PONDICHERRY UNIVERSITY

Ramanujan School of Mathematical Sciences

Draft Regulations
and
Syllabus for M.Sc. Quantitative Finance

(Under UGC Innovative Programme)

(CBCS Pattern)
Effective from the Academic Year 2017-18 onwards

PONDICHERRY UNIVERSITY

Ramanujan School of Mathematical Sciences

M. Sc. (Quantitative Finance)

CURRICULUM & COURSE STRUCTURE

Eligibility:

A candidate who has secured 55% marks or above in any one of the following or equivalent is eligible to apply. B. Sc. (Mathematics), B. Sc. (Statistics), B. Com./B.B.A/B.B.M with Mathematics, B. A. / B. Sc. (Economics/Econometrics) with Mathematics , Bachelor's degree in Engineering (Computer Science & Engineering/Information Technology) or Bachelor's degree in Computer Science/Computer Applications/Information Technology.

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 Contemporary Business/Economics/Finance Issues and Mathematics (Algebra and Calculus at higher secondary level).

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 performances in the respective courses.

This program trains the students to focus on real time application oriented problems using computer oriented packages (Financial and Statistical packages) like Minitab, CMIE-

PROWESS, BLOOMBERG, SPSS, R , EVIEWS and STATA.

Duration of the course:

The normal duration of any PG program is 4 Semesters. However, students are allowed to complete the PG program of the study within a maximum of 8 Semesters

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 weightage of 40 marks for Internal Continuous Assessment Component shall consist of the following:

Written test [2 Class Test(s)]	=	30 marks
Written Assignment(s)	=	5 marks
Seminar Presentation(s)/ Field Work(s)	=	5 marks
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 internal experts and the exams will be organized by the department under the direct supervision of the Dean, Ramanujan School of Mathematical Science. The list of External Examiners is to be approved by the Dean Ramanujan School of Mathematical Science 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 Internal Examiner. The sum of the marks awarded in

the Internal Assessment and by the End Semester 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 immediate end semester examination

(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 (at the end of second Semester) 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 as well as the Department 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 August, 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/Ramanujan 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-voice.

Question Paper Pattern:

The question paper pattern for the theory papers in the End-Semester Written Examinations shall be as given below:

Section A :	Five questions are to be answered out of eight questions, each carrying 4 marks:	**5 × 4 = 20 marks**
Section B :	Five questions are to be answered in either or type .	**5 ×8 = 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 2017– 2018

Non - Credit Bridge Courses			Nature of the Course
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	Quantitative Techniques for Beginners	Hard Core

Semester	Course Code	Title of the Course	Nature of the Course	No. of Credits
I	MSQF 411	Accounting and Financial Analysis	Hard Core	3
	MSQF 412	Financial Institutions and Markets in India	Hard Core	3
	MSQF 413	Managerial Economics	Hard Core	3
	MSQF 414	Probability Distributions	Hard Core	3
	MSQF 415	Lab I: Financial Statement Analysis(Using Excel)	Hard Core	2
	MSQF 416	Lab II: Data Analysis Using SPSS	Hard Core	2
II	MSQF 421	Portfolio Management	Hard Core	3
	MSQF 422	Statistical Inference	Hard Core	3
	MSQF 423	Basic Econometrics	Hard Core	3
	MSQF 424	Financial Engineering and Derivatives	Hard Core	3
	MSQF 425	Data Science	Hard Core	3
	MSQF 426	Financial Management	Hard Core	3
	MSQF 427	Lab III: Data Analytics using R	Hard Core	2
III	MSQF 531	Applied Time Series Analysis and Forecasting	Hard Core	3
	MSQF 532	Applied Regression Modelling using R	Hard Core	3
	MSQF 533	Risk Management	Hard Core	3
	MSQF 534	Corporate Internship and Viva	Hard Core	3
	MSQF 535	**Any three papers has to be selected from pool of Electives**	Soft Core	3
	MSQF 536		Soft Core	3
	MSQF 537		Soft Core	3
IV	MSQF 541	Project Course Work	Hard Core	4
	MSQF 542	Project Work	Hard Core	8
	MSQF 543	Comprehensive Viva	Hard Core	3

Pool of Electives

Course Code	Title of the Course	Nature of the Course	No. of Credits
1	Python for Data Analysis	Soft Core	3
2	Stochastic Modeling	Soft Core	3
3	Optimization Techniques	Soft Core	3
4	Statistical Techniques for Managers	Soft Core	3
5	Management Information System	Soft Core	3
6	Information Security	Soft Core	3
7	Global Finance and International Banking	Soft Core	3
8	Big Data Analytics	Soft Core	3
9	Behavioral Finance	Soft Core	3
10	Treasury and Fixed Income Securities	Soft Core	3
11	Algorithmic Trading	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 Organist ions – 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, PH1 Learning, New Delhi.

Books for Reference

1. Akhileshwar Pathak (2007): Legal Aspects of Business, 2/ e., Tata Mc Graw-Hill, New Delhi Publishing, New Delhi
2. Dearden , J and S.K. Bhattacharya(1997): Accounting for Management, (1997) 3/e.Vikas Publishing House,New Delhi.
3. Prasad L M (2001): Principles and Practice Of Management, Chand and Company Ltd., New Delhi.
4. Rustomji .M.K, (2005):All about Balance sheets, Mac Millan.

MSQF 402: BASICS OF COMPUTER

Unit I: Introduction to Excel

Introduction to Excel - Excel menu and options – Excel interface – Basic navigation and Editing

Unit II: Basics of R

Data types, objects, vectors, sequence, lists, arrays, Defining matrices and performing basic matrix operations, Creating data frames – reading files of different file formats data editor to create a data frame.

Unit III: Fundamental of SPSS

Descriptive statistics, correlation – Pearson's, Spearmen's. Fundamental of SPSS, reading different file formats, data editing features and summary statistics.

Unit IV: Introduction to EVIEWS, GRETL and STATA

Introduction to the software's - its menu and options – simple graph and calculations in Eviews, Gretl and Stata

Unit V:

Practical application using software's

Books for Study

1. Bowerman.L.B, O'Connell.R.Murphree.S,(2010): Business Statistics in Practice, Tata McGraw-Hill Edition
2. Ellis Horowitz , (1998): Fundamentals of Programming Language, Galgotia Publications 1998

Books for Reference

1. Anderson. R.D., Sweeney.J.D .,Williams A,(2002): Statistics for Business & Economics, 8/e, Thompson Asia Pvt, Ltd
2. Heinz, Kohleer (2001): Statistics for Business & Economics, 1/e,Harper Collins, New York
3. Landau, S. and Everitt, B. S. (2004) , A Handbook of Statistical Analyses using SPSS, Chapman and Hall/CRC.
4. Sankar Kumar Bhaumik (2015), Principles of Econometrics: A Modern Approach Using EViews , Oxford University Press; UK ed

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 -IS-LM Curve model - Employment – Monetary Demand and Supply - Money Prices and Inflation — 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. Mankiw N Gregory (2014), Principle of Economics, 7 / e ,South-Western College Publishing.

Books for References:

1. Ahuja H.L.(2008):Modern Economics, Sultan Chand, New Delhi
2. Jhingan.M.C.(2009): Microeconomic Theory Vrindha Pub(p) Ltd., New Delhi
3. Koutsoyiannis, A.(2000): Modern Microeconomics, 2 /e, Macmillan Press,London.
4. Richard.T.Froyen (2003): Macro Economics: Theories and Policies, Pearson Education.
5. Stigler, G.(1996): Theory of Price, PHI, New Delhi.

MSQF 404 : QUANTITATIVE TECHNIQUES FOR BEGINEERS

Unit-1

Definition of statistics–measures of central tendency- measures of dispersion-moments- Skewness and kurtosis and their measures. Bivariate data – scatter diagram, Pearsons correlation coefficient, Spearman's Rank correlation - normal Distribution- Concept of Regression, regression coefficients

Unit-II

Random Experiment: Sample space, Different types of events - Definition of probability: Classical and relative-frequency approach to probability - Addition and multiplication theorem on Probability(statements only) - Conditional probability and Independence of events.

Unit-III

Random variable - discrete and continuous random variables - probability mass function and probability density function - Distribution Function and its properties - expectation, variance - moment generating function and characteristic function - Concept of conditional distributions and conditional expectation.

Unit-IV

Linear Programming Problem (LPP) – various solutions - graphical method of solving LPP- simplex algorithm – simple problems.

Unit-V

Differentiation – standard forms- product rule- quotient rule – chain rule – Maxima , Minima Matrices, Determinants , Properties of determinants – rank of a matrix- inverse of a matrix

Books for Study

1. Das, N. G. (2014): Statistical Methods, Volume I and II, McGraw Hill Education.
2. Hooda, R. P. (2013): Statistics for Business and Economics, fifth /e, Vikas publishing house PVT Ltd.
3. Irwin Miller and Marylees Miller (2014): Mathematical Statistics with applications, 8/e, Pearson.
4. Medhi.J. (1992): Statistical Methods an Introductory Text , Wiley Eastern Ltd.
5. Narayanan, Manicavachagom pillay. T.K. (1997), Calculas-I, S,Viswanathan Printers & publishers

S.Arumugam (2003): Modern Algebra, Scitech Publishers.

Books for Reference

1. Goon Gupta and Das Gupta (1986): Fundamentals of Statistics, 5/e , The World Press.
2. Prakasa Rao, B.L.S. (2011): A First Course in Probability and Statistics, World Scientific publication.
3. Prakasa Rao, B.L.S. (2011): A First Course in Probability and Statistics, World Scientific publication.
4. Rohatgi, V.K. and Ebsanes Saleh, A.K. Md. (2002) : An introduction to Probability and Statistics, 2/e., John Wiley & Sons, Inc.
5. Sharma .A.K, (2005): Text Book of Elementary Statistics, Discovery Publishing House.
6. Amir.D.Aczel and Sounder Pandian (2006): Complete Business Statistics, 6/e, Tata McGraw Hill Publishing Company Limited.

SEMESTER I

MSQF 411: ACCOUNTING AND FINANCIAL ANALYSIS CREDITS: 3

Objectives

- *To acquaint the students with the fundamentals principles of Financial, Cost and Management Accounting*
- *To enable the students to prepare, Analyse and Interpret Financial Statements*
- *To enable the students to take decisions using Management Accounting Tools*

UnitI: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:

Final Accounts of Companies (Format only) – Banking Company accounts –Preparation of Final Accounts of Banking Companies- Non-Performing Assets – Asset Classification and Provisioning Norms

Unit III: Financial Statement Analysis: Ratios

Financial Analysis – Tools of Financial Analysis – Ratio Analysis – Computation and Interpretation of Ratios.

Unit IV: Financial Statement Analysis: Funds/Cash Flow Analysis

Preparation of Funds Flow Statement –Preparation of Cash Flow statement – Evaluation of Funds and cash Flow analysis

UnitV: Marginal Costing and Profit Planning:

Cost-Volume-Profit analysis – Application of Marginal Costing Technique - Budgetary Control and Standard Costing: Budgets and Budgetary Control – Preparation of Budgets – Standard Costing and Variance Analysis –Material Cost Variance and Labour Variance – Utility of Variance Analysis.

Books for Study

1. Gupta, R. L. and Radhaswamy, M. (2005): Advanced Accounting, Vol. I , Sultan Chand & Sons, New Delhi .
2. Maheswary, S. N. (2014): 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 (2011): Advanced Accounts, Kalyani Publishers, Ludhiana.
3. Jain, S. P. and Narang, K. L. (2014): Cost Accounts, Kalyani Publishers, Ludhiana.
4. Shukla, M. C. and Grewal, T. S. (1997): Advanced accounts, Vol. I , Sultan Chand & Co, New Delhi.

MSQF 412: FINANCIAL INSTITUTIONS AND MARKETS IN INDIA CREDITS:3

Objectives

- *To get an insight into the constitutions, structure, objectives and working of the Banking Institutions in India*
- *To evaluate the performance of Banking Institutions and their contribution to the growth of Indian Corporate Sector and*
- *To have a Bird's view of the Indian Financial System and in the context of Global Indian Banking System.*

Unit I: Introduction to Indian Financial System

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

Unit II: Money, 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 – stock markets information- Derivatives Markets - Equity Markets- Debt Markets.

Unit III: Merchant bankers

Merchant Banking in India-Functions- 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.

Unit IV: Foreign Exchange Market

Exchange rate – types – determination of exchange rate – nature of forex market - nature of forex inflow and outflow – Current account and Capital account convertibility- ECBs and NREs – RBI and exchange rate management

Unit V: Banking Institution and Financial Regulators

Banking Systems – Definitions – Functions – Types – Central Banking – Structure of Banking System- Rural Financing – Banker and Customer Relationship – Deposit Mobilization – Loans and Advances – Assets and Liabilities Management – Secured Advances – Endorsement and Crossing of Cheques – Payment of Cheques – Collection of Cheques.

Books for Study:

1. David S. Kidwell, David W. Blackwell, David A. Whidbee, Richard W. Sias (2012): "Financial Institutions, Markets, and Money", 11 /e , Wiley Publication, New York.
2. Srivastava R M. (2014): Management of Indian Financial Institutions, Himalaya Publishing House, Mumbai

Books for Reference

1. Anthony Saunders (2007): Financial Markets and Institutions, Tata McGraw Hill Ltd, New Delhi.
2. Bhole, L.M (2002): Indian Financial Institutions and Markets, Tata McGraw Hill Ltd, New Delhi.
3. Gurusamy (2009): Merchant Banking & Financial Services, Tata McGraw Hill, New Delhi
4. Jeff Madura (2010): Financial Markets and Institutions, 10th ed. – Western Cengage
5. Khan M.F, (2006): Indian Financial Institutions, Tata McGraw Hill Ltd, New Delhi
6. Pathak, Bharathi V., (2007): The Indian Financial System: Markets, Institutions and services, 2/e, Pearson Education India, New Delhi.

MSQF 413: MANAGERIAL ECONOMICS CREDITS:3

Objectives

- *This course will help independent business person to take various decisions pertaining analytical skills through integrating their knowledge of the economic theory with decision making techniques.*
- *To acquire knowledge associated with current Economy and organization*

Unit I: Definition, Scope & **Fundamental concepts:** Introduction, Definition, Scope of Managerial economics, Circular flow of Activity -Objective of a firm; Economic theory and managerial theory; Managerial economists role and responsibilities; profit and sales Maximization -The Economics of Effective Management - Fundamental economic concepts – basic concepts of consumption and Utility analysis

Unit II: Quantitative Demand Analysis : Demand determination - Market Forces: Demand and Supply**:** Individual and market demand functions; Law of demand/ supply, determinants of demand/ supply; Elasticity of demand/ supply- its meaning and importance; Price elasticity income elasticity and cross elasticity; Using elasticity in managerial decisions, Demand estimation for major consumer durable and non durable products; Demand forecasting techniques -Consumer surplus and producers surplus.

Unit III: Theory of individual behavior - Production and cost Analysis :
Cardinal utility approach, indifference approach, revealed preference and; Law of variable proportions- Law of returns to scale - Economies and diseconomies of scale Production function - Cost theory and estimation; Short and long run Cost curve – cost forecasting- Analysis of risk and uncertainty.

Unit IV: Market , Pricing Strategies and methods: Market structures and Competition: Characteristics of different market structures; Managing Competitive market -Price and output decision: Firm's equilibrium in short-run and long-run under perfect competition, Monopoly , Monopolistic competition, Duopoly and oligopoly. Methods of price determination in practice: Price discrimination; Degree of Price discrimination -International price discrimination and dumping; Transfer pricing. Decision Making theories.

Unit V: Macro economics and Business : Introduction to National Income – main economic indicators- Employment and unemployment- Business cycle – Inflation- Fiscal and Monetary policy- Economic environment and transaction of Indian economy.

Books for Study

1. Atmanand, (2009):Managerial Economics, 2 /e.
2. Bayal, Michael R. (2011): Managerial Economics and Business Strategy, 7/e, McGraw Hill Inc.New York.
3. Bruce .W. Allen, Keith Weigelt, Neil Dohrty and Edwin Mansfield, (2010):Managerial Economics, 7/e.
4. Gough, J. and S. Hill (1979): Fundamentals of Managerial Economics, MacMillan London.
5. Sankaran.S (2003): Managerial Economics, 4/e Tata McGraw Hill, Delhi

Books for Reference

1. Chopra, O.P (1984): Managerial Economics, Tata McGraw Hill, Delhi.
2. Koutsoyiannis, A.(2000): Modern Microeconomics, 2//e, Macmillan Press,London.
3. Salvatore, Dominick(2014): Managerial Economics in a Global Economy, McGraw Hill,New York.
4. Varsheny RL and Maheshwari KL(2014): Managerial Economics; Sultan Chand and Sons,New Delhi
5. Yogesh Maheshwari (2009): Managerial Economics; PHI Learning, New Delhi

MSQF 414 : PROBABILITY DISTRIBUTIONS CREDITS: 3

Objectives

- *To acquaint the students with the fundamentals of various distributions and their characteristic properties*
- *To provide illustrations on modelling of financial data using these distributions*

Unit I: Discrete distributions

Bernoulli, Binomial, Poisson, Multinomial, Geometric, Hypergeometric, Power series distributions and their characteristics - simple problems

Unit II: Continuous distributions

Uniform, Normal, Exponential, Gamma, Pareto, lognormal distributions and their characteristics - simple problems

Unit III: Sampling distributions

Concept and definition of Sample distribution- standard error - characteristics and uses of sampling distributions. – central limit theorem - Student t, chi-square and Snedecor F distributions and their interrelations.

Unit IV: Truncated and Compound distribution

Concept of truncation – zero truncated binomial and Poisson distribution - Compound distributions – compound binomial, compound Poisson and compound negative exponential (Pareto) distributions – their applications.

Unit V: Order statistics and their distribution

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

Books for Study

1. Biswas, S. and Sriwastav, G. L. (2011): Mathematical Statistics, Narosa Publishing House, New Delhi.
2. Das, N. G. (2014): Statistical Methods, Volume I and II, McGraw Hill Education.
3. Mood, A.M. Graybill, F.A. and Boes, D.C. (1974) : An introduction to the theory of Statistics, 3/e, McGraw Hill Book Company.
4. Parimal Mukhopadhyay(2006):Mathematical Statistics, 3/e, Books and Allied (P) Ltd, Kolkata.

Books for Reference

1. Goon Gupta and Das Gupta (1986): Fundamentals of Statistics, 5/e, The World Press.
2. Irwin Miller and Marylees Miller (2014): Mathematical Statistics with applications, 8/e, Pearson.
3. Pitman J. (1993): Probability Distributions, Narosa Publishing House.
4. Prakasa Rao, B.L.S. (2011): A First Course in Probability and Statistics, World Scientific publication.
5. Rohatgi, V.K.and Ebsanes Saleh,K. Md.(2002):An introduction to Probabilit and Statistics, 2/e, John Wiley & Sons, Inc.

MSQF 415: Lab I - FINANCIAL STATEMENT ANALYSIS (USING EXCEL) CREDITS: 2

Objectives

- *To enrich data analysis using Excel*
- *To have a better knowledge towards graphical depiction of data*

1. Random number generation
2. Probability distributions
3. Data retrieval and handling
4. Data analysis
    a. Return calculation (Monthly and Weekly)
    b. Estimation of beta
    c. Correlation, Standard deviation and variance
    d. Regression
5. Financial Statement Analysis – tools and techniques
6. Portfolio Analysis
    a. Portfolio Expected Return and Variance
    b. Efficient Frontier Portfolio Performance
    c. CAPM
    d. VAR

Books for Reference

1. Foster, George(1986): Financial Statement Analysis, Prentice Hall, and N.J .
2. Heinz, Kohleer (2001): Statistics for Business & Economics, 1/e,Harper Collins, New York.
3. Martin Baxter and Andrew Robbie (1996): Financial calculus Cambridge University, Press
   Cambridge.
4. Martin Baxter and Andrew Robbie (1996):Financial calculus Cambridge University, Press Cambridge.
5. Stice K Earl, Stice D James (2006): Financial Accounting Reporting and Analysis: South Western
6. White I Gerald, Sondhi C Ashwinpaul and Fried Do (2007): The analysis and use of financial Statements Wiley India
7. Wild J John, K.R Subramanyam and Halsey F.Robert, (2007):Financial Statement Analysis, Tata McGraw – Hill

MSQF 416: LAB II – DATA ANALYTICS USING SPSS CREDITS: 2

Objectives

- *To enrich data analysis using SPSS*
- *This gives an exposure towards functions and tools available in SPSS*

1. Basics – Import and Export of data files, Recoding into different variables, visual binning.
2. Summary statistics using Descriptive option and Means option.
3. Fitting of curves – Linear, parabola and cubic
4. Fitting of curves - exponential, Breakeven point
5. Simple Correlation – Spearman, Pearson and Kendall's
6. Multiple regression with variable selection
7. Parametric tests: two sample and paired t- test
8. One way with post hoc test (Tukey's test and Duncan's test)
9. Two way ANOVA. With post hoc test (Scheffe's test and LSD)
10. Chi-Square test for goodness of fit and independence of attributes
11. Mann-Whitney U test and Wilcoxon –sign match pair test
12. Kruskal – Wallis H test, Median Test and Friedman test.

Books for Reference

1. Robert Yaffee with Monnie McGee. Introduction to Time Series analysis and Forecasting with applications of SAS and SPSS, Academic Press, Inc.
2. Landau, S. and Everitt, B. S. (2004) , A Handbook of Statistical Analyses using SPSS, Chapman and Hall/CRC.

SEMESTER II

MSQF 421: PORTFOLIO MANAGEMENT CREDITS: 3

Objectives

- *To have understanding on investment and avenues of investment*
- *To have exposure on analysis techniques of capital market and*
- *To understand various theories of portfolio management*

Unit I **: Introduction**
Meaning, importance, objectives, characteristics, Investment, Gambling, Speculation.

Unit II: Return and Risk
Estimation of return and risk of a security- estimating return and risk of a portfolio - Effects of combining securities, Fundamental Analysis-Economic, Industries and Company Analysis, Technical Analysis-Dow theory, Different Charts and Techniques.

Unit III: **Portfolio Analysis:** Markowitz risk returns optimization. Single Index Model: Portfolio total risk, portfolio market risk and unique risk; Sharpe's optimization solution. Capital market line, security market line; Risk free lending and borrowing; recent developments.

Unit IV: **Portfolio Construction:** Arbitrage pricing theory, principle of arbitrage, arbitrage portfolios; two factor and multi factor models. Techniques of portfolio construction, Index Models,CAPM&APT Modelsofassetreturns,multiindexmodels,singleindexmodel,systematicandspecificrisk, estimation of beta.

Unit V: Performance Evaluation
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. Frank K. Reilly, Keith C. Brown (2011), Investment Analysis and Portfolio Management,South-Western College
2. Donald E. Fisher, Ronald J. Jordan (2007): Security analysis and Portfolio Management Prentice Hall New Delhi.
3. Prasanna Chandra(2008) ,Investment Analysis And Portfolio Management,Tata McGraw Hill Education
4. PunithavathyPandian(2012) ,Security Analysis and Portfolio Management,Vikas Publishing House.
5. Falguni H. Pandya (2013),Security Analysis and Portfolio Management , Jaico Publishing House

Books for Reference

1. Clark, James Francis (1991): Investment Analysis and Management, McGraw Hill, International Edition, New York.
2. Elton Edwin J. Gumber Martin J (2014): Modern Portfolio Theory and Investment Analysis; John Wiley, New York.
3. Fabozzi, Frank J (1999): Investment Management, Prentice Hall, International Edition, New York.
4. PunithavathyPandian (2001). Security Analysis & Portfolio Management, Vikas Publications house, Pvt,Noida
5. Falguni H. Pandya (2013),Security Analysis and Portfolio Management , Jaico Publishing House

MSQF 422: STATISTICAL INFERENCE **CREDITS: 3**

Objectives

- *To provide fundamental knowledge in the concepts of estimation theory and hypotheses testing*
- *To help in making decisions on hypotheses related to financial management*

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 – Interval Estimation - Confidence intervals for mean, proportion (large samples)- Simple problems

Unit III

Statistical hypothesis testing – Null and Alternative hypothesis - Simple and Composite hypothesis – Types of errors – Critical region – Level of significance – Power of a test – Computations of probability of Type I, Type II errors and power of the test - Chi-square tests for goodness of fit and independence of attributes

Unit IV

Tests of significance (Large samples): Test for single mean and proportion, Test for equality of means and proportions (two populations) – 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

Concept of Non-Parametric tests – advantages - Sign test –Mann Whitney U test – Test for Randomness (Run Test) –Kruskal Wallis test – Friedman test.

Books for Study

1. Hooda, R. P. (2013): Statistics for Business and Economics, 5/e, Vikas Publishing House Pvt. Ltd.
2. Black, K. (2008): Business Statistics for Contemporary Decision Making, 4/e, Wiley India.
3. Anerson, D. R., Sweeney, D. J. Williams, T. A. (2011): Statistics for Business and Economics, 11/e, South Western- cengage Learnings.
4. Prakasa Rao, B.L.S. (2009): A first course in probability and statistics, World Scientific Publishing Co. Pvt. Ltd. New Delhi.
5. Gupta S.C and Kapoor, V.K (2000): Fundamentals of Mathematical Statistics, Sultan Chand and Co.

Books for Reference

1. Hogg, R.V., Mc Kean J W and Craig, A.T (2008): Introduction to Mathematical Statistics, 6/e Pearson Edition
2. Miller, I and Miller, M (2002): John E. Freunds Mathematical Statistics, Pearson Education.
3. Mood, A.M., Graybill, A.M and Boes, D.C (1974): Introduction to theory of Statistics, Mc Graw Hill, New Delhi

MSQF 423: BASIC ECONOMETRICS CREDITS: 3

Objectives

- *This course provides knowledge in some advanced topics, such as panel data models, models with dummy dependent variable, and time series econometrics, which are important for empirical researchers in economics and Finance*

Unit I: Fundamentals of Econometrics

Definition and scope of econometrics- GLS-OLS-Linear regression model- properties of estimators- Gauss-Markov theorem- - Estimation and Hypothesis testing -correlation and regression . Analysis of residuals: Standardized, Studentized and predicted residuals- Test for normality- Stepwise and Piecewise linear regression -Ridge Regression- Instrumental Variables

Unit II: Problems in regression analysis

Violation of assumption of classical regression model – Consequences, detection and remedial measures of multicollinearity, heteroskedasticity, and autocorrelation – Model selection criteria - comparing two linear models - R^2 – adjusted R^2 .

UNIT-III: Non-Linear Regression and Limited Dependent Variable Models

Non linear least squares estimation; Gradient methods, Newton-Raphson method; testing general Nonlinear hypothesis - Introduction to binary variables; Dummy variables , LPM.

Unit IV: Simultaneous Equation and Distributed Lag Models :

Simultaneity bias, structural versus reduced form, identification: rank versus order condition - methods of estimation including indirect least squares- two-stage least squares- Autoregressive linear regression. Distributed lag models.

Unit V: Introduction to Panel Data Models

Introduction to panel data, advantage and disadvantage of panel data- within and between estimates - pooled OLS, Fixed effect mode- Random effect estimator – Breusch-Pagan test- Hausman test, dynamic Panel model.

Books for Study

1. Gujarati, N.D (2003): Basic Econometrics, 4/e, McGraw Hill.New Delhi
2. Chris Brooks (2014), Introductory Econometrics for Finance, 3/e/, Cambridge University Press.

Books for Reference

1. Enders, W.(2006): Applied Econometric Time Series, 2/e, John Wiley and Sons.
2. Heinz, Kohleer.(2001): Statistics for Business & Economics, 1/e,Harper Collins, New York.
3. Johnston, J.(2006): Econometric Methods, 3/e, McGraw Hill
4. Nachane, DM.(2006): Econometrics: Theoretical Foundations and Empirical Perspective, Oxford University Press.
5. Ramanathan, R.(2002): Introductory Econometrics with applications, 5/e, Thomson Asia Private Limited.
6. Wooldridge, J.(2012): Introductory Econometrics: A Modern Approach, 5/e,South- Western
7. Marno Verbeek (2012): A guide to Modern Econometrics, 4/e,Wiley and Sons

MSQF 424: FINANCIAL ENGINEERING AND DERIVATIVES CREDITS:3

Objectives

- *A broad range of derivative products are examined with a primary focus on how to use these for the management of financial risks.*
- *The course introduces standard models of pricing forward, futures and options on diverse underlying assets.*
- *The course then explores hedging methods to conduct risk management for business operations, speculative trades, and issued financial instruments.*
- *After completing this course students will be familiar with derivatives valuation and their use in risk management.*

Unit I: Introduction

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 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- Mechanics of Futures Markets – Long and Short of Financial Futures- Clearing House Arrangement – Futures price-Spot price – Forward price - Trading Futures positions – Hedging strategies using futures - BASIS Risk – Minimum variance hedge ratio – Stock index futures

Unit IV: Options

Meaning – Types of Options– Options Contract – Option pricing models – Binomial model – Black-Scholes model - Options Trading - Differences between Futures and Options Contract– Option strategies – Covered call – Protective put - Spreads – Bull spreads – Bear spreads – Butterfly spreads – Calendar spreads – Straddle – Strips and straps – Strangles – Put-call parity theorem - 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 and Vipul K. Bansal (1991), Financial Engineering: A complete Guide to Financial Innovation, Prentice-Hall of India Private Ltd. New Delhi.
2. John Hull, (2015)"Options, Futures and Other Derivatives", Prentice Hall.

Books for Reference

1. Chance Don,(2006) "An Introduction to Derivatives, Dryden Press
2. Das Satyajith (2004)" Swaps & Derivatives Financing, Probes
3. Vijayabhaskar P and Mahapatra B (2003): Derivatives Simplified, Respose Books, Sage Publications, New Delhi .
4. Sundaram (2017):Derivatives Principles and Practice, McGraw Hill Education, New Delhi
5. Ruppert**, David,** Matteson**, David S (2015),** Statistics and Data Analysis for Financial Engineering, Springer.
6. Ruey S. Tsay (2014), "Analysis of Financial Time Series, Financial Econometrics", 3/e Wiley.
7. Sheldon M. Ross (2002), An Elementary Introduction to Mathematical Finance,2/e, Cambridge University press

MSQF 425: DATA SCIENCE **CREDITS: 3**

Objective

- *Able to apply fundamental algorithmic ideas to process data*
- *Data Science explores novel statistical, algorithmic, and implementation challenges that emerge in processing, storing, and extracting knowledge from data .*

Unit I - Data Mining

Introduction – Definitions – comparison with other research areas – DM application areas. Data Preprocessing – Visualization Techniques.

Unit II –

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

Unit III - Classification problems

Classification problems – Logestic regression – Support Vector Machine – Discriminant Aanalysis.

Unit IV
Decision trees- Random Forest, Artificial Neural Networks, Bagging and boosting

Unit – V

Case studies on Data Mining tools.

Books for Study

1. Arun K. Pujari, (2001):Data Mining Techniques, Universities Press
2. Pang-Ning Tan (2013): Introduction to Data Mining, Pearson Publishers
3. Douglas Hackney,(1997):Understanding and Implementing Successful Data, Marts– Addison Wesley Developers Press
4. Han, Jiawei; Kamber, Micheline,(2001): Data mining: concepts and techniques, Morgan Kaufmann Publishers.
5. Kimball, Ralph, Reeves Laura (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.
5. Hastie, Tibshirani and Friedman (2009), The Elements of Statistical Learning ,2/e , springer.

MSQF 426 : FINANCIAL MANAGEMENT CREDIT 3

Objectives

- *To know the various sources of finance*
- *To understand the various uses for finance and*
- *To familiarize oneself with the techniques used in financial management*

Unit I:

Financial Management: Meaning, Nature and Scope of Finance, Financial Goals, Profit Vs Wealth Maximization, Finance Function – Investment, Financing and Dividend decisions.

Unit II:

Capital Budgeting: Nature of Investment Decisions; Investment evaluation criteria, Net Present Value, Internal Rate of Return, Profitability Index, Payback Method, Accounting Rate of Return, NPV and IRR comparison, Capital rationing, Risk analysis and Capital Budgeting - Cost of Capital: Meaning and significance; Calculation of cost of Debt, Preference Capital, Equity capital and Retained earnings; Combined Cost of Capital (Weighted), Cost of Equity and CAPM.

Unit III:

Financial Leverage: Measurement, Effects of Leverage on EPS, EBIT-EPS analysis, Indifference Point, Degree of Financial Leverage - Capital structure Theories: NI approach, NOI approach; Traditional Theory, MM Hypothesis – Without taxes and with taxes, Determinants of Capital structure in practice - Dividend Policies : Issues in dividend decisions, Walter‘s Model, Gorden‘s Model, MM Hypothesis, Dividend Policies, Forms of Dividend, Corporate dividend behavior.

Unit IV:

Management of Working Capital: Meaning, Significance, Types, Determinants, Calculating Operating Cycle period, Estimating working Capital requirements, Financing working capital and Norms of Bank finance, Management of Cash, Receivables and Inventory.

Unit V:

Valuation of Securities: Valuation concept, Equity Valuation, Discount models, The P/E ratio Approach, The relationship between Earnings- Price Ratio, dividend, Expected return and Growth .

Books for Study

1. PrasannaChandra (2017),Financial Management: Theory and Practice, McGraw Hill Education; Ninth edition (1 July 2017)
2. Gupta P (2012),Financial Management,Vayu Education of India
3. Van Horne(2015),Fundamentals of Financial Management, Pearson Education, India
4. PrasannaChandra (2017),Financial Management: Theory and Practice, McGraw Hill Education; Ninth edition (1 July 2017)
5. J Srinivasan, P Periasamy(2016),Fundamentals of Financial Management,Publisher: Vijay Nicole Imprints

Books for Reference

1. Van Horne, James, C. (2001): Financial Management and Policy, Prentice Hall, Delhi.
2. Khan MY, Jain PK. (2002): Financial Management, Tata Mc Hill, New Delhi.
3. Brigham, Eugene and Ehrhardt C Michael (2004), Financial Management: Theory and Practice, 10/e, Activity Based Learning.

MSQF 427: Lab III: Data Analytics using R **CREDITS: 2**

Objectives

- *To enrich data analysis using R language at basic and advanced level*

1. One Way ANOVA, Two Way ANOVA, One way MANOVA post hoc tests – Tukey, Bonferonni
2. Assessing Normality : MVN package
3. Pictorial Representations of Multivariate data: 2D-bar, pie, histogram; 3D- pie, bar, histogram and bivariate Box plot, scatter matrix plot.
4. Logistic regression – odds ratio, Wald's statistic – Variable Selection
5. Discriminant Analysis – Stepwise Method – classification matrix and cross validation
6. Ridge and Lasso Regression.
7. Principal Component Analysis – Scree plot – eigen values – Interpretation and its uses –
8. Factor analysis – Initial extraction of factors through Principal Components – varimax rotation - Assigning factor scores and its Applications
9. Concept of Change point analysis – ecp package for detecting single and multiple change points in univariate data structure
10. Concept of Change point analysis – ecp package for detecting single and multiple change points in multivariate data structure
11. Cluster Analysis – K Means – Hierarchical clustering
12. Decision Trees

Books for Study

1. Gergely D., et al. (2013): Introduction to R for Quantitative Finance, Packt publishing.
2. Cohen, Y. and Cohen, Jeremiah, Y. (2008): Statistics and Data with R, An applied approach through examples, John Wiley and Sins.
3. Dalgaard, P. (2008): Introductory statistics with R, 2/e, Springer.
4. Crawley, M. J (2013): The R book, 2/e, John Wiley and Sons.
5. Ugarte, M.D., Militine, A. F. and Arnholt, A. T. (2008): Probability and Statistics with R, CRC press, Taylor and Francis Group.
6. Faraway, J. F. (2004): Linear Models with R, CRC Press.

SEMESTER III

MSQF 531: APPLIED TIME SERIES ANALYSIS AND FORECASTING CREDITS:3

Objective:

- *Providing a clear explanation of the fundamental theory of time series analysis and forecasting*
- *The book features treatments of forecast improvement with regression and autoregression combination models and model and forecast evaluation, along with a sample size analysis for common time series models to attain adequate statistical power*

Unit I: Introduction to Stationary Time Series

Definition and examples of Time Series Models-Graphical Representation of Time Series Data - Approaches of Time Series –Additive and multiplicative approach-Components and various decompositions of Time Series Models-Numerical description of Time Series - Data transformations - Methods of estimation –Trend, Seasonal and exponential.

Unit II: Smoothing Techniques and Stationary

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.

Unit III: Stationary and Non- Stationary Time Series Models

Stationary and Non- Stationary Time Series Models -First and Second order AR and MA Models – ARMA Models -ARIMA models their statistical Properties – ACF and PAF functions-Stationary Time Series Models –General Unit Root Tests: Dickey Fuller Test, Augmented Dickey Fuller Test; - Johansen Test for cointegration - Engle Granger causality - error correction model -Vector Autoregressive (VAR) model - Vector Error Correction Model (VECM), Lag models - ARDL.

Unit IV: Modeling Volatility

Impulse response function, variance decomposition – box Jenkins methodology- 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.

Unit V: Evaluating and combining forecast

Introduction to business forecasting –scope-types of forecasting- Forecasting cycle-different forecasting techniques- Exploring data patterns and choosing forecasting technique- Managing forecasting process-measuring forecasting error -Forecasting error comparison.

Books for Study

1. Hooda. R.P. (2003): "Statistics for business and Economics", Macmillen (Unit I and V)
2. Hamilton,J. (1994):Time Series Analysis. Princeton University Press.
3. George E. P. Box, G. M. Jenkins and G. C. Reinsel, (1994) :Time Series analysis Forecasting and Control, Prentice Hall International, 3/e . (Unit II and IV)
4. Gujarati, D. (2011): Econometrics by Example, Palgrave Macmillan.

Books for Reference

1. Makridakis. S. G. and Wheelwright. S. C. (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. Shumway R. H. and Stoffer. D. S. (2011): Time Series Analysis and its Applications with R Examples, Springer.
4. Montgomery D.C., C.L. Jennigs and M. Kulachi (2006): Introduction to Time Series analysis and Forecasting, Wiley InterScience.
5. Makridakis. S, Andersen, A., R. Carbone, Fildes, R., Hibon, M. Lewandowski, R. *et.al*., (1984): The Forecasting accuracy of major time series Methods, John Wiley & Sons Ltd.

MSQF 532 Applied Regression Modeling using R CREDITS:3

Objectives

- *To provide in-depth knowledge in model building and its various aspects*
- *This course familiarizes in applied regression that involves hands-on data analysis*

UNIT I

Multiple Regression Analysis – Assumptions – least squares approach- test for overall regression- intercept and slope

UNIT II

Dummy variable approach- methods for comparing two straight lines: using separate regression fits-Parallelism, intercept and coincidence; using single regression equation- Parallelism, intercept and Coincidence.

UNIT III

Regression Diagnostics- residual analysis: outliers detection-violations of model assumptions- Collinearity: Tolerance, Variance Inflation Factor (VIF) and Condition Index- Variable selection: forward, backward and stepwise

UNIT IV

Polynomial regression – least square approach for fitting parabola-ANOVA table-testing overall regression-model adequacy- lack of fits- Poisson regression- likelihood approach- goodness of fit

UNIT V

Binary Logistic regression- logistic model- odds ratio using logistic regression – deviance statistic – Polytomous and ordinal regression methods – Probit analysis.

Books for study

1. David G. Kleinbaum, Lawrence L. Kupper, AzharNizam, Keith E. Muller (2011), Applied Regression Analysis and Other Multivariable Methods, Duxbury press, 4/e

Books for reference

1. Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining (2012), Introduction to Linear Regression Analysis, John Wiley, 5/e
2. Alan Agresti (2012), Categorical Data Analysis, 3/e, John Wiley

MSQF 534 RISK MANAGEMENT **CREDITS:3**

Objectives:

- *This paper focuses the basic concept of risk management and expose various types of risk faced andIt helps to take positions for investing and trading in options and future market*
- *Analyse how futures and forward markets operate and be able to calculate theoretical forward and futures prices and values*
- *Analyse the sources of financial risk and the importance of implementing effective financial risk management procedures in business entities*
- *Evaluate hedging strategies using forwards, futures, options and swaps to hedge identified financial risks in currencies, interest rates, commodities and shares and to evaluate the outcomes of these strategies*

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. David Iverson(2013) Strategic Risk Management: A Practical Guide to Portfolio Risk Management , Wiley (2013)
2. Michel Crouhy , Dan Galai , Robert Mark(2014), The Essentials of Risk Management, McGraw-Hill Education
3. Chew Lillian(1996): Managing derivative Risk, John Wiley, New Jersey.
4. Chapman, R.J. (2006): Simple Tools and Techniques for Enterprise Risk Management, wiley.

Books for Reference

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

MSQF 534: CORPORATE INTERNSHIP AND VIVA CREDITS: 3

Objective

- *Internship consists of an exchange of services for experience between the student and an organization*.
- *The purpose of the student internship is to provide an opportunity to seek, identify and further develop an appropriate level of professionalism .*
- *To expand network of professional relationships and contacts.*

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 as well as by the Department 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 PROJECT COURSE WORK CREDIT 4

objective

- *The course develops the research skills to investigating the research problems with a view to arrive at objective findings, interpretation of data and conclusions of their investigation in the form of systematic reports. .*

Unit I:

Research Approach Meaning of research- objectives of research - Approach to research- Significance of research - Types of research- Research in social science - Facts, theories and concepts in social science research - Research Design - features of a good research design.

Unit II:

Identifying a Research Problem Research problem – Identifying the research problem – formulation of research problem, concept of hypothesis- role and formulation of hypothesis- scientific methods of research- nature of scientific research- stages of scientific methods.

Unit III:

Research Methods Logic and Scientific method- deductive and inductive methods- the case study methods- merits and demerits of case study methods- survey methods- merits and demerits of survey methods- type of survey- selecting the survey method – sample survey different types – merits and demerits.

Unit IV:

Survey Techniques Schedule and questionnaire – principle underlying the construction of questionnaire- measurement and scaling techniques- processing and analysis of data

Unit V:

Presentation Interpretation and report writing- steps- bibliography quality of a good research report Readings

Books for Study

1. R.Panneerselvam(2014), Research Methodology, 2/e PHI, New Delhi
2. C.R. Kothari (1985), Research Methodology, Wiley Eastern Ltd., New Delhi.

Books for Reference:

1. W. G. Cochran (1977) Sampling Technique, John wiley, New York.
2. W.J. Goode and P.K. Hatt (1952) Methods in Social Research, McGraw Hill, New York.
3. T.S. Wilkinson and P.L. Bhandarkar (1994) Methodology and Techniques of social Research, Himalaya Publishing

MSQF 542 PROJECT WORK **CREDITS: 8**

- *To make the student understand the basic concept of project finance*
- *Provide students with an analytical and conceptual framework to evaluate capital investment proposals.*
- *To familiarize students with the various management techniques in implementing the project to its successful completion.*

MSQF 543 COMPREHENSIVE VIVA **CREDITS: 3**

1. It is an individual compulsory project work offered in IV semester with 8 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 and references.
6. The project work will be assessed for 8 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 3 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 (Number of chapter can be reduced or increased depending upon the number of objectives), chapter VII for findings and suggestions.

POOL OF ELECTIVES **CREDITS: 3**

1. PYTHON FOR DATA ANALYSIS

Objective

- *The course is designed to provide Basic knowledge of* **Python**. **Python programming** *is intended for software engineers, system analysts,*

Unit - I : *Introduction to Relational Database Managemet Systems*: File Systems Vs DBMS- The Realtional Model - Queries in DBMS - Structure of a DBMS - The ER Model - Transactions Management.

Unit II : *SQL Introduction:* Basic SQL query Syntax - MySQL basics and advantanges - SQL Commands: SELECT - INSERT - UPDATE - DELETE - DROP- UNION - GROUP BY - Nested Queries

UNIT III: *Python Data Handling*: Introduction to Python Programming language - Python Interpreter basics - IPython Introduction – Control Structures – Functions - Modules Basics - Python DB-API - Data Processing Using Arrays.

Unit IV: *Data Analysis with Pandas*: Introduction – Series – DataFrame - Index Objects - Indexing, Selection and Filtering - Sorting and Ranking - Summarizing and computing Descriptive Statistics - Handling Missing Data.

Unit V: *Plotting and Visualization*: Matplotlib basics - Line plots - Bar plots – Histograms - Scatter plots – Python Visualization tools ecosystems with case study of any two visualization modules.

Books for References:

1. Raghu Ramakrishnan and Johannes Gehrke (2007) Database Management Systems , 3rd /e
2. Linn Beighley (2007),Head First SQL , O'Reilly Publishers .

Books for Study:

1. Payl Barry (2011), Head First Python , O'Reilly Publishers
2. Wes McKinney O'Reilly (2012),Python for Data Analysis 1st /e

Web Resources:

http://www.elated.com/articles/mysql-for-absolute-beginners/
https://docs.python.org/3/tutorial/index.html

2. STOCHASTIC MODELING CREDITS: 3

objective

Unit I: Stochastic Processes

Stochastic processes: Definition and classification of a stochastic processes. 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.

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 - Mean and variance of BP - Concept of extinction -Simple problems.

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. Medhi. J. (2002): Stochastic Processes, 2/e New Age International Pvt. Ltd.
3. Lefebvre , M. (2012): Applied Stochastic Processes, Springer.
4. Taylor, H.M. and Karlin, S. (1998): An introduction to stochastic modeling , Academic Press.

Books for Reference

1. Karl in, S. and Taylor, H.M (1975): A first course in stochastic processes, Academic Press, New York.
2. Bhat, U.N. and Miller, G.K. (2002): Elements of applied stochastic processes 3rded. Wiley Inter, New York.
3. Brzezniak, Z and Zastawniak, T. (1998): Basic Stochastic Processes: A course through Exercises, Springer , New York.
4. Douglas Kennedy (2010): Stochastic Financial Models, Chapman & Hall/CRC Finanical Mathematics Series
5. Richard Serfozo, (2009): Basics of Applied Stochastic Processes, Springer.

3. OPTIMIZATION TECHNIQUES CREDITS: 3

Objective

- *To introduce to tools and techniques of OR and to equip them to make optimal managerial decisions.*

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 – concept of duality (conversion of primal to dual).

Unit II:

Transportation problem – Initial Basic Feasible Solution – North West Corner Rule – Vogel's Approximation Method – MODI method of finding optimal solutions - Assignment problem.

Unit III:

Sequencing problem – 'n' jobs two machines problem – 'n' jobs 'm' machines problem – 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. Sharma, J.K. (1997): Operations Research, Theory and applications, Macmillan.
2. Sujit, K. Bose (2012): Operations Research Methods, Narosa Publishing House Pvt. Ltd, New Delhi.
3. Chandrasekhara Rao, K. and Mishra, S. L. (2012): Operations Research, Narosa Publishing House Pvt. Ltd, New Delhi.
4. Sujit K. Bose (2012): Operations Research Methods, 2/e, Narosa Publishing House Pvt.Ltd
5. Sheikh Ahmed Hossain, Samarjit Kan (2014): Operations Research, Resent Advance, Narosa Publishing House Pvt.Ltd

Books for Reference

1. Hamdy A. Taha (2006): Operations Research – An Introduction, 8/e, Prentice Hall of India Private Ltd, New Delhi.
2. Hillier F S and Libermann G J(2002): Introduction to Operations Research, 7/e, McGraw Hill
3. Kanti Swarup, Manmohan and Gupta P.K.(1985): Opertaions Research, Sultan Chand and Sons, New Delhi.
4. Prasad, D. (2015): Operation Research, Narosa Publishing House Pvt. Ltd, New Delhi.

4. STATISTICAL TECHNIQUES FOR MANAGERS CREDITS:3

Unit I

Concept of Quality – Quality Management – Quality Circles – Total Quality Management – ISO 9001 - 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 - Six Sigma and lean six sigma.– tools and techniques: DMAIC methodology – DMADV -

Unit II

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

Unit III

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 IV

Latin Square Design (LSD) – Concepts and simple problems – Estimating a missing value in RBD and LSD - Multiple comparison tests : Duncan's , Tukey's and Least Significant Difference test

Unit V

Factorial Experiments – Concepts - 2^2, 2^3 and 3^2 designs – Simple Problems

Books for Study

1. Borror.M (2009), The certified quality engineer handbook, 3/e, ASQ quality press, Milwankee, Wisconsconsin, USK.
2. Jayachandra M (2001) , Staistical Quality control, CRC press
3. Montgomery.D.C. (2009): Introduction to Statistical Quality Control, 6/e, John Wiley and Sons.
4. Montgomery.D.C. (2013): Design and Analysis of Experiments, 8/e, John Wiley and Sons.
5. Peter W.M.John (1998), Statistical Desigh and analysis of experiment, SIAM publications

Books for Reference

1. Duncan A.J.(1974): Quality Control and Industrial Statistics, 4/e, Taraporewala & Sons.
2. Grant.E.L. and Leavenworth.R.S. (1980): Statistical Quality Control, McGraw Hill.
3. Greg Brue(2003), Design of Six sigma, Tata Mc Graw hill, New Delhi
4. Greg Brue(2002), Design of Six sigma for Managers, Tata Mc Graw hill, New Delhi
5. Amir.D.Aczel and Sounder Pandian (2006): Complete Business Statistics, 6/e, Tata McGraw Hill Publishing Company Limited.

5.MANAGEMENT INFORMATION SYSTEMS CREDITS:3

Unit I: Introduction
Introduction to Information Systems – Various types of Information Systems- 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.- Competitive Advantages of Using MIS.

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. Management Information Systems, 10/E, Raymond McLeod & George Schell, Prentice Hall, 2007
3. Licher, Paul: Managing Information Systems: A Strategic Approach, Dryden Press, and Illinois.
4. 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, Henrcy 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.

6. 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

Threats in network -Types of Threats - 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 and data - Redress for software failures - Cyber crime – ethical issues in computer security- Case studies – Introduction to ethical Hacking – Security in Mobile Devices.

Unit V: System security

Intruders – Intruder detection – password management – virus & related threats – virus counter measures – Firewall design principles – trusted systems - Introduction to Open Source Security Tools.

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 (1998) , Cryptography and Network Security Principles and Practices, 3/e, PHI.

7. GLOBAL FINANCE AND INTERNATIONAL BANKING CREDITS: 3

Objectives

- *To have exposure on International Monetary System*
- *To understand about Balance of Payments and currency Exposure and*
- *To introduce and familiarize the International Banking, Financial Markets and Instruments*

Unit I: 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 II: 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 –

Unit III: Exchange Rate

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 V: International Banking

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

Books for Study

1. Giddy, I.H (1994) GLOBAL Financial Markets, A.I.T.B.S., Delhi.
2. Shapiro A C (2002) Multinational Financial Management, Prentice Hall, New Delhi.

Books for Reference

1. Apte P G (2011) International Financial Management, Tata Mc Graw Hill, New Delhi
2. Buckley, Adrian (1996) Multinational Finance, Prentice Hall of India, New Delhi
3. Henning C N, Piggot W and Scott W H (2011) International Financial Management, Mc Graw Hill Int Ed, NY
4. Giddy (1994) Global Financial Markets, A.I.T.B.S Publishers and Distributors New Delhi.
5. Maurice, Levi (2009) International Finance, Mc Gaw Hill Int Ed, New York

8.BIG DATA ANALYTICS **CREDITS:3**

Objectives:

- *This course deploys a structured lifecycle approach to data science and big data analytics projects*
- *select visualization techniques and tools to analyze big data and create statistical models*

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.

9. BEHAVIORAL FINANCE CREDITS:3

Objectives

- *To Examine how the insights of behavioral finance theories shed light on the behavior of individual investors and finance professionals in investment decision-making and corporate financial decision-making.*
- *To explore the possibility to improve investment performance and corporate performance by recognizing the cognitive biases and applying appropriate 'debasing' techniques.*
- *To investigate the implications of behavioral finance for the construction of good corporate governance mechanism*

Unit I: Information Perception and Intertemporal Choice
Cognitive information perception, peculiarities (biases) of quantitative and numerical information perception, Weber law, subjective probability, overconfidence, representativeness, anchoring, asymmetric perception of gains and losses, framing and other behavioral effects

Unit II: Human Preferences and Market efficiency
Decision-making under risk and uncertainty, Expected utility theory,Prospect theory, Barnewall Two-Way Model, Bailard, Biehl, and Kaiser Five-Way Model, Allais and Elsberg's paradoxes, rationality from an economics and evolutionary prospective, different ways to definerationality: dependence on time horizon, individual or group rationality, examples from experimentaleconomics: ultimatumand public goods games, experiments in isolated societies, bounded rationality,investor rationalityand market efficiency.

UNIT III: Behavioral Factors and Financial Markets
Fundamental information and financial markets, market predictability, the concept of limits of arbitrage, Asset management and behavioral factors, active portfolio management: return statistics and sources of systematic underperformance, technical analysis and behavioral factors

UNIT IV: External factors and investor behavior
Weather, emotions, and financial markets: sunshine, geomagnetic activity, Mechanisms of the external factor influence on risk perception and attitudes, Connection to human psychophysiology and emotional regulation, Misattribution as a mechanism for externals factors influence, Emotional content of news articles and their correlation with market dynamics, Social trends and market dynamics: music, fashion, demographics, Group Behavior: Conformism, herding, fatal attractions

UNIT V: Behavioral Corporate Finance
Behavioral factors and corporate decisions on capital structure and dividend policy, capital structure dependence on timing of good and bad corporate news announcement, mergers and acquisitions: the Winner's curse and market timing, systematic excessive optimism and overconfidence in managers' decisions, company name and its market value, sunk costs and mental accounting, evolutionary explanations for behavioral effects, evidence from behavioral game theory, systematic approach to using behavioral factors in corporate decision-making

Books for Study

1. M. M. Sulphey,(2014) Behavioural Finance, PHI Learning
2. Lucy Ackert and R.Deaves,(2011) Understanding Behavioural Finance, Cengage Learning Shefrin,H.,(2007))Behavioural Corporate Finance, Tata McGraw Hill Irwin Publishers

Books for Reference

1. Pompian, Michael M,(2006) Behavioral Finance and Wealth Management. Wiley: New Jersey.
2. William Forbes,((2009)) Behavioural Finance, Wiley India Pvt Ltd
3. Plous, S.,(1993)The Psychology of Judgment and Decision Making, McGraw-Hill
4. Shefrin, H.,(2006) Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing, Oxford University Press
5. Paul V. Azzopardi,(2010), Behavioural Technical Analysis, Harriman House Ltd
6. Shleifer, A.,(2000) Inefficient Markets: An Introduction to Behavioral Finance, Oxford University Press

10. TREASURY AND FIXED INCOME SECURITIES CREDITS:3

Objectives

- *Immerse the student in the fundamental principles of Treasury and fixed-incomesecurities with a special emphasis on structured products.*
- *Deepen the student's understanding of fixed-income valuation models including the valuation of bonds with embedded options.*
- *Give each student the opportunity to solve problems encountered by practitioners in fixed-income markets.*

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, Realized YTM,YTC.

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, Time structure: Theories of term structure

Unit V: Multi-Factor Term Structure Models

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

Books for Study

1. Moorad Choudhry (2010): Fixed Income Securities and Derivatives Handbook: Analysis and Valuation, Wiley
2. Fabozzi, F. (2004): Bond Markets, Analysis and Strategies, Prentice Hall.
3. Hull, J, (2014):options: Futures and other Derivatives, Prentice Hall, New Delhi.
4. Marshall, J. and Bansal V.K.(1992): Financial Engineering- A complete Guide to financial innovation, Prentice Hall Inc, New Delhi.

Books for Reference

1. Copeland, T. E. and J. F. Weston (1992): Financial Theory and Corporate Policy, Addison Wesley.
2. Brealey, R. and S. Myers (1997): Principles of Corporate Finance, 5/e, New York, McGraw Hill.
3. Tuckman, B. (2002): Fixed Income Securities, Willey Finance.

11. Algorithmic Trading CREDITS:3

Objectives

- *Helps to understand Quantitative Algorithmic Strategies*
- *To inspire towards a successful Algorithmic trading career, by focusing on derivatives, quantitative trading, electronic market-making or trading related technology and risk management.*

Unit I - Introduction to algorithmic trading - Building blocks of the algorithms - Benefits of Algorithmic Trading - Global trends - Lifecycle in development of AT - Government and regulatory structures -Taxation, transaction cost in India - Current trends in India market - Challenges

Unit II - Mathematical elements of AT - Stdev - correlation analysis - Spread, volume curve - volatility based trading - Mean reversion - Mean Reversion of Stocks and ETFs - Mean Reversion of Currencies and Futures

Unit III - Algorithmic Trading Strategies - Trend-following - pair trading - Statistical Arbitrage - Market Making - Momentum Strategies - Dark pool strategies - High-frequency trading - Agency algo: VWAP, TWAP, Inline, Aggressive, Passive, POV - Prop algo: Pairs, Trend following, High frequency - DMA, DSA, dark-pool, flash trading - Market Sentiment - Stealth - Layering - low latency trading - delta neutral strategies

Unit IV - Risk management in AT - Optimal Leverage - Constant Proportion Portfolio Insurance - Stop loss - Risk Indicators

Unit V – **applications using software's like Excel, Python and R language**

Practical Hands on in back-testing and Monte Carlo simulation - Alpha generation: hands on using regression - Hands on training on designing a VWAP algorithm - Hands on training on designing an automated pair-trading algorithm using soft wares

References:

1)Chan, E.P (2013): Algorithmic Trading – Winninf Strategies and their rationale, Wiley

2)Edward A Leshik and Jane Cralle (2011): An Introduction to Algorithmic Trading, Wiley

3)Chan, E.P(2008): Quantitative Trading, Wiley

4) Barry C. Johnson(2009), Algorithmic Trading and DMA, Myeloma Press

5) Ruey Tsay (2014), Analysis of financial Time Series, Wiley