMAT/GRE) with objective type of questions in General English, Reasoning, Problem Solving, Basics of Computer Science, General Engineering and Contemporary Business/Economics/Finance Issues.

Choice Based Credit System (CBCS)

The M. Sc Quantitative Finance degree programme is offered through a unique ‘**Choice Based Credit System (CBCS)**’. The Salient features of the CBCS system is that the programme is offered through credit based courses. Subjects are divided into Hard core and Soft core. Hard core subjects are compulsory. The students have choice to select from among the list of Soft core subjects. Soft core subjects are similar to electives. Based on the quantum of syllabus and number of hours of teacher interaction in the classroom, each subject is assigned with certain number of credits.

A student is expected to complete a minimum of 72 credits worth of courses within 4 semesters of M. Sc Quantitative Finance degree programme. Students are assessed and awarded letter grades based on the relative performances in the given class.

This programme trains the students to focus on real time application oriented problems using computer oriented packages (Financial and Statistical packages) like Minitab, CMIE-PROWESS, SPSS, R , EVIEWS and STATA.

Weightage of Marks:

The weightage of marks for Continuous Internal Assessment (CIA) and End Semester Examination shall be 40 and 60 respectively. A student is declared passed in the given subject when he/she secures a minimum of 50 marks (Both Internal and End Semester put together). A minimum of 40% in end semester exam is essential.

Internal Continuous Assessment Component:

The weight age of 40 marks for Internal Continuous Assessment Component shall consist of the following:

Written test [Best of 2 Class Test(s)]	=	30 marks
Written Assignment(s)	=	5 marks
Seminar Presentation(s)	=	5 marks
/ Field Work(s)		

Total : 40 marks

Evaluation of End Semester Written Examination:

Each student will be assessed by the concerned teacher by conducting internal assessment activities for 40 marks. Since the internal assessment is a continuous assessment of the progress of the student, there will not be any supplementary tests.

End Semester Exam will be conducted at the end of each semester during the prescribed time schedule given by the University. The question paper will be set by the external experts and the exams will be organized by the department under the direct supervision of the Deans of both School of Management/Ramanujam School of Mathematical Sciences. The list of External Examiners is to be approved by the Dean of School of Management/Ramanujam School of Mathematical Sciences from a panel of External Examiners to be given by the Course in-charge for each subject and the consolidated panel of examiners shall be forwarded to the Dean by the HoD/Co-ordinator of the Programme.

The answer scripts of the End Semester Examination shall be evaluated for a weightage of 60 marks and this will be evaluated by the External Examiner. The sum of the marks awarded in the Internal Assessment and by the External examination will be taken for awarding the Grades.

Supplementary examination:

- (i) A failed student who meets the attendance requirement and has a minimum of 40% in internal assessment marks may be permitted to register for the next end semester examination in the following semester itself.
- (ii) Students who have failed due to insufficient attendance and /or less than 40% in Internal Assessment marks should repeat the course as and when it is offered.

Summer Internship:

Every student of M. Sc Quantitative Finance Degree Programme shall undergo an internship in any leading Bank, Financial Institution, Stock Market, Investment Bank, Insurance Companies, Merchant Banking and Stock broking companies for a period of 6 weeks during summer vacation (May & June) under the guidance of a Faculty Member in the Department. Once guides are allotted to the students, the students should contact the respective guides periodically and get necessary guidance and feedback on the project work.

Company should be identified by student at the end of second semester examinations and it should be communicated to the department, the name of the company in which he/she is undergoing the project, the exact title of the project, the name of the Company Guide and his contact number etc. In the first week of July, all the students have to give a presentation about their observations made by them in internship. Students have to follow a detailed guidelines being circulated by the department in the preparation of internship report. At the end of the internship period, every student shall submit a structured internship report within 15 days from the date of the completion of the project period.

Workshop:

Workshop is an educational seminar or series of meetings emphasizing interaction and exchange of information on financial modeling among students of M. Sc (Quantitative Finance). Students have to produce their own model in their area of specialization at the end of workshop and which will be evaluated and marks will be awarded by an external expert.

Final Project:

Every student of M. Sc Quantitative Degree Programme shall carry out a full semester project associated with development of solution for finance industry and leading financial institution for a period of five months during January to May. Once guides are allotted to the students, the students should contact the respective guides periodically and get necessary guidance and feedback on the project work. There will be two mid course review presentations on the progress of work. An attendance certificate from the company guide on satisfactory completion of the project work is essential.

The Final Project Report and Viva-Voce examination will be conducted, jointly by External Examiner and one Internal Examiner (respective Faculty Guide). The list of External Examiners is to be approved by the Dean, School of Management/Ramanujam School of Mathematical Sciences from a panel of External Examiners to be submitted by the HOD/Co-ordinator of the Programme.

Since focus of the each of the project work is different, every candidate is evaluated independently on the merits of the topic, Quantum of work done and major contributions made, etc. Absolute grading is recommended in the place of relative grading while evaluating the final project and viva-voce.

Question Paper Pattern:

The question paper pattern for each of the subjects for the End-Semester Written Examinations shall be as given below:

Section A :	Ten questions are to be answered each carrying 2 marks:	10 x 2 = 20 marks
Section B :	Five questions are to be answered in either or type .	5 X8 = 40 marks
Total		----- = 60 marks. -----

Attendance:

Each student shall obtain 70 per cent attendance to be eligible for appearing for the End- Semester Examination. While submitting the examination form, the students have to get their attendance certificate certified from concerned teacher and faculty advisor.

Grading:

Grading of the marks obtained by the students shall be made as per the norms of Choice Based Credit System (CBCS). The programme committee in the presence of VC's Nominee will finalize the grades in each paper.

PONDICHERRY UNIVERSITY
M.Sc. QUANTITATIVE FINANCE
 (CHOICE BASED CREDIT SYSTEM)

Effective from the Academic Year 2013 – 2014

Semester	Course Code	Title of the Course	Nature of the Course	No. of Credits
Bridge Courses				
Pre Semester	MSQF 401	Basics of Business and Accounting	Hard Core	
	MSQF 402	Basics of Computer Programming	Hard Core	
	MSQF 403	Basics of Economics	Hard Core	
	MSQF 404	Statistics and Quantitative Techniques for Beginners	Hard Core	
First Semester				
I Semester	MSQF 411	Financial Institutions and Markets	Hard Core	3
	MSQF 412	Accounting and Financial Analysis	Hard Core	3
	MSQF 413	Managerial Economics	Hard Core	3
	MSQF 414	Basic Econometrics	Hard Core	3
	MSQF 415	Probability and Distributions	Hard Core	3
	MSQF 416	Lab I: Data Analytics (Minitab)	Hard Core	2
	MSQF 417	Lab II: Financial Statement Analysis (Using Excel)	Hard Core	2
	MSQF 418	Comprehensive Viva	Hard Core	2
Second Semester				
II Semester	MSQF 421	Security Markets and Portfolio Management	Hard Core	3
	MSQF 422	Empirical Methods in Finance	Hard Core	3
	MSQF 423	Applied Econometrics	Hard Core	3
	MSQF 424	Global Finance and International Banking	Hard Core	3
	MSQF 425	Statistical Inference	Hard Core	3
	MSQF 426	Lab III: Advanced Data Analytics (SPSS)	Hard Core	2
	MSQF 427	Lab IV: Corporate Finance (CMIE Data Base)	Hard Core	2
	MSQF 428	Presentation and Comprehensive Viva	Hard Core	3
Third Semester				
III Semester	MSQF 531	Time Series Analysis and Forecasting	Hard Core	3
	MSQF 532	Investment Banking	Hard Core	3
	MSQF 533	Electives	Soft Core	3
	MSQF 534		Soft Core	3
	MSQF 535		Soft Core	3
	MSQF 536	Lab V: Applied Financial Analytics (Using R Language)	Hard Core	2
	MSQF 537	Presentation and Comprehensive Viva	Hard Core	3
	MSQF 538	Corporate Internship	Hard Core	3
Fourth Semester				
IV Semester	MSQF 541	Contemporary Development in Quantitative Finance (Workshop)	Hard Core	3
	MSQF 542	Project Work	Hard Core	6
	MSQF 543	Comprehensive Viva	Hard Core	2

Electives Stream
(Any three subjects from one stream)

Course Code	Title of the Course	Nature of the Course	No. of Credits
Stream 1: Applied Statistics			
1	Optimization Techniques	Soft Core	3
2	Stochastic Modeling	Soft Core	3
3	Financial Mathematics	Soft Core	3
4	Multivariate Data Analysis	Soft Core	3
5	Numerical Methods	Soft Core	3
6	Statistical Techniques for Managers	Soft Core	3
Stream 2: Information Technology			
1	Data Warehousing and Data Mining	Soft Core	3
2	Management Information System	Soft Core	3
3	Information Security	Soft Core	3
4	Oracle and Database Management	Soft Core	3
5	Object oriented programming using C++	Soft Core	3
6	Visual Basic Programming	Soft Core	3
Stream 3: Risk Management			
1	Financial Engineering and Derivatives	Soft Core	3
2	OTC Derivatives	Soft Core	3
3	Big Data Analytics	Soft Core	3
4	Risk Management and Strategies	Soft Core	3
5	Treasury and Fixed Income Securities	Soft Core	3
6	Forex Risk Management	Soft Core	3

BRIDGE COURSES

MSQF 401: BASICS OF BUSINESS AND ACCOUNTING

Unit I: Nature of Business : Manufacturing – Services – trading – Banking – Commission Agency, etc. Types of Organizations – Sole trader – Partnership – Company form – Cooperatives. Business Organisations – Company form – Formation – Board of Directors – Memorandum of Association – articles of Association

Unit II: Legal aspects of Business : Company Law – Provisions – Factories Act – Competition Law – Consumer Protection Law- Law of Contract – Sale of Goods Act. Taxes – Direct Taxes – Indirect Taxes – Central Sales Act – Octroi – Excise – Customs duties – Foreign Trade – Exports – Imports – Special Economic Zones – EOUs

Unit III: Indian Industrial Policy – IPRs – Public Vs Private Sector – Privatization – Top Business Houses – Product Concentration – Entry of MNCs - Institutional facilitating Business– Banks, Markets, Insurance.

Unit IV: Accounting Principles and Conventions -Types of Accounts – Personal, Nominal and Real - Journal : Opening Accounts – Closing Entries- Subsidiary Books of Accounts – Sales Ledger – Purchase Ledger- Cash Book –Cash with Bank transactions – BRS

Unit V: Ledger : Features – Journal Entries – Narration- Trial Balance – Debit accounts – Credit accounts – Balance-Manufacturing and Trading Account –Profit and Loss account – Preparation of Balance Sheet – Simple adjustments.

Books for Study

1. Bhattacharya .L, (2009):Elements of Financial Accounting, PHI Learning, New Delhi

Books for Reference

1. Dearden , J and S.K. Bhattacharya: Accounting for Management,Vikas Publishing House,New Delhi.
2. Hingorani, Ramanathan & Grewal: Management Accounting (Sultan Chand)
3. Maheswari.S,: Management Accounting (Sultan Chand)
4. Rustomji .M.K, (2005):All about Balancesheets, Mac Millan.
5. Vinayakam.N & B. Charumathi: Financial Accounting (S. Chand)

MSQF 402 : BASICS OF COMPUTER PROGRAMMING

Unit I: Introduction to Imperative Programming using C

Data Types, Constant, Variables, Assignment Statement, I/O Functions - Control and Loop Statements – Arrays, Functions- Structure and Union – File Functions – Sample Programs

Unit II: Introduction to Object Oriented Programming using C ++

Class, Constructor, Destructor, Data & Method Visibility - Operator Overloading – Function Overloading - Friend Function – Virtual Functions - Template Class – Abstract Class – IO Streams– Sample Programs

Unit III: Introduction to Visual Programming using Visual Basic

Forms – Visual Components – Events – Event Programming Model - DB Connectivity - Files – Object Oriented Programming with VB – Sample Application

Unit IV: Introduction Client-side Scripting languages

HTML - Java Script - Sample Applications

Unit V: Introduction to Server-side Scripting Language

JSP - JDBC in JSP - Sample Applications

Books for Study

1. Ellis Horowitz , (1998): Fundamentals of Programming Language, Galgotia Publications 1998
2. Balagurusamy. E,(2008): Computing fundamentals and C Programming , Tata McGraw-Hill Publishing Company Limited

Books for Reference

1. Balaguruswamy.E, (1999),:Programming with Java, Tata McGraw Hill Publications Limited, 2nd Edition.
2. Balagurusamy, E.(2002): Object –Oriented Programming with C++, 2/C Tata Mc Graw Hill Publishing Company Ltd., New Delhi
3. Garry Cornell, (1998):Visual Basic 6 Ground Up , Tata McGraw Hill.
4. Robert W.Sebesta,(1996):Concepts of Programming Languages, Addison-Welsey.

MSQF 403 : BASICS OF ECONOMICS

Unit I: Scope and Methodology of Economics : What economics is about – Micro and Macro Economics – Methodology of Economics – Central problem of an Economy –Capitalist economic system – Role of Price Mechanism.

Unit II: Theory of Demand, Production and Cost: Demand and Law of Demand –Factors and theory of Production — Production function with one variable, two variable inputs - Cost theory and estimation – cost of production and cost curve .

Unit III: Theory of Firm : Equilibrium of a Firm – Pricing practices –Price Discrimination – Price determination under different market condition – Characteristics of different market structure – Perfect and imperfect competition.

Unit IV: Modern Macroeconomics: Theory of Income and Employment – Monetary Demand and Supply - Money Prices and Inflation – IS-LM Curve model – Business cycle and Macroeconomic policies – Government and Macro economy – Open Economy.

Unit V: Development Economics : Theories of Growth – Factors Determining Economic growth and Development – Population Growth and Development Economics – Capital Formation – Role of Education and Economic Development - Employment and unemployment – Poverty and Inequality – economic reform , Structural adjustment and growth.

Books for Study

1. John B.Taylor, (1997):Economics, AITBS publications.
2. Paul Wonnacott and Ronald Wonnacott, (1996): Economics, Tata McGraw Hill Publication.
3. Thomas Sowell,(2007): Basic Economics-A citizen guide to economics,

Books for References:

1. Ahuja H.L.(2008),Modern Economics, Sultan Chand, New Delhi
2. Koutsoyiannis, A.(2000), Modern Microeconomics, (2nd Edition), Macmillan Press,London.
3. Richard.T.Froyen (2003), Macro Economics: Theories and Policies, Pearson Education.
4. Sen, A.(1999), Microeconomics : Theory and Application, Oxford University Press,Delhi.
5. Stigler, G.(1996), Theory of Price, PHI, New Delhi.

MSQF 404 : STATISTICS AND QUANTITATIVE TECHNIQUES FOR ENGINEERS

Unit-1:

Definition of statistics–measures of central tendency- measures of dispersion-moments- Skewness and kurtosis and their measures.

Unit-II:

Random Experiment: Trial, Sample point, Sample space, Different types of events. Definition of probability: Classical and relative-frequency approach to probability. Additive and multiplicative theorem of Probability.(statements only). Conditional probability and Independence of events, Bayes' Theorem and its applications.

Unit-III

Random variable; discrete and continuous random variables; probability mass function and probability density function; expectation- mean, variance, moment generating function and characteristic function- conditional distributions, conditional expectation.

Unit-IV

Bivariate data – scatter diagram, correlation coefficient and its properties, Concept of Regression, regression coefficients, Principles of least squares, Fitting of polynomial and exponential curves. Spearman's Rank correlation.

Books for Study

1. Goon Gupta and Das Gupta (1986): Fundamentals of Statistics, fifth edition, The World Press.
2. Medhi.J. (1992): Statistical Methods an Introductory Text , Wiley Eastern Ltd.

Books for Reference

1. Dudewicz, E.J and Mishra, S.N(1980): Mathematical Statistics, John Wiley, NY.
2. Freund, JE (1998) : Mathematical Statistics, Prentice Hall International.
3. Rohatgi, V.K. and Ebsanes Saleh, A.K. Md. (2002) : An introduction to Probability and Statistics, 2nd Ed., John Wiley & Sons, Inc.
4. Sharma .A.K, (2005): Text Book of Elementary Statistics, Discovery Publishing House.

SEMESTER I

MSQF 411: FINANCIAL INSTITUTIONS AND MARKETS

CREDITS:3

Unit I: Introduction to Money

Simple exposition to money demand and supply – RBI and measures of money supply- commercial banks and credit creation – RBI control on money supply- Time Value of Money and Interest rates.

Unit II: Introduction to Indian Financial System

Overview of Indian financial system – Functions of financial system – players – structures and growth – regulatory bodies

Unit III: Money and Capital Markets

Indian money market – Instruments – Institutions – Functioning of Indian money market – Changes in the regulatory framework – growth – stocks and bonds – primary and secondary markets – process of initial public offer – offer of government bonds – stock market functioning – stock indices – evaluation of stocks and bonds – understanding stock markets information- Derivatives Markets - Equity Markets- Mortgage Markets.

Unit IV: Foreign Exchange Market

Exchange rate – types – determination of exchange rate – nature of forex market - nature of forex inflow and outflow – examples ECBs and NREs – RBI and exchange rate management

Unit V: Merchant bankers, Insurance and Investment bankers

Functions, Merchant Banking in India, SEBI guidelines for Merchant Bankers - Role of merchant bankers in fund raising -Managing public issue- Pre and Post issue –Book Building - private placement- raising of Funds through Bonds and public deposits. An Overview of the Banking Industry - The Relationship between Commercial and Investment Banking - Insurance Companies and Pension Funds - Regulation of Financial Institutions- Need and Development of International Banking - Commercial Bank Operations - International Markets.

Books for Study:

1. David S. Kidwell, David W. Blackwell, David A. Whidbee, Richard W. Sias (2012), “Financial Institutions, Markets, and Money”, 11th Edition ,Wiley Publication, New York.
2. Jakob de Haan, Rijksuniversiteit Groningen (2012), Financial Markets and Institutions, 2nd Edition The Netherlands

Books for Reference

1. Bhole, L.M (2002). Indian Financial Institutions and Markets, Tata McGraw Hill Lts, New Delhi.
2. Jeff Madura (2010), Financial Markets and Institutions, 10th ed. – Western Cengage .
3. Khan M.F, (2006), Indian Financial Institutions, Tata McGraw Hill Ltd, New Delhi
4. Pathak, Bharathi V., (2007), The Indian Financial System: Markets, Institutions and services, 2/e, Pearson Education India, New Delhi.

Unit I: Financial Accounting:

Accounting Concepts and Conventions – Recording of Business Transactions – Double Entry System – Journal – Ledger – Trail Balance – Preparation of Final accounts

Unit II: Joint Stock Company Accounts:

Issue of Shares (Principles only) – Final Accounts of Companies (Format only) – Banking Company accounts – Capital and Reserves- Preparation of Final Accounts of Banking Companies- Non-Performing assets – Asset Classification and Provisioning

Unit III: Management Accounting:

How Management accounting differs from Financial Accounting – Financial Analysis – Tools of Financial Analysis – Ratio Analysis – Computation and Interpretation of Ratios - **Funds Flow analysis** – Preparation of Funds Flow Statement – Cash flow Analysis – Preparation of Cash Flow statement – Evaluation of Funds and cash Flow analysis

Unit IV: Marginal Costing and Profit Planning:

Cost-Volume-Profit analysis – Applications of Marginal Costing Techniques - **Budgetary Control and Standard Costing:** Budgets and Budgetary Control – Preparation of Budgets – Standard Costing and Variance Analysis – Calculation of Material Cost Variance and Labour Variance – Utility of Variance Analysis.

Unit V: Introduction to Tally

Basic features - Undervalue, Preparation of Ledger accounts on Tally - Preparation of Invoices- subsidiary books - Display- of final accounts - Ratios (Practice sessions: 10)

Books for Study

1. Gupta R L and Radhaswamy M, Advanced Accounts, Vol I , Sultan Chand & Sons, New Delhi
2. Maheswary S N, Management Accounting, Sultan Chand & Sons, New Delhi

Books for Reference

1. Foster, George (1986): Financial Statement Analysis, Prentice Hall, and New Jersey.
2. Jain S P and K L Narang, Advanced Accounts, Kalyani Publishers, Ludhiana
3. Jain S P and K L Narang, Cost Accounts, Kalyani Publishers, Ludhiana
4. Shukla M C and Grewal T S, Advanced accounts, Vol I , S Chand & Co, New Delhi

Unit I: Nature and Scope of Managerial Economics: Objective of a firm; Economic theory and managerial theory; Managerial economist's role and responsibilities; Fundamental economic concepts incremental principle, opportunity cost principle, discounting principle equi- marginal principle.

Unit II: Demand Analysis: Individual and market demand functions; Law of demand, determinants of demand; Elasticity of demand- its meaning and importance; Price elasticity income elasticity and cross elasticity; Using elasticity in managerial decisions, Consumer surplus.

Unit III: Theory of Consumer Choice and Production Theory: Cardinal utility approach, indifference approach, revealed preference and theory of consumer choice under risk; Demand estimation for major consumer durable and non durable products; Demand forecasting techniques. Production function production with one and two variable inputs; Stages of production; Optimum Factor combination, Economies of scale; Estimation of production function; Cost theory and estimation; Economic value analysis; Short and long run Cost functions their nature, shape and inter relationship; Law of variable proportions; Law of returns to scale.

Unit IV: Pricing Practices: Methods of price determination in practice: Pricing of multiple products; Price discrimination; International price discrimination and dumping; Transfer pricing. Price Determination under Different Market Conditions: Characteristics of different market structures; Price determination and firm's equilibrium in short-run and long-run under perfect competition, monopolistic competition, oligopoly and monopoly.

Unit V: Business Cycles and Inflation: Nature and phases of a business cycle; Theories of business cycles psychological, profit, monetary, innovation, cobweb, Samuelson and Hicks theories. Definition, Characteristics and types; Inflation in terms of demand pull and cost push factors; Effects of inflation.

Books for Study

1. Atmanand, (2009): Managerial Economics, 2nd Edition.
2. Bruce .W. Allen, Keith Weigelt, Neil Dohrty and Edwin Mansfield, (2010): Managerial Economics, 7th Edition.
3. Gough, J. and S. Hill: Fundamentals of Managerial Economics, MacMillan London.

Books for Reference

1. Baya, Michael R: Managerial Economics and Business Strategy, McGraw Hill Inc. New York.
2. Chopra, O.P: Managerial Economics, Tata McGraw Hill, Delhi.
3. Koutsoyiannis, A.(2000), Modern Microeconomics, (2nd Edition), Macmillan Press, London.
4. Salvatore, Dominick: Managerial Economics in a Global Economy, McGraw Hill, New York.
5. Varsheny RL and Maheshwari KL: Managerial Economics; Sultan Chand and Sons, New Delhi

MSQF 414: BASIC ECONOMETRICS

CREDITS: 3

Unit I: Introduction : Definition and scope of econometrics- Methodology of econometric research – specification and estimation of econometric model- basic concepts of estimation – Nature and source of Data for econometric analysis- types of data – cross section – time series – panel data-dummy variable - Instrumental variable – regression and correlation.

Unit II: Linear Regression Models: Linear regression model, two variables and multi variables, BLUE property, general and confidence approach to hypothesis testing, partial effects and elasticity, goodness of fit, model evaluation, matrix approach to linear regression models- functional forms of regression models- linear and compound growth rate.

Unit III: Problems of OLS estimation: violation of assumption of classical regression model - Consequences and detection of multicollinearity, heteroskedasticity, and autocorrelation, and remedial measures

Unit IV: Simultaneous Equation and Distributed Lag Models : Simultaneity bias, structural versus reduced form, identification: rank versus order condition - exact and over identifications, triangular model, methods of estimation including indirect least squares, two-stage least squares and three-stage least squares - Autoregressive linear regression. Distributed lag models

Unit V: Application of econometric methods: estimation of demand and supply function – production and cost functions – consumption and investment functions.

Books for Study

1. Gujarati, N.D., (2003), Basic Econometrics, fourth edition, McGraw Hill.
2. Marno Verbeek,(2012): A guide to Modern Econometrics, 4/e,Wiley and Sons.

Books for Reference

1. Heinz, Kohleer(2001): Statistics for Business & Economics, 1/e,Harper Collins, New York.
2. Johnston, J.,(2006): Econometric Methods, third edition, McGraw Hill
3. Nachane, DM .,(2 0 0 6) : Econometrics: Theoretical Foundations and Empirical Perspective, Oxford University Press.
4. Ramanathan, R.,(2002): Introductory Econometrics with applications, 5/e, Thomson Asia Private Limited.
5. Wooldridge, J.,(2012): Introductory Econometrics: A Modern Approach, 5/e,South- Western

Unit I: Discrete distributions

Uniform, Bernoulli, Binomial, Poisson, Multinomial, Hyper geometric, Geometric, their characteristics and simple applications.

Unit II: Continuous distributions

Uniform, Normal, exponential, Gamma, Chi square, Pareto, lognormal, logistic distributions – their characteristics and applications.

Unit III: Sampling distributions

t, χ^2 and F distributions and their interrelations and characteristics – applications in Tests of significance.

Unit IV: Truncated distribution

Compound distributions – compound binomial, compound Poisson and compound negative binomial distributions – their applications.

Unit V: Order statistics and their distribution

Distribution of sample median and mid range – sample generation from basic discrete and continuous distributions.

Books for Study

1. Mood, A.M. Graybill, F.A. and Boes, D.C. (1974) : An introduction to the theory of Statistics, 3rd Ed., McGraw Hill Book Company.
2. Pitman J. (1993): Probability Distributions, Narosa Publishing House.

Books for Reference

1. Freund, JE (1998) : Mathematical Statistics, Prentice Hall International.
2. Larson, H.J.: Introduction to Probability Theory and Statistical Inference, 3/e, Wiley.
3. Parimal Mukhopadhyay(2006):Mathematical Statistics, 3/e, Books and Allied (P) Ltd, Kolkata.
4. Rohatgi, V.K.and Ebsanes Saleh,K. Md.(2002):An introduction to Probabilit and Statistics, 2nd Ed., John Wiley & Sons, Inc.

MSQF 416: Lab I - FINANCIAL DATA ANALYTICS (Minitab)

CREDITS:2

1. Data Management - Import - export– sorting data
2. Diagrammatic representation - Scatter plot, Histogram, Pie charts
3. Matrices - Transpose, Diagonal, Eigen Values analysis and Arithmetic operations
4. Basic Statistics: Descriptive Statistics
5. Random number generation, (i) Binomial, (ii) Poisson, (iii) Normal (iv) Chi-square
6. Computation of simple and multiple correlation coefficients
7. Chi-square, t and F distributions
8. Simple and Multiple Regression analysis
9. One-Way and Two-Way ANOVA

MSQF 417: Lab II - FINANCIAL STATEMENT ANALYSIS (USING EXCEL)

CREDITS: 2

UNIT I : Framework for financial statement analysis - International reporting standards - Principal financial statements - other sources of financial information - role of auditor - accrual concept of income - Revenue and expenses recognition - Recognition methods - Non recurring items - quality of earnings - statement of shareholders equity

UNIT II: Cash flow statement an international perspective - Analysis of cash flow information - Ratios an integrated analysis - economic characteristics and strategies - earnings per share and other ratios used in valuation - patterns of ratio disclosure - Market based research - Modern portfolio theory - Efficient Market Hypothesis - Implications for empirical research for financial statement analysis

UNIT III: Analysis of inventory - comparison of information provided by alternative methods - Financial ratios LIFO versus FIFO - Analysis of long lived assets - Capitalisation versus expensing - Analytical adjustments for capitalisation versus expensing - Analysis of fixed assets disclosure - Analysis of income tax - Deferred tax analytical issues

UNIT IV: Analysis of financing liabilities - Bond Covenants - Leases and off-balance sheet debt-Pension and other employee benefits-Analysis of pension plan disclosure - Analysis of Interoperate investments - Analysis of marketable securities

UNIT V: Derivatives and hedging activities - hedging techniques - Analysis of hedging disclosures - Financial statement analysis a synthesis - Adjustments to reported income -Accounting and finance based measures of risk - credit risk - equity risk - Valuation and forecasting - Asset based valuation models - Tobin's Q-Discounted cash flow valuation models - EBO model - Forecasting models - Comparison with analyst forecast - alpha growth

Books for Study

1. Foster, George(1986), Financial Statement Analysis, Prentice Hall, and N.J .
2. Martin Baxter and Andrew Robbie (1996): Financial calculus Cambridge University, Press Cambridge.

Books for Reference

1. Heinz, Kohleer (2001): Statistics for Business & Economics, 1/e,Harper Collins, New York.
2. Martin Baxter and Andrew Robbie (1996):Financial calculus Cambridge University, Press Cambridge.
3. Stice K Earl, Stice D James (2006): Financial Accounting Reporting and Analysis: South Western
4. White I Gerald, Sondhi C Ashwinpaul and Fried Do (2007): The analysis and use of financial Statements Wiley India
5. Wild J John, K.R Subramanyam and Halsey F.Robert, (2007):Financial Statement Analysis, Tata McGraw - Hill

SEMESTER II

MSQF 421: SECURITY MARKETS AND PORTFOLIO MANAGEMENT CREDITS: 3

UNIT I :Security Markets and New Issues - Legal Environment: SEBI Act, 1992 , Securities contract regulation Act 1956 companies act 1956 (various provisions relating to securities), RBI, rules and guidelines for FLL s. Primary and Secondary markets: primary market its role and functions methods of selling securities in primary market; New financial instruments SEBI Guidelines For Public Issues - Pricing of issues, Promoters Contribution appointment and role of merchant bankers underwriters, brokers, registrars and managers, bankers etc. Underwriting of issues; Allotment of shares, Procedures for new issues; e- trading. Secondary Market its role importance, organisation of stock exchange; listing of securities in stock exchange; Trading mechanism- screen based trading; Insider trading; take-overs; Interest based trading.

UNIT II: Depository,NSC and OTCEI: Role and need of depository; the Depositories act, 1996; SEBI (Depositories and participants regulations) 1996; SEBI (Custodian of Securities) Regulation 1996; National Securities Depository Ltd. (NSDL); Depository participant 6National Stock Exchange and over the counter Exchange -role, organization and management; Listing rules, procedure including formats formalities, Accounting records for buying selling transactions; Nature of transaction cash and forward settlement of trades.

UNIT III: Portfolio Management: Meaning, importance, objectives and various issues in portfolio construction, revision of portfolio and evaluation. Estimating rate of return and standard deviation of portfolio returns; Effects of combining securities.

UNIT IV: Portfolio Analysis: Markowitz risk return optimisation. Single Index Model: Portfolio total risk, portfolio market risk and unique risk; Sharpes optimisation solution. Capital market line, security market line; Risk free lending and borrowing; recent developments.

UNIT V: Portfolio Construction and its Performance Evaluation: Arbitrage pricing theory, principle of arbitrage, arbitrage portfolios; two factor and multi factor models. Techniques of portfolio construction, Measure of return, risk adjusted measures of performance evaluation, market timing, evaluation criteria and procedures, Market Efficiency: Concept, importance and status of Indian capital market.

Books for Study

1. Donald E. Fisher, Ronald J. Jordan: Security analysis and Portfolio Management Prentice Hall New Delhi.
2. French Don: Security and Portfolio Analysis Merrill Publishing Co.

Books for Reference

1. Clark, James Francis: Investment Analysis and Management, McGraw Hill,International Edition, New York.
2. Elton Edwin J. Gumber Martin J: Modern Portfolio Theory and Investment Analysis; John Wiley, New York.
3. Fabozzi, Frank J: Investment Management, Prentice Hall, International Edition, New York.
4. Sharpe, William F: Portfolio Theory and Capital Markets, McGraw Hill, New York.
5. Strong, Robert: Portfolio Construction : Management and Protection, West Publishing Co.

Unit I: Introduction to Financial Markets

Capital markets, consumption and investments with and without capital markets, market places and transaction costs and the breakdown of separation; Fisher separation theorem; the agency problem; maximization of shareholder's wealth

Unit II: Predictability of Asset Returns

The Random Character of Stock Market Prices: Unconditional distributions, conditional distributions, conditional means - mean reversion, conditional means-instrumental variable, conditional variances, relationship between means and variances, stock prices and volume.

Unit III: Event Study Methodology

Various approaches to event study methodologies, measurement abnormal returns and test statistics

Unit IV: Index Models, CAPM & APT

Models of asset returns, multi index models, single index model, systematic and specific risk, equilibrium models-capital asset pricing model, capital market line, security market line, estimation of beta; arbitrage pricing theory

Unit V: Modeling long run relationship in finance

Inter temporal equilibrium model- derivative pricing model – fixed income securities- term structure models

Books for Study

1. Campbell, J. Y. Lo, A. W. and Mackinlay, A. C. (1997): The Econometrics of Financial Markets, Princeton University Press, 1997
2. Copeland, T. E. and J. F. Weston, (1992): Financial Theory and Corporate Policy, Addison Wesley.

Books for Reference

1. Brealey, R. and S. Myers, (1997): Principles of Corporate Finance, 5/e, New York, McGraw Hill.
2. Brooks, C. (2002): Introductory Econometrics for Finance, Cambridge University Press.
3. Houthakker, H.S. and P.J. Williamson, (1996): Economics of Financial Markets, Oxford University Press.
4. Joel Hasbrouck, (2007): Empirical Market Microstructure, Oxford University Press.

UNIT-I: Generalized linear Model

Aitken's theorem (statement only); GLS estimator, Asymptotic distribution of GLS estimator; Analysis of residuals: Standardized, Studentized and predicted residuals; Granger's test of causality-treating outliers; Comparing two linear regression models; Dummy variable approach; Stepwise and Piecewise linear regression; Switching Regression Model.

UNIT-II: Criteria for model selection

Goodness of fit measures; R^2 and adjusted R^2 Criteria; C_p criterion; Generalized Mean Squared error criterion-information criteria-AIC, SBC; Test for normality- Jarque-Bera test- Shapiro-Wilk test- Minimum Absolute Deviation (MAD) estimation- Box-Cox transformations.

UNIT-III: Non-Linear Regression

Non-Linear regression; Non linear least squares estimation; Maximum Likelihood estimation; Idea of computational methods; Gradient methods, Steepest descent method and Newton-raphson method; testing general Nonlinear hypothesis; Wald test, Lagrange multiplier test and likelihood ratio Test.

UNIT-IV: Limited Dependent Variable Models

Introduction to binary variables, limitation of LPM, logistic curve, Probit and Logit models, predicted probabilities, censored versus truncation, TOBIT model, ordinal models, multinomial models, and nested models

UNIT-V: Panel Data Models

Introduction to panel data, pooled model, within and between estimators, fixed effects, random effects, Hausman test, one way and two way model, random coefficients, dynamic panel data models, difference in difference methodology and dynamic panel data, Generalised Method of Moments estimator- panel unit root and cointegration, panel VAR models

Books for Study

1. Enders, W.,(2006): Applied Econometric Time Series, 2/e, John Wiley and Sons.
2. Wooldridge, J. M.,(2001): Econometric Analysis of Cross Section and Panel Data, MIT Press.

Books for Reference

1. Cook. D and Weisberg. S (1982), Residuals and Inference in Regression, Chapman and Hall.
2. Johnston, J (1984): Econometric Methods, 3/e , MC Graw Hill.
3. Judge, C.G., Griffiths, and Hill, R.C. et al (1985): Theory and Practice of Econometrics, John Wiley.
4. Kleinbum, Kupper, Nizam and Muller (2008): Applied Regression Analysis and other multivariate methods, Duxbury Applied Series

UNIT-IV: International Business Environment

Framework – International Economic Institutions – WTO – UNCTAD – IMF and World Bank – Regional Economic Cooperation – Growth and Development of MNCs – Types and Rationale – Gains for of International Trade

UNIT-IV: International financial centers

International financial centers – Offshore banking units – Special Economic Zones – Foreign exchange management control – International loan agreements – International debt management. Asset liability management – Profitability of international banking operations -Fixed and Flexible Exchange Rates – Spot and Forward Markets – Exchange Rate Quotes – LERMS – Factors affecting Exchange Rates – Basic Theories – PPP – Interest Rate Parity – Fisher Effect – Currency derivatives – Futures and Options – Currency Swaps

UNIT-IV: International Finance

International Financial System – Bretton wood Conference afterwards – European Monetary System – International Financial Markets – Creation of Euro – Emergence of Euro Currency Markets – International Money Market Instruments – GDRs – ADRs – Euro Bonds – Repos – CPs – Loan Syndicates – Euro Deposits

UNIT-IV: Multinational Financial Management

Complexities – Working Capital Management – Investment and Financing Decisions – Capital Budgeting – Cost of capital of Overseas Investment – Risk Exposure – Types – Measurement and Management of Exposure - International Portfolio Management

UNIT-IV: International Banking

Banking Practices of European Banks – Large Banking Centers – Japanese Banking – American Banking System – Basel I and Basel II guidelines – LIBOR – Portfolio of Operations of Global Banking – Swiss Banking Practices.

Books for Study:

1. Giddy, I.H; GLOBAL Financial Markets, A.I.T.B.S., Delhi.
2. Shapiro A C., Multinational Financial Management, Prentice Hall, New Delhi.

References:

1. Apte P G., International Financial Management, Tata Mc Graw Hill, New Delhi
2. Buckley, Adrian., Multinational Finance, Prentice Hall of India, New Delhi
3. Henning C N, Piggot W and Scott W H., International Financial Management, Mc Graw Hill Int Ed, NY
4. Giddy: Global Financial Markets, A.I.T.B.S Publishers and Distributors New Delhi.
5. Maurice, Levi., International Finance, Mc Gaw Hill Int Ed, New York

MSQF 425: STATISTICAL INFERENCE

CREDITS: 3

UNIT-I

Basic problem of statistical inference: Point estimation – Parameters of estimators: Unbiasedness and consistency – Conditions for consistency – Sufficiency – Factorization theorem (without proof) – Simple problems

UNIT-II

Methods of estimation: Methods of moments – Method of least squares – Method of Maximum Likelihood Estimation (MLE) – Simple problems – Confidence intervals: Basic Notions- Confidence intervals for the mean, proportion (large samples)

UNIT-III

Statistical hypothesis testing – Simple and Composite hypothesis, Null and Alternative hypothesis – Types of errors – Critical region – Level of significance – Power of a test – Most powerful test – Simple problems for calculating probability of Type I and Type II errors and power of the test

UNIT-IV

Tests of significance (Large samples): Test for single mean and proportion, Test for equality of means and proportions (two populations) – Chi-square test for independence of attributes. Test of significance (small samples): Test for single mean, test for equality of means and variances (two populations) – Paired t-test – Analysis of variance – one way and two way classification

UNIT-V

Non-Parametric methods: sign test – Mann Whitney U test – Test for Randomness (Run Test) – Kruskal Wallis test – Friedman test.

Books for Study

1. David R Anderson, Dennis J Sweeney and Thomas A Williams (2002): Statistics for Business and Economics, 8/e. Thomson
2. Roghati, V.K and Saleh, A.K (2002): Introduction to Probability and Statistics, 2/e, Satya Prakashan Publications, New Delhi

Books for Reference

1. Gupta S.C and Kapoor, V.K (2000): Fundamentals of Mathematical Statistics, Sultan Chand and Co.
2. Hogg, R.V., Mc Kean J W and Craig, A.T (2005): Introduction to Mathematical Statistics, 6/e Pearson Edition
3. Larson (1982): Introduction to Probability Theory and Statistical Inference, 3/e, John Wiley
4. Miller, I and Miller, M (2002): John E. Friends Mathematical Statistics, Pearson Education.
5. Mood, A.M., Graybill, A.M and Boes, D.C (1974): Introduction to theory of Statistics, Mc Graw Hill

1. Basics – Import and Export of data files, Recoding, computing new variables – Descriptive statistics.
2. Selection of cases, splitting and merging of files.
3. Tests for Normality : P-P plot, Q-Q plot, box plot and One sample Kolmogorov – Smirnov test
4. Fitting of curves – Linear, parabola, cubic and exponential.
5. Discriminant Analysis
6. MANOVA.
7. Non Parametric tests: Kruskal – Wallis, Friedman, McNemer, Median tests.
8. Factor Analysis.
9. Cluster Analysis

List of Practicals

Based on Annual Reports of Companies:

- Analysis of Financial Statements based on the any five select annual reports, Important Ratios, Funds Flow Analysis statements, Examining the trends over a period of time, Comparison between cross category ratios, cross sectional analysis

CMIE Based:

- Extraction of Industry wise data on select fundamentals
- Extraction of Company specific data on Fundas
- Annual data on select indicators across companies in a given industry
- Data on select Big Business Houses in India
- Data on Capital structure designs of select industries
- Sector wise Stock Price Indices
- Company specific Price charts and identification of events

Excel Based Exercises:

- Estimation of Daily Returns, Weekly Returns, Monthly, Quarterly and Half yearly returns
- Calculation of Geometric Mean and Standard deviation to returns
- Estimation of Beta for select stocks in select industries
- Working out leads and lags in the stock market

SPSS Based Exercises:

- Calculation of correlation between fundas and stock returns
- Estimation of Multiple Regression Equation between select firm values and market returns
- Dummy value regressions, step-wise regressions
- Multivariate Analysis : Factor Analysis and Principle Component Analysis
- Discriminate functions and Credit Rating
- Cluster Analysis and Data distances

SEMESTER III

MSQF 531: TIME SERIES ANALYSIS AND FORECASTING

CREDITS:3

UNIT-I: INTRODUCTION

Definition and examples of Time Series and stochastic process-Graphical Representation of Time Series Data-Components and various decompositions of Time Series-Numerical description of Time Series: Stationarity, Autocovariance and Autocorrelation functions - Data transformations - Trend and Seasonal adjustments.

UNIT-II: SMOOTHING TECHNIQUES and STATIONARY MODELS

Smoothing Techniques: Moving Averages: Simple, centered, double and weighted moving averages; single and double exponential smoothing –Holt's and winter's methods - Exponential smoothing techniques for series with trend and seasonality-Basic evaluation of exponential smoothing. Stationary Time Series Models: First and Second order AR and MA Models – Mixed ARMA models their statistical Properties – ACF and PAF functions-Finite order AR(p) and MA(q) models..

UNIT-III: NON-STATIONARY TIME SERIES MODELS

Tests for Nonstationarity: Random walk –random walk with drift –Trend stationary –General Unit Root Tests: Dickey Fuller Test, Augmented Dickey Fuller Test; ARIMA Models: Basic formulation of the ARIMA Model and their statistical properties - Autocorrelation function (ACF), Partial autocorrelation function (PACF) and their standard errors.

UNIT-IV: FUNDAMENTALS OF FORECASTING

Nature and Uses of Forecasting – Forecasting methods: qualitative and quantitative methods – Steps involved in stochastic model building – Forecasting model evaluation – Model selection techniques: AIC, BIC and AICC – Forecasting model monitoring;

UNIT-V: VOLATILITY MODELING AND FORECASTING

Nonlinear Modeling of financial time series: Meaning of non-linearity, non-constant conditional variance models for volatility-Definition and representation of ARCH and GARCH Models- their use in financial time series data- Volatility forecasting using GARCH (1,1) Model- Diagnostic checking of model – analysis of residuals.

Books for Study

1. Hamilton,J., (1994):Time Series Analysis. Princeton University Press.
2. George E. P. Box, G.M.Jenkins and G.C. Reinsel, (1994):Time Series analysis Forecasting and Control, Prentice Hall International, 3/e .
3. Montgomery DC., CL. Jennigs and M. Kulachi (2006): Introduction to Time Series analysis and Forecasting, Wiley InterScience.

Books for Reference

1. Makridakis .SG and Wheelwright. SC.,(1997): Forecasting: Methods and Applications, 3/e John Wiley & Sons.
2. Mills, T., (1997):The Econometric Modeling of Financial Time Series.2/e Cambridge University Press.
3. Robert Yaffee with Monnie McGee. Introduction to Time Series analysis and Forecasting with applications of SAS and SPSS, Academic Press, Inc.
4. Ruey S. Tsay. Analysis of Financial Time Series, Wiley.
5. Shumway RH. and Stoffer.DS., (2011)Time Series Analysis and its Applications with R Examples, Springer.

Unit I: Introduction: Overview of Investment Banking

Corporate debt and underwriting procedures securitization and asset backed debt securities, high yield debt investment bankers as traders and market-makers, private placements

Unit II: Investment Process

Methods - Sources of funding/investor decision making – Credit borrowing Vs Issuing Equity - Analysis of funding options: bank borrowing, cross currency, private placements, private equity, public stock/bond market, high yield market, floating rate vs. fixed rate borrowing, equity vs. convertible securities Disinvestments mechanism — Incentives — Future Prospects

Unit III: Mergers & Acquisitions

Introduction to valuation of companies; the law of mergers & acquisitions, markets for takeover stocks and risk arbitrageurs restructuring: theory of adding value, LBOS, practice of adding value

Unit IV: How Investment Bankers Compete

Developing new business, international business, professional standards and management ,Structure of banking industry, major developments in India, and in international capital markets 1975-1997: legal basis of corporate finance and investment banking.

Unit V: International Monetary system

Balance of payment, international banking system, firms of international trade, foreign currency option.

Books for Study

1. Liaw, T. (1999): The Business of Investment Banking, John-Wiley.
2. Investment Banking: Valuation, Leveraged Buyouts, and Mergers and Acquisitions Joshua Rosenbaum, Joshua Pearl, Joseph R. Perella, Wiley Publications

Books for Reference

1. Bodie, Z., A Kane and Marcus .A.J.,(2005): Investments, Irwin McGraw-Hill.
2. Cheney, J and E. Muses: Fundamentla of Investmental, Paul, New York.
3. Sharpe, W.F., Gordon, J.A and Bailey J.V., (1999):Investments, Prentice-Hall.
4. Subramanyam, P. (2005):Investment Banking, Tata McGraw-Hill.
5. Verma,(2005):Merchant Banking: Organisation and Management, Tata McGraw Hill.

MSQF 536: Lab V: APPLIED FINANCIAL ANALYTICS (R programming language)
CREDITS: 2

1. Creating objects, vectors, sequence, lists, arrays and matrices and performing basic operations.
2. Generating random numbers from Uniform, Binomial, Poisson, Normal, Multivariate Normal and Exponential distributions and fitting of the distributions.
3. Creating data frames – reading from a text file – using data editor to create a data frame.
4. Computation of descriptive statistics, correlation and regression coefficients.
5. One and two sample t tests, one way and two way ANOVA.

MSQF 537: PRESENTATION AND COMPREHENSIVE VIVA

CREDITS:3

MSQF 538: CORPORATE INTERNSHIP

CREDITS:3

Every student of M. Sc Quantitative Finance Degree Programme shall undergo an internship in any leading Bank, Financial Institution, Stock Market, Investment Bank, Insurance Companies, Merchant Banking and Stock broking companies for a period of 6 weeks during summer vacation (May & June) under the guidance of a Faculty Member in the Department. Once guides are allotted to the students, the students should contact the respective guides periodically and get necessary guidance and feedback on the project work.

Company should be identified by student at the end of second semester examinations and it should be communicated to the department, the name of the company in which he/she is undergoing the project, the exact title of the project, the name of the Company Guide and his contact number etc. In the first week of July, all the students have to give a presentation about their observations made by them in internship. Students have to follow a detailed guidelines being circulated by the department in the preparation of internship report. At the end of the internship period, every student shall submit a structured internship report within 15 days from the date of the completion of the project period.

SEMESTER IV

MSQF 541: CONTEMPORARY DEVELOPMENT IN QUANTITATIVE FINANCE

(Workshop)

CREDITS: 3

Predictive Financial Modeling with Statistical Protocols

The workshop may cover all or some modules in four weeks schedule

Week -1: Project objectives and Report making

1. Observations of organizational /industrial activities, Identification of project problem from the workplace, identification of research hypothesis
2. Report writing, presentations methods, documentation and publication of the project report
3. Statistical issues in data collection, field work organization, coverage of data, schedule preparation of project work, preparation of questionnaire
4. Sampling frame and methods, sample size determination, handling of sampling and non-sampling errors

Week -2: Data Handling Protocols

5. Basics of data mining and Exploratory data analysis
6. Data Collection methods, primary and secondary data sources, Data procurement through hard/raw sources, Internet and other soft sources, exploration of data from data marts and other disseminated places,
7. Data base creation and its management, protocols of data administration, problems and solution methods with Big-Data processing and its preserving, data refinement and updating, data scrutiny, data processing

Week-3: Modeling Methodologies

8. Formulation of financial models to the working organization; Protocols of mathematical modeling, statistical data modeling, stochastic finance modeling to the proposed organization,
9. applied regression methods on forecasting and time series models, Multivariate analysis techniques for financial data sets, Formulation and solution methods of Linear programming problems, Identification, exploration and interpretations of most essential descriptive statistics

Week-4: Software Computations

10. Computational procedures through SPSS software package in extraction of Statistical reports, descriptive statistics, Inferential and analytical statistics
11. Identification of organizational decision making issues in financial aspects, Evaluation protocols of financial performance of organization with Data envelopment Analysis
12. Formulation of operational research models, linear programming problems, product mix programming problems, solution with MS Excel solver

MSQF 542 PROJECT WORK**CREDITS: 6****MSQF 543 PROJECT AND VIVA-VOCE****CREDITS: 2**

1. It is an individual compulsory project work offered in IV semester with 6 credits.
2. The Project work shall be guided and supervised by a faculty member assigned in the beginning of the semester.
3. The project work should be undertaken in a reputed and relevant organization and topics are to be selected in such a way that there is enough scope to apply and demonstrate the statistical, financial and econometric techniques learnt in the course.
4. At the end of the semester, before the last working day, project report should be submitted (two copies) with a certificate from industrial guide.
5. The project report shall contain the statement of problem, Methodology adopted, statistical tools used for analysis, findings, conclusions, suggestions, bibliography and references.
6. The project work will be assessed for 6 credits. Students have to give a seminar of their project report at the end of the semester and which will be evaluated internally.
7. There will be viva-voce examination for 2 credits by an internal and an external examiner.
8. Report shall have the following format: Chapter I for Introduction for providing conceptual clarity, Chapter II for Review of Literature, Chapter III for Methodology, Chapter IV, V & VI for analysis and interpretations of each objectives (No of chapter can be reduced or increased depending upon the number of objectives), chapter VII for findings and suggestions.

ELECTIVES

STREAM I (Applied Statistics)

1. OPTIMIZATION TECHNIQUES

CREDITS: 3

UNIT I: Linear programming problems - model formulation and graphical solution – various types of solutions – simplex method of solving linear programming – Artificial variable techniques - Big M method – principle of duality

UNIT II:— Transportation problem – Initial Basic Feasible Solution – North West Corner Rule – Vogel’s Approximation Method – MODI method of finding optimal solutions - Assignment problem - Sequencing problem – ‘n’ jobs two machines problem – ‘n’ jobs ‘m’ machines problem

UNIT III:– Replacement problem – Replacement of policy when value of money changes/does not change with time – Replacement of equipment that fails suddenly – Game theory – Two person zero sum games – Pure and Mixed strategies – Games with saddle point - principle of dominance - graphical method

UNIT IV: Decision analysis – components of decision making – decision making without probabilities – maximin – minimax regret – Hurwicz and equal likelihood criterion – decision making with probabilities – expected value – expected opportunity loss criterion.

UNIT V: Network flow models – shortest route problem – project management – the CPM and PERT Networks – sensitivity analysis

Books for Study

1. Hamdy A. Taha (2006): Operations Research – An Introduction, 8/e, Prentice Hall of India Private Ltd, New Delhi.
2. Sharma, J.K. (1997) : Operations Research, Theory and applications, Macmillan.

Books for Reference

1. Hillier F S and Libermann G J(2002): Introduction to Operations Research, 7th Edition, McGraw Hill
2. Kanti Swarup, Manmohan and Gupta P.K.(1985): Opertaions Research, Sultan Chand and Sons, New Delhi.

2. STOCHASTIC MODELING

CREDITS: 3

UNIT I: Stochastic Processes

Stochastic processes: Definition and classification of a stochastic process. Finite and countable Markov chains with stationary transition probabilities, classification of states, communicating classes, Irreducibility, Stationary distribution and its interpretation, random walk and gambler's ruin problems. Computing n-step transition probability matrix by spectral representation

UNIT II: Markov Chains

Discrete Time Markov Chains: Definitions, Notations, Properties, Limiting Probabilities, Absorbing barriers-various types of states and chains-simple problems-notion of stationary processes.

UNIT III: Markov Processes

Markov processes, Poisson process and its properties- Compound Poisson process-Pure Birth and Pure death Processes -Birth-death processes - Kolmogorov forward and backward equations- Yule process.

UNIT IV: Branching Processes

Discrete Branching Processes (BP) - Simple examples - BP as a Markov Chain -Generating function relationship - Mean and variance of BP - Concept of extinction -Simple problems - Total number in the progeny - Concept of Age dependent Branching Processes

UNIT V: Diffusion Processes

Wiener Processes, Brownian Motion with drift, Geometric Brownian Motion, Integrated Brownian motion, Bessel's Process, White Noise Process- Ito and Levy processes — applications to Finance.

Books for Study

1. Bhat .B.R., (2004), Stochastic Models Analysis and Applications, New Age International Pvt. Ltd
2. Karlin, S and Taylor, H.M (1975): A first course in stochastic processes, Academic Press, New York.
3. Medhi. J (2002), Stochastic Process, 2/e New Age International Pvt Ltd.

Books for Reference

1. Bhat, U.N. and Miller, G.K. (2002): Elements of applied stochastic processes 3rd ed. Wiley Inter, New York.
2. Brzezniak, Z and Zastawniak, T. (1998): Basic Stochastic Processes: A course through Exercises, Springer , New York.
3. Douglas Kennedy (2010): Stochastic Financial Models, Chapman & Hall/CRC Financial Mathematics Series
4. Jitka Dupacova, Jan hurt & Joseph Stepan, Stochastic Modeling in Economics and Finance, Kluwer Academic Publishers
5. Richard Serfozo, (2009): Basics of Applied Stochastic Processes, Springer.

3. FINANCIAL MATHEMATICS

CREDITS: 3

Unit I: Basic Financial Calculations

Introduction: financial securities- zero coupon bond, fixed interest, index linked securities etc.; the time value of money; nominal Vs. real interest, deflationary conditions; accumulating factors, force of interest, compound interest functions.

Unit II: Annuities and Equation of Value

Discounting and Accumulation: discrete and continuous cash flows; level annuities, deferred and increasing/decreasing annuities, equation of value and yield on transaction, probability of cash flows, higher discount, loan schedules; consumer credit: flat rate and APRs.

Unit III: Capital Budgeting Techniques and Compound Interest Problems

Introduction to financial statement, assessing financial performance, net present value, internal rate of return, payback period; projects with different lives; money and time weighed rate of return; fixed interest securities, uncertain income securities, equities, valuing a loan with allowance for capital gains and indexation.

Unit IV: Arbitrage, Forward Contracts, and Term Structure of Interest

Rationale for no arbitrage assumption; forward contracts, calculating the forward price for a security with known dividend yield; hedging, fixed cash income; Discrete time and continuous time rates; continuous time spot rates and forward rates; instantaneous forward rates; theories of time; term structure of interest rates; yield curve; yields to maturity; convexity and immunization; interest rate risk..

Unit V: Stochastic Interest Models and Investments

Simple stochastic interest rate models, fixed and varying interest model, log normal distribution; fixed interest government borrowings, government bonds, tax, security, marketability and return; government bills: corporate debt, debentures, unsecured loan stocks, eurobonds, certificates of deposit, convertibles, property, derivatives, future, range of futures, clearing house, margin, bond futures, short interest futures, stock index futures etc.,

Books for Study

1. Ross, S.M., (1999): An Introduction to Mathematical Finance, Cambridge University Press, Norton, London.
2. Martin, P.G. and Michael B., (1991): Applied Financial Mathematics, Prentice Hall.

Books for Reference

1. Baxter, M. and A. L. Rennie, (1996): Financial Calculus, Cambridge University Press.
2. Karatzas, L. and Shreve S.E., (1998): Methods of Mathematical Finance, Springer.
3. Watsham, T.J. and Perramore, K., (1997): Quantitative Methods in Finance, International Thomson Business Press.

4. MULTIVARIATE DATA ANALYSIS

CREDITS:3

Unit I

Matrices: Rank, inverse, trace and their properties – Characteristic roots and vectors – Idempotent and partitioned matrices – G-inverse and properties – Reduction of a matrix into diagonal, canonical and triangular forms

Unit II

System of Linear Equations: Consistency – different types of solutions - Quadratic forms – reductions of different types – Definite quadratic forms – Cochran's theorem (statement only)

Unit III

Normal distribution – Bivariate Normal distribution – properties – Multivariate Normal distribution – marginal and conditional distributions – simple problems - Maximum likelihood estimation of the parameters of Multivariate Normal and simple problems – Inference concerning the mean vector when covariance matrix is known.

Unit IV

Classification problems – scope and its applications - Categorical Data Analysis: Categorical response data, logistic regression-odds ratio, Wald's statistic - Classification in to one of two populations – Linear discriminant function – Multivariate analysis of variance (MANOVA) – One- Way classification (Concept only).

Unit V

Principal components – Definition – Extraction of Principal components and their variances. Factor analysis - Concept of factor rotation – Varimax criterion – cluster analysis – correspondence analysis

Books for Study

1. Alvin C. Rencher(2002): Methods of Multivariate Analysis, 2/e, Wiley Interscience
2. Johnson, Richard A and. Wichern D.W (2007): Applied Multivariate Statistical Analysis, 6 /e, Prentice-Hall of India Private Ltd., New Delhi.

Books for Reference

1. Affifi and sansane (2004) Practical Multivariate Analysis , Wiley
2. Anderson, T.W(2003) : An Introduction to Multivariate Statistical Analysis, Wiley Eastern Ltd.
3. Morrison, F(1985): Multivariate Statistical Methods, Mc Graw Hill Book Company.

5. NUMERICAL METHODS

CREDITS:3

UNIT I: Algebraic Equations

Solution of Algebraic and Transcendental Equations: Bisection method – Regula Falsi method – Iteration method - Newton Raphson method – Horner’s Method Simultaneous equations: Direct methods: Gauss Elimination method – Gauss-Jordan method – Iterative methods: Gauss-Jacobi method - Gauss Siedal iterative method.

UNIT II: Finite Differences

Finite differences: Forward and backward differences – Differences of a polynomial – Relation between the Operators E, δ , μ and backward difference operator, and their basic properties – Application to summation of series.

UNIT III: Interpolations with Equal Intervals

Interpolation with equal intervals: Newton’s forward and backward differences formulae. Central differences: Gauss’s forward and backward differences formulae – Stirling’s, Bessel’s and Laplace- Everett’s formula – Simple problems only.

UNIT IV: Interpolations with Unequal Intervals

Interpolation with unequal intervals: Divided differences and their properties – Newton’s divided difference formula – Lagrange’s formula – simple problems. Inverse interpolation: Iteration or successive approximation method – Lagrange’s method — simple problems.

UNIT V: Numerical Integration

Numerical Integration: Trapezoidal rule – Simpson’s 1/3 and 3/8 rules – Weddle’s rule – Euler’s summation formula

Books for Study

1. Sastry .S.S. (1998) : Introductory Methods of Numerical Analysis, Prentice-Hall of India.
2. Venkatraman .M. K. (2005): Numerical Methods in Engineering and Science, National Publishing company, India

Books for Reference

1. Chitode. JS (2010): Numerical Methods, Technical Publications, Pune
2. John F. Monahan (2001) Numerical Methods of Statistics, Cambridge University Press

6. STATISTICAL TECHNIQUES FOR MANAGERS

CREDITS:3

UNIT 1

Concept of Quality – Quality movement in India – Standardization for Quality – Quality movement – Quality management – Quality circles – Total Quality Management – ISO 9001.

UNIT 2

Need for SQC in industries – process control – chance and assignable causes of variations – concepts of specification and tolerance limits – process capability – statistical basis for control charts

UNIT 3

Control chart for variables – \bar{x} and R chart – simple problems - Control charts for attributes – p, np, c charts – simple problems

UNIT 4

Basics of Experimental design - Principles of design of experiments: Randomisation, Replication and local control - determination of experimental units and notion of experimental error – Completely Randomized Design (CRD) – Randomized Block Design (RBD) – Concepts and Simple problems

UNIT 5

Latin Square Design (LSD) – Concepts and simple problems - Factorial Experiments – Concepts - 2^2 , 2^3 and 3^2 designs – Simple Problems

Books for Study

1. Agarwal B.L., (2010): Theory and Analysis of Experimental Designs, CBS Publishers and Distributors.
2. Gupta S.C. and Kapoor V.K. (1999): Fundamentals of Applied Statistics, Sultan Chand and Sons.
3. Montgomery.D.C. (1991): Introduction to Statistical Quality Control, 2/e, John Wiley and Sons.

Books for Reference

1. Das.M.N and Giri.N.C(1986): Design and Analysis of Experiments, Wiley Eastern Limited.
2. Duncan A.J.(1974): Quality Control and Industrial Statistics, 4/e, Taraporewala & Sons.
3. Grant.E.L. and Leavenworth.R.S. (1980): Statistical Quality Control, McGraw Hill.

STREAM II (Information Technology)

1. DATA WAREHOUSING & DATA MINING

CREDITS:3

Unit – I : Data Warehousing – Introduction – architecture – meta data management – data quality management – Infrastructure Development – overview – current capabilities – establishing Warehouse organizational infrastructure – development life cycle – architecture design and implementation strategy

Unit – II: Initiating a Data Warehouse Project – techniques for data warehouse requirements analysis – designing and implementing the data warehouse – techniques for constructing and implementing the architecture – production performance tuning – data warehouse support and maintenance overview

Unit – III: Data Mining – Introduction – Definitions – comparison with other research areas – DM application areas –

Unit – IV: Association rules – introduction – methods to discover association rules – Clustering techniques – introduction – clustering paradigms – partitioning algorithms – k-Medoid algorithms – Hierarchical Clustering – Categorical Clustering Algorithms

Unit – V: Case studies on Data Mining tools .

Books for Study

1. Arun K. Pujari, (2001):Data Mining Techniques, Universities Press
2. Douglas Hackney,(1997):Understanding and Implementing Successful Data, Marts–Addison Wesley Developers Press
3. Han, Jiawei; Kamber, Micheline,(2001): Data mining: concepts and techniques, Morgan Kaufmann Publishers.
4. Kimball, Ralph, Reeves, Laura et al, (1998): Data warehouse lifecycle toolkit: expert methods for designing, developing, and deploying data warehouses John Wiley & Sons.

Books for Reference

1. Jiawei Han et, al., (2000): Data Mining: Concepts and Techniques , Morgan Kaufmaan Series.
2. Ralph Kimball,(1998):The Data Warehouse Life Cycle Toolkit, John Wiley & Sons Inc.,
3. Sean Kelly, (1997):Data Warehousing in Action, John Wiley & Sons Inc.,
4. Uthurusamy, (1996):Advances in Knowledge Discovery and Data Mining, The M.I.T Press.

2. MANAGEMENT INFORMATION SYSTEMS

CREDITS:3

Unit I : Introduction

Concept, evolution and meaning of MIS; Goals of MIS; Information system for competitive advantage; Systems approach to problem solving; Challenges in the development of MIS, MIS function in an organization.

Unit II: Information and Managerial Effectiveness

Information as a corporate resource, pervasiveness of information, types of information operational, tactical and strategic; Levels of management and information needs of management; Process of generation of information; Quality of information; Information systems for finance, marketing, manufacturing, research and development and human resource areas.

Unit III: Information Systems

Information systems and their role in business systems, changing role of information systems, users of information systems; Types of information systems transaction processing system, MIS decision support system, executive support system; Enterprise Resource Planning (ERP) system, geographical information system, business expert system, etc; Procurement options and outsourcing information system services.

Unit IV: System Development Life Cycle

Sequential Process of software development; Computer Aided Software Engineering (CASE); Tools and the modular approach to software development; Information system audit. **Development and Management of Data Bases:** Relational databases; Data Base Management Systems (DBMS) and their components; Concept of entity and relationships; Data dictionary, SQL and other related concepts in DBMS; Normalisation process.

Unit V: Data Communication and Networking

Uses of computer networks, types of networks, network topologies; Network media and hardware; Data communication over telephone; Intranets and collaborative processing - Methods and steps in implementation of system; Approaches and process of evaluating MIS. Threats to information systems; Vulnerability, risk and control measures.

Books for Study

1. Kumar, Muneesh: Business Information Systems, Vikas publishing House, New Delhi.
2. Licher, Paul: Managing Information Systems: A Strategic Approach, Dryden Press, and Illinois.
3. Management Information Systems by James A. O'Brien, Tata McGraw Hill Publishing Company Limited, New Delhi.

Books for Reference

1. Judith R. Gordon and Steven R. Gordon, Information System: A Management Approach, Dryden Press, Illinois
2. Laudon, Kenneth C and Jane P. Laudon: Management Information Systems: Organization and Technology, Prentice Hall, New Delhi.
3. Lucas, Henry C: Information Technology for Management, McGraw Hill, International Edition.
4. Murdick Robert G., Joel E. Ross and James R. Calggett: Information System for Modern Management, Prentice Hall, New Delhi.

3. INFORMATION SECURITY

CREDITS:3

Unit I : Security problem in computing

Introduction - Security trends – Security attack – Security service – Security mechanism – model for network security – Cryptography – program security – Database & data mining securing

Unit II: Network Security

Threat in network - Network security control- firewalls – Intrusion detection system- Secure –E-mail

Unit III: Administering security

Security planning - Risk analysis - organizational security policies - Physical security.

Unit IV: Computer security

Protecting programs & data - Redress for software failures - Computer crime – ethical issues in computer security Case studies

Unit V System security

Intruders – Intruder detection – password management – virus & related threats – virus counter measures – Firewall design principles – trusted systems.

Books for Study

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, (2003): Security in Computing.
2. Farooq Anjum & Patros Mouchitaris, (2007): Security for wireless adhoc networks, John Wiley & sons.
3. Philip Alexander (2008): Information Security .A manager's guide to thwarting data thieves & hackers.
4. William Stallion, (2006): Common criteria for IT security evaluation, Prentice Hall INC.

Books for Reference

1. Bruce Schneier, Applied Cryptography, 2/e, John Wiley & Sons
2. Caelli, J., and Longley D. and Shain M., (1991): Information Security Handbook, Macmillan.
3. Davice and Price, (1989): Security of Computer Networks, Wiely.
4. McClure S., Scambray J. and Kurtz G., (1999): Hacking exposed: Network security secrets and solutions, McGraw-Hill.
5. William Stallings, Cryptography and Network Security Principles and Practices, 3/e, PHI.

4. ORACLE & DATABASE MANAGEMENT

CREDITS:3

Unit I

Introduction to Database System: Overview – Data Models – Database System Architecture – History of Database Systems. Entity – Relationship Model: basic Concepts – Constraints – Keys – Design Issues – Entity-Relationship Diagram – weak Entity sets – design of an E-R Database Schema.

Unit II

Relational Mode: Structure of Relational Database – Relational Algebra – Extended Relational Algebra Operations – Modification of Database – Views – Tuple – Relational Calculus – Domain Relational Calculus.

Unit III

SQL: Background – Basic Structure – Set Operations – Aggregate Functions – Null Values – Modification of the Database – Data Definition Language – Embedded SQL.

Unit IV

Integrity and Security : Domain Constraints – Referential Integrity – Assertions – Triggers – Security and Authorization – Authorization in SQL – Relational Database Design: First Normal Form – Second Normal Form – Boyce-Codd Normal Form – Third Normal Form.

Unit V

Transactions: Transaction Concept – Transaction State – Implementation of Atomicity and Durability – Serializability – Testing for Serializability.

Books for Study

1. Oracle: A Beginner's Guide, Tata McGraw Hill Publishing Company Limited, New Delhi.
2. Selbetschatz and Sudharshan (2002): Database System Concepts, 4th Edition, McGraw Hill Education, International Edition.

Books for Reference

1. Bipin C Desai, (2001): An Introduction to Database Systems , Galgotia Publications.
2. Elmasri, Navathe,(2000): Fundamentals of database Systems , 3/e, Addison Wesley.
3. Jeffrey D.Ulman, Jenifer Widom,(2001): A First Course in Database Systems: Pearson Education.
4. Joycet Banerjee .,(2008): Oracle applications DBA , Tata Mc Graw Hill publication Ltd
5. Michael Alibey Michael j. Corey .,(1997): Oracle – A beginners guide –. Tata Mcgraw Hill. Publishing company ltd.

5. OBJECT ORIENTED PROGRAMMING USING C++

CREDITS:3

Unit I: Commands using C++

Introduction – starting with C++ program - Constants- Variables - Declaration of variables - Type conversions - Relational operators - Decision making, branching and looping - Functions - Simple functions - Passing arguments to functions - Returning values from functions - Reference arguments - Overloaded functions - Inline functions.

Unit II: Concepts of OOPS

Defining classes - Creating objects - Constructors - Accessing class members - Member functions - Overloaded constructors - Static class data - Arrays and strings.

Unit III: Overloading

Operator overloading - Overloading unary and binary operators- Data conversion - Derived class- Class hierarchies - Public and private inheritance - Multiple inheritance.

Unit IV: Pointers

Pointers in addresses - Arrays, functions and strings - Memory management - New and delete functions – Friend functions - Pointer to objects

Unit V: Working with files

Files and streams - the fstream class – Exception handling – Class templates

Books for Study

1. Arumugam S, Thangapandi Isaac A, and Somasundaram A,(2005): Numerical Methods, Scitech Publications (India) Pvt. Ltd., Second Edition Chennai
2. Balagurusamy, E.(2002): Object –Oriented Programming with C++, 2/C Tata Mc Graw Hill Publishing Company Ltd., New Delhi.

Books for References

1. Bjarne Stroustrup (2000) : The C++ Programming language , 3/e , Addison Wesley.
2. John Hubbard(2000):Programming with C++, 2/e, Schaum Series
3. Robert Lafore(1997): Object Oriented Programming in Turbo C++, Galgotia Publishers .
4. Sastry, S.S(1990): Introductory Methods of Numerical Analysis, Prentice Hall of India .

6. VISUAL BASIC PROGRAMMING

CREDITS:3

UNIT-I:

VB environment; Tools; Bars; Different Menus; Customizing a Form – Setting Different properties; Saving, Edit, Debug, Run and writing simple programs; user interface – Creating Controls; Command buttons, simple event procedure; image controls, text boxes; Labels and Navigation.

UNIT-II:

VB Programming – Editing Tools; Statements; Variables; Data Types; Strings; Numbers; Picture Boxes; Printer Object; Operators, Determinant and Indeterminant loops; Decision Making Statements; Built-In-Functions; Date-Time functions.

UNIT-III:

Functions – Procedures – Arrays – Writing simple programs using above function(like Searching, Sorting and etc.) – Control Arrays – List and Combo Box; Flex Grid control – VB Object Browser – Introduction to Object Oriented Programming – Making user interfaces using MS Window common control, MDI Forms.

UNIT-IV:

Tools and Techniques for testing, Debugging and optimization; ActiveX Controls, Basic file Handling – Workspace; Database; Recordset; Report Generation; Accessing with different back end (MS Access, Oracle8i),

UNIT-V:

Building Packages (like Student Information System, Library Information System, Railway Reservation System, Inventory Control System etc.)

Books for Study

1. Connell (1999): VISUAL BASIC 6.0 , Tata McGraw-Hill.
2. Deitel and Deitel, T.R. Nieto,(1999): Visual Basic 6 How to Program , Prentice Hall of India.

Books for Reference

1. David Kruglirski.J, (1993):Inside Visual C++, Microsoft press.
2. Gary Cornell, (1998):Visual Basic 6 From The Ground Up, Tata McGraw-Hill Publishing Company .
3. Pappas, C.H., Murray, W.H. (1999): III Visual C++: The Complete Reference , Tata McGraw-Hill Publishing Company.

STREAM III (Risk Management)

1. FINANCIAL ENGINEERING AND DERIVATIVES

CREDITS:3

Unit I:

Introduction to Financial Engineering-Meaning, scope and Need-Tools of Financial Engineering-Financial Engineering and Financial Analysis-Factors Contributing to the Growth of Financial Engineering-Financial Engineering process. Financial Product Development-Need-Direction-Design-Testing and Introduction-Recent Debt Market Innovations-Zero Coupon Securities-Repo and reverse Market- Financial Engineering Process and Strategies

Unit II:

Financial Derivatives – Introduction- Meaning- Definition- purpose and types of Derivatives - Derivatives Market in India and other countries- New Financial Derivatives emerging in international financial markets.

Unit III:

Futures - Forward and Futures Contracts – Futures Markets- the mechanics of Futures Markets – the Long and Short of Financial Futures- Clearing House Arrangement – Futures price-Spot price – Forward price - Trading Futures positions.

Unit IV:

Options – Meaning – Types of Options– Options Contract - Options Trading - Differences between Futures and Options Contract– Market participations and motivations –

Unit V:

Swaps – Meaning – Types – Interest Rate Swap – Currency Swaps – Valuation – mechanics of operation – Credit Risk and Swaps

Books for Study

1. John F.Marshall & Vipul; K. Bansal, Financial Engineering: A complete Guide to Financial Innovation, Prentice-Hall of India Private Ltd. New Delhi.
2. John Hull, “Options, Futures and Other Derivatives”, Prentice Hall.

Books for Reference

1. Chance Don, “An Introduction to Derivatives, Dryden Press
2. Das Satyajith, “ Swaps & Derivatives Financing, Probes
3. Kolb, Robert W., “Understanding Futures Markets”, Prentice Hall.
4. Prasanna Chandra, Financial Management, Tata McGraw Hill.

2. OTC DERIVATIVES

CREDITS:3

UNIT I Introduction

The Definitions and History of Derivatives Trading - The OTC Market, Uses and Users - Financial Treatment of Derivatives and Capital Framework - Pricing Considerations - Risk Considerations

UNIT II OTC Options

The Basics of Options - Valuation and Pricing - The Greeks - Option Strategies - Further Option Types

UNIT III Interest Rate Derivatives

Interest Rate Changes - Forward Rate Agreements (FRA) - Interest Rate Swaps (IRS), Basis Swaps and Currency Swaps - Interest Rate Protection - Other Interest Rate Products

UNIT IV Credit Derivatives, Equity Derivatives & Other Derivatives

Credit Derivatives, Market Considerations - Equity Derivative Products, Foreign Exchange- Asset Swaps and Bond Options - Other Products

UNIT V Element 7 Operations And Risk Control

Trade Capture - Payment and Reconciliation - Documentation - Static Data and Event Monitoring - Electronic Processing

Books for Study

1. Hull J C, (2002): Options, Futures and Other Derivatives, Prentice Hall.
2. Chance Don, "An Introduction to Derivatives, Dryden Press

Books for Reference

1. Marshal JF, (1991): Futures and Options Contracting: Theory and Practice, south Western Publishing Company.
2. Kolb R W, (2002): Futures, Options and Swaps, Blackwell Publishers.
3. Das Satyajith, () Swaps & Derivatives Financing, Probes

3. BIG DATA ANALYTICS

CREDITS:3

UNIT-I Introduction to Big Data Analytics

Big Data Overview - State of the Practice in Analytics - The Data Scientist - Big Data Analytics in Industry Verticals - Data Analytics Lifecycle

UNIT-II Review of the Basic Data Analytic Methods using R

Introduction to R – look at the data - Analyzing and Exploring the Data- Statistics for Model Building and Evaluation

UNIT-III Advanced Analytics-

K-means clustering - Association rules- Linear Regression- Logistic Regression- Naïve Bayes- Decision Trees- Time Series Analysis- Text Analysis

UNIT-IV Big Data Analysis Models and Algorithms

Analytics for Unstructured Data (MapReduce and Hadoop)- The Hadoop Ecosystem- In-database Analytics – SQL Essentials- Advanced SQL and MADlib for in-database Analytics

UNIT-V New Research Trends and Applications

Operationalizing an Analytics Project -Creating the Final Deliverables- Data Visualization Techniques- Final Lab: Application of Data Analytics Lifecycle to a Big Data Analytics Challenge

Books for Study

1. Frank J. Ohlhorst (2013), Big data Analytics, Turning Big data into big money, John Wiley and Sons.
2. IBM Paul Zikopoulos, Chris Eaton, Paul Zikopoulos (2011)., Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data., McGraw Hill Professional

Books for Reference

1. Viktor Mayer-Schönberger, Kenneth Niel Cukier (2013)., Big Data: A Revolution That Will Transform How We Live, Work, and Think., Houghton Mifflin Harcourt Publishing Company.,
2. Arvind Sathi (2012). Big Data Analytics: Disruptive Technologies for Changing the Game., MC PressLLC
3. Michael Minelli, Michele Chambers, Ambiga Dhiraj (2013), Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends . John Wiley and Sons.

4. RISK MANAGEMENT AND STRATEGIES

CREDITS: 3

Unit I: Introduction to Risk Management

Sources of risk, currency risk, fixed income risk, equity risk, commodity risk, market risk measurement, VAR as downside risk, definition, parameter, elements of VAR system, stress testing

Unit II: VAR Methods

An overview of VAR methods, VAR local and full valuation, delta normal methods, historical simulation, Monte Carlo simulation, examples of VAR applications.

Unit III: Hedging

Hedging liner risk, optimal hedging, hedge ratio as regression coefficient, duration hedging, beta hedging, non-linear risk hedging, delta and dynamic hedging

Unit IV: Credit Risk Management

Settlement risk, introduction to credit risk, measuring credit risk, credit exposure, types of credit derivatives, credit default swap, pricing and hedging credit derivatives, measuring credit VAR, credit risk models, Basel accord, the Basel market risk charges

Unit V Operation & Integrated Risk Management

Introduction to operational risk, identifying operational risk, managing operational risk, risk capital, RAROC, risk capital, RAROC methodology, legal accounting, tax risk management

Books for Study

1. Chew Lillian: *Managing derivative Risk*, John Wiley, New Jersey.
2. Chapman, R.J., *Simple Tools and Techniques for Enterprise Risk Management*, Wiley, 2006

Books for Reference

1. Vaughan, E. J., *Risk Management*, Wiley, 1998
2. Doherty, N., *Integrated risk management: techniques and strategies for managing corporate*, McGraw-Hill, 2000
3. Jorion, P., *Financial Risk Management Handbook*, Wiley, 2003

5. TREASURY AND FIXED INCOME SECURITIES

CREDITS:3

Unit I: Introduction to Fixed Income Securities

Time value of money, discount factors, the law of one price, arbitrage, bond prices, spot prices, STRIPS, coupon bonds, definition and interpretation of yield-to-maturity, coupon effect, yield-to-maturity and spot rates and forward rates

Unit II: Fixed Income Market in India

An introduction to the Indian debt market, the government securities market, bond, T-bills, the corporate bonds, commercial papers, repos, the trading mechanism in the NSE-WDM, regulations in the bond market

Unit III: Measure of Price Sensitivity and Hedging

One-factor measure of price sensitivity, modified and Macaulay duration and convexity, par bonds and perpetuities, measure of price sensitivity based on parallel yield shift, bond immunization, hedging strategies, volatility weighted hedging and regression based hedging

Unit IV: Term Structure Models

The science of term structure models, normally distributed rates and zero drift models, time dependent drift - Ho-Lee model, the mean reversion model: Vasicek model, the volatility models: the Cox- Ingersoll-Ross model

Unit v: Multi-Factor Term Structure Models

Motivation for principal component models, the two factor models, properties of the two factor models, multi-factor models, trading with term structure models and case studies, hedging to the model versus hedging to the market

Books for Study

1. Fabozzi, F. *Bond Markets, Analysis and Strategies*, Prentice Hall, 2004
2. Hull, J, *options: Futures and other Derivatives*, Prentice Hall, New Delhi.
3. Marshall, John and V.K. BANSAL: *Financial Engineering- A complete Guide to financial innovation*, Prentice Hall Inc, New Delhi,

Books for Reference

1. Copeland, T. E. and J. F. Weston, *Financial Theory and Corporate Policy*, Addison Wesley, 1992.
2. Brealey, R. and S. Myers, *Principles of Corporate Finance*, fifth edition, New York, McGraw Hill, 1997
3. Tuckman, B. *Fixed Income Securities*, Willey Finance, 2002

6. FOREX RISK MANAGEMENT

CREDITS:3

Unit I International Monetary and Financial System

Importance of international finance; Bretton woods conference and afterwards, IMF and the World Bank; European monetary system - meaning and scope.

Unit II Balance of Payment and International Linkages

Balance of payments and its components; International flow of goods, services and capital; Coping with current account deficit.

Unit III International Financial Markets and Instruments

International capital and money markets; Money and capital market instruments; Salient features of different international markets; Arbitrage opportunities; Integration of markets; Role of financial intermediaries.

Unit IV Foreign Exchange Risk

Transaction exposure, translation exposure and economic exposure; management of exposures internal techniques, netting, marketing, leading and lagging, pricing policy, assets and liability management and techniques.

Unit V Management of Risk in Foreign Exchange Markets

Forex Derivatives Swaps – Future and Option and Forward Contracts. Currency Derivatives – Currency Forwards – Currency Futures – Currency Options – Exchange traded transactions – Financial Swaps – Forward Rate agreements – Interest Rate Options.

Books for Study

1. Apte, P.G: International Financial Management, Tata Mc Graw hill, New Delhi.
2. Buckley, Adrian; Multinational Finance, Prentice Hall, New Defhi.
3. C. Jeavanandam: Foreign Exchange Practice, Concepts Sultan & Control Chand & Sons, New Delhi.

Books for Reference

1. Eitman, D.K. and A.I Stenehilf: Multinational Business Cash Finance, Addison Wesley, New York.
2. Henning, C.N., W Piggot and W.H Scott: international Financial Management, McGraw Hill, International Edition.
3. Levi, Maurice D: International Finance, McGraw-Hill, International Edition.