

# **PONDICHERRY UNIVERSITY**

**Ramanujan School of Mathematical Sciences**



## **Syllabus for M.Sc. Quantitative Finance**

**(CBCS Pattern)**

**Effective from the Academic Year 2019-20 onwards**

# **PONDICHERY 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, PYTHON, GRETL 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
<b>Total</b>	<b>:</b>	<b>40 marks</b>

**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/Coordinator 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 and external 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/Coordinator 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:

<b>Section A:</b>	Five questions are to be answered out of ten questions, each carrying 4 marks:	<b>5 × 3 = 15 marks</b>
<b>Section B:</b>	Five questions are to be answered in either or type .	<b>5 × 9 = 45 marks</b>
<b>Total</b>		<b>= 60 marks.</b>

### **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.

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

**Effective from the Academic Year 2019– 2020**

Non - Credit Bridge Courses			Nature of the Course
<b>Pre Semester</b>	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
<b>I</b>	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
<b>II</b>	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	Global Finance and International Banking	Hard Core	3
	MSQF 426	Financial Management	Hard Core	3
	MSQF 427	Lab III: Data Analytics using R	Hard Core	2
	MSQF 428	Lab IV: Technical Analysis	Hard Core	2
<b>III</b>	MSQF 531	Applied Time Series Analysis and Forecasting	Hard Core	3
	MSQF 532	Financial 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*	Python for Data Analysis	Soft Core	3
	MSQF 536*	Financial Information System	Soft Core	3
	MSQF 537*	Statistical Techniques for Financial Analyst	Soft Core	3
	MSQF 538*	Optimization Techniques	Soft Core	3
	MSQF 539*	Behavioral Finance	Soft Core	3
<b>IV</b>	MSQF 541	Contemporary Development in Finance	Hard Core	4
	MSQF 542	Research Methods for Quantitative Finance	Hard Core	3
	MSQF 543	Project Work and comprehensive viva voce	Hard Core	6

**\* Any three papers has to be selected**

# **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 – GST – 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. 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 Computer Programming**

Introduction to Computer programmes and programming languages - Programme Types - Overview of Problem Solving Techniques

### **Unit II: Introduction to Excel**

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

### **Unit III: 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 IV: Fundamental of SPSS**

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

### **Unit V: Introduction to EViews, GRETL and STATA**

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

### **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 ENGINEERS**

### **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. S. 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.

# **SEMESTER I**

**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*
- ❖ *Understand the automated accounting system Apply Tally.ERP 9 in maintaining books of accounts and generating reports*

**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:**

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**

Financial Analysis – Tools of Financial Analysis – Ratio Analysis – Computation and Interpretation of Ratios -Preparation of Funds Flow Statement –Preparation of Cash Flow statement – Evaluation of Funds and cash Flow analysis

**Unit IV: Marginal Costing and Budgeting**

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.

**Unit V: Computer Based Accounting: Tally**

Introduction to Tally - General features- Accounting features- Inventory features- Preparation of Ledger accounts on Tally - Preparation of Invoices- subsidiary books - Display- of final accounts - Ratios (Practice sessions: 10)

**Books for Study**

1. Bhushan Kumar Goyal (2018): Basic Financial Accounting, Taxmann's Publication.
2. R.S.N. Pillai and V. Bagavathi (2010): Management Accounting, S. Chand, New Delhi.
3. Maheswary, S. N. (2014): Management Accounting, Sultan Chand & Sons, New Delhi.
4. Soumya Ranjan Behera (2014) Learn Tally.ERP, BK Publications, Bhubaneswar

**Books for Reference**

1. Ambrish Gupta (2018) Financial Accounting for Management: An Analytical Perspective, Pearson Education, New Delhi.
2. Jain S P and K L Narang (2011): Advanced Accounts, Kalyani Publishers, Ludhiana.
3. S. N. Maheshwari (2018): Financial Accounting, Vikas Publishing

**Objectives**

- *To get an insight into the constitutions, structure, objectives, performance and working of the Banking Institutions in India and their contribution to the growth of Indian Corporate Sector.*
- *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**

Money and finance – Money and near-money – Financial intermediation and financial intermediaries – The structure of the financial system – Functions of the financial sector – Indicators of financial development – Equilibrium in Financial Markets –Financial System and Economic Development – Criteria to evaluate assets; Risk and financial assets, types of risk, return on assets, Risk – Return trade off – Valuation of Securities.

**Unit II: Money and Capital Markets**

Role and structure of money market and capital market – Call money market, Treasury bill market, Commercial bill market including commercial paper and certificate of deposits, Discount market – Government securities market – Markets for derivatives; futures and options, and other derivatives; types, uses and pricing of derivatives –Primary and secondary market for securities; SEBI: its impact on the working of capital market in India; IRDA and its role in financial markets.

**Unit III: 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 IV: 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 V: The Central Bank, Commercial Banks and Monetary Policy**

Functions of Central Bank – The aims and objectives of the monetary policy in developed and developing countries – Instruments of monetary policy – Proliferation of banking and non-bank financial intermediaries – Effectiveness of monetary policy– Credit creation and its control; Profitability and efficiency of banks; Development banks – role and functions; Investment banking and merchant banking; Financial sector reforms in India.

**Books for Study:**

1. Jeff Madura (2014).Financial Institutions and Markets, Kindle edition
2. David S. Kidwell, David W. Blackwell, David A. Whidbee, Richard W. Sias (2012): “Financial Institutions, Markets, and Money”, 11 /e , Wiley Publication, New York.
3. Jakob de Haan, Rijksuniversiteit Groningen (2012): Financial Markets and Institutions, 2nd /e The Netherlands

**Books for Reference**

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

**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 -. 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- Macro Economic Environment -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 Doherty 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.



**Objectives**

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

1. Data retrieval and handling
2. Data analysis
3. Correlation and regression
4. Random number generation
5. Pivot Table
6. Financial Function tools in Excel
7. Financial Statement Analysis: Comparative Statement analysis
8. Financial Statement Analysis: Common Size Statements analysis
9. Financial Statement Analysis: Trend Analysis
10. Financial Statement Analysis: Ratio Analysis

**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. Conrad George Carlberg (2001) Business Analysis with Microsoft Excel, Indianapolis Pearson Education.
6. Stice K Earl, Stice D James (2006): Financial Accounting Reporting and Analysis: South Western
7. White I Gerald, Sondhi C Ashwinpaul and Fried Do (2007): The analysis and use of financial Statements Wiley India
8. Wild J John, K.R Subramanyam and Halsey F.Robert, (2007): Financial Statement Analysis, Tata McGraw – Hill

**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
4. Correlation
5. Multiple regression with variable selection
6. Parametric tests: two sample and paired t- test
7. One way with post hoc test
8. Two way ANOVA. With post hoc test
9. Chi-Square test
10. Mann-Whitney U test and Wilcoxon –sign match pair test
11. Kruskal – Wallis H test, Median Test
12. 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: Nature and Scope of Investment

Investment: Meaning-importance-objectives - characteristics, Investment vs. Speculation - Gambling  
Common Errors in Investment - Qualities of Successful Investing.

### Unit II: Basic Concepts and Equity & Bond Valuation

Fundamental Analysis: Economic, Industries and Company Analysis, Technical Analysis: Basic Tenets of  
Technical Analysis - Dow Theory, Different Charts and Techniques, Efficient Market Theory - Risk and  
Return: Estimation of return and risk of equity-estimation of Beta- Bond Valuation- HPR, Yield to  
Maturity

### Unit III: Modern Portfolio Theory

Portfolio Theory: The Benefits of Diversification- Estimation of Portfolio Return and Risk, 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.

### Unit IV: Portfolio Construction:

Arbitrage pricing theory, principle of arbitrage, arbitrage portfolios; Two Factor and Multi Factor Models,  
Techniques of portfolio construction - Single Index Models, CAPM & APT Models.

### Unit V: Performance Evaluation

Measure of Return, Risk adjusted measures of performance evaluation, market timing - Performance  
Measures: Treynor Measure - Sharpe Measure - Jensen Measure- Asset Allocation.

### Books for Study

1. Prasanna Chandra (2017) ,Investment Analysis And Portfolio Management, Tata McGraw Hill Education
2. V.K.Bhalla (2018) Investment Management: Security Analysis and Portfolio Management, S.Chand, New Delhi
3. Frank K. Reilly, Keith C. Brown (2011), Investment Analysis and Portfolio Management, South-Western College
4. Donald E. Fisher, Ronald J. Jordan (2007): Security analysis and Portfolio Management Prentice Hall New Delhi.
5. Punithavathy Pandian (2012) ,Security Analysis and Portfolio Management, Vikas Publishing House.

### Books for Reference

6. Clark, James Francis (1991): Investment Analysis and Management, McGraw Hill, International Edition, New York.
7. Elton Edwin J. Gumber Martin J (2014): Modern Portfolio Theory and Investment Analysis; John Wiley, New York.
8. Fabozzi, Frank J (1999): Investment Management, Prentice Hall, International Edition, New York.
9. PunithavathyPandian (2001). Security Analysis & Portfolio Management, Vikas Publications house, Pvt,Noida

**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

**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- Linear regression model- properties of estimators- Gauss-Markov theorem- Estimation and Hypothesis testing -correlation and regression . Analysis of residuals: - comparing two linear models -  $R^2$  – adjusted  $R^2$  . Test for normality- Stepwise and Piecewise linear regression.

**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

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

Non linear least squares estimation; Gradient methods, Newton-Raphson method; - Introduction to binary variables - Dummy variables regression models – Qualitative response regression models

**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- introduction to lag models – Dynamic Econometric 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 models.

**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

**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: Financial Engineering**

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

**Unit II: Financial Derivatives**

Derivatives - Meaning- Definition- function and types of Derivatives - Derivatives Market in India and other countries - OTC and 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-Closing out futures positions - Specification of Futures Contracts- Hedging strategies using futures - Convergence of futures price to spot price - MTM - Clearing House Arrangement - Stock index futures.

**Unit IV: Options**

Options Contract - Meaning - Types of Options - Option pricing models - Binomial model - Black-Scholes model - Differences between Futures and Options Contract - Options Trading strategies -Covered call - Protective put - Spreads - Bull spreads - Bear spreads - Butterfly spreads - Calendar spreads - Straddle – Strips and straps - Strangles - Put-call parity theorem.

**Unit V: Swaps**

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

**Objectives**

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

**International Banking and Financial Institutions:** International Banking: Origin and Evolution of International banking – Global trends as reasons for growth of international banking – financial activity following real-sector transactions –Regulatory, Tax and Supervisory explanations – Definitions – Growth and future prospects of International banking – Need for regulation of international banking in the current scenario. International financial institutions – The World Bank Group –International Bank for Reconstruction and Development (IBRD) – IDA – IFC – MIGA – International Monetary Fund (IMF) in brief – Lending facilities – BIS –ADB – AfDB

**Forex management :** Foreign Exchange Markets – Spot Prices and Forward Prices – Factors influencing Exchange rates –The effects of Exchange rates in Foreign Trade – Tools for hedging against Exchange rate variations –Forward, Futures and Currency options – FEMA – Determination of Foreign Exchange rate and Forecasting.

**International Banking Operations:** Off-shore financial centres – Rationale – Characteristics of offshore financial centres – Types of offshore centers – Benefit and reasons for growth – Factors of success – Tax Havens – Major Offshore Financial Centres – International Banking facilities – Special Economic Zones (SEZs) – Regulatory concerns. Correspondent banking – Origin and Growth of Correspondent banking – Challenges for correspondent banking – clearing house functions – payments and collections – credit services – foreign exchange services – other facilities. Foreign Bank Branches' operations: Factors behind overseas branch expansion – Objectives of abroad branches – constraints faced by overseas operations.

**International Payment Arrangements:** International Transfer and Payment Systems: International Payment Arrangements – Society for Worldwide Interbank Financial Telecommunication (SWIFT) – SWIFT messaging. Payment methods in International Trade – Cash in advance – Letter of Credit (L/C) – Documentary collection – Open account or credit – Countertrade or Barter.

**International Banking** – recent trends: Basel III compliance by Banking Industry across the globe – Shadow Banking – Issues pertaining to provisioning and nonperformance assets – cross-border terrorism.

**Books for Study:**

1. Dr. D.M Mithani .(2018). Money, Banking, International Trade And Public Finance, Himalaya Publication House
2. Indian Institute of Banking & Finance. (2017). International Trade Finance ISBN No.:9789386394729
3. A.W. Mullineux& Victor Murinde. (2003). Handbook of International Banking. ISBN 1840640936 Edward Elgar Publishing.



**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: Introduction:**

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, Gordon'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. 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.

**Objectives**

- *To enrich data analysis using R language*
  - *Trains the students in statistical modelling and analysis*
1. Introduction to R
  2. Data Entry and Import Data into R - Reading from external file
  3. Packages and functions
  4. Creating objects, vectors, sequence, lists, arrays
  5. Matrices and performing basic operations.
  6. Creating data frames
  7. Indexing, Sorting, Conditional Selection, Conditional execution, loops.
  8. Plots: Bar, line, Pie, Histogram, Box
  9. Computation of descriptive statistics, correlation and regression coefficients.
  10. One and two sample t tests
  11. One way and two way ANOVA

**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 Sons.
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.

**Objectives**

- *Technical analysis is a trading discipline employed to evaluate investments and identify trading opportunities in price trends and patterns seen on charts.*
- *Technical analysts believe past trading activity and price changes of a security can be valuable indicators of the security's future price movements.*
- *The strengths and weaknesses of technical analysis*

1. **Constructing and Interpreting Charts:** Tools - the construction of different types of charts -line chart, bar chart, point and figure chart, candlestick charts etc.; What to Look for on the Charts.
2. **Trends and Pattern Study:** Basics of pattern recognition; determination of price trends; support and resistance levels; real time presentations; moving averages; gaps.
3. **Technical Analysis Theories:** Dow Theory, Elliott wave theory, Fibonacci sequence, Cycle analysis.
4. **Technical Indicators:** Major indicators & oscillators RSI indicator; Stochastics; Rate of change (RoC) indicator; MACD; Bollinger bands.
5. **Trading Strategies:** Meaning and advantages of day trading; Risks involves in day trading; Strategies for day trading; Momentum trading strategy; Techniques for entry and exit in momentum trade.
6. **Trading psychology and risk management:** Stop loss- Analyze reward risk ratio- Trail stop loss-Booking Profit.
7. **Sentimental Indicators:** Volatility index (VIX), Put/call ratio, Bull/bear indicators, Dow's psychology of bull and bear markets, Insider activity.
8. **Market Behavior analysis:** Calendar Affect-Monday/Weekend affect, Month of the year affect-January affect, Turn-of the –Month affect, Festival affect, Trade War affect, Stock market bubble.

**Books for Study**

1. Jack D. Schwager (2013) Getting Started in Technical Analysis, John Wiley & Sons.
2. Mark Mobius (2011) Technical Analysis: An Introduction to the Core Concepts by, John Wiley & Sons.
3. John J. Murphy (1999) Technical Analysis of the Financial Markets, New York Institute of Finance
4. Thomas A. Meyers (2012) The Technical Analysis Course, McGraw-Hill Education

# **SEMESTER III**

**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 and Non-Stationary Time Series 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- First and Second order AR and MA Models – ARMA/ARIMA Models -Mixed ARMA /ARIMA models their statistical Properties – box Jenkins methodology ACF and PAF functions-Finite order AR(p) and MA(q) models .

**Unit III: Stationary and Non-Stationary Time Series**

Trend stationary -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), estimation of Lag models.

**Unit IV: Modeling Volatility**

Impulse response function, variance decomposition – 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”, Macmillan (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.
6. Peter J.Brockwell and Richard A.Davis (2016): Introduction to Time Series and Forecasting, 3/e Springer international Publication, Switzerland.

## **MSQF 532: Financial 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: Introduction**

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

### **UNIT II: Dummy variables regression models**

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: Residual analysis**

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

### **UNIT IV: Qualitative response regression models**

Polynomial regression – Binary Logistic regression – Cluster Analysis - Decision Trees

### **UNIT V: Time Series models**

Decomposition of Time Series - Stationarity- DF – ADF test- Granger causality- error correction model- VAR-VECM model- ARMA, ARIMA- ARCH - GARCH -Pooled models

#### Books for study

1. David G. Kleinbaum, Lawrence L. Kupper, Azhar Nizam, 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
3. Ronald R.Hocking (2013):Methods and Applications of Linear Models, Regression and Analysis of Variance, 3/e John Wiley series.

## MSQF 533: 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

Introduction to risk management- Sources of risk - risks of equity investment - risks of fixed income investment- risks of currency investment- risks of commodity investment - market risk measurement.

### Unit II: VAR Methods and Hedging

An overview of VAR- definition, downside VAR - VAR methods -VAR local and full valuation, delta normal methods, historical Simulation, Monte Carlo simulation, stress testing, Hedging: liner risk hedging, non-linear risk hedging, optimal hedging.

### Unit: III: Foreign Exchange Risk Management

Management of Transaction exposure, money market hedge - hedging foreign currency payable - hedging through invoice currencies - Hedging via lead and lag - Exposure netting; management of translation exposure - balance sheet hedge and derivatives hedge; Management of economic exposure; Determinants of economic exposure; Settlement risk.

### Unit IV: Credit Risk Management

Introduction to credit risk - measuring credit risk- credit exposure - types of credit Derivatives- credit default swap - pricing and hedging credit derivatives- 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.

### Books for Study

1. David Iverson (2013) Strategic Risk Management: A Practical Guide to Portfolio Risk Management , Wiley (2013)
2. Philippe Jorion (2009) “Financial Risk Manager Handbook”, John Wiley & Sons, Inc.
3. Michel Crouhy , Dan Galai , Robert Mark(2014), The Essentials of Risk Management, McGraw-Hill Education
4. C. Jeavanandam (2004) Foreign Exchange Practice and Concepts, Sultan Chand & Sons.
5. Chapman, R.J. (2006): Simple Tools and Techniques for Enterprise Risk Management, wiley.
6. Alexander J. McNeil, Rüdiger Frey & Paul Embrechts (2015): “Quantitative Risk Management: Concepts, Techniques and Tools”, Revised Edition.

### 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.

**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.



**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 Management Systems**

File Systems Vs DBMS- The Relational Model - Queries in DBMS - Structure of a DBMS - The ER Model - Transactions Management.

**Unit II: SQL Introduction**

Basic SQL query Syntax - MySQL basics and advantages - 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 - Python Introduction – Control Structures – Functions - Modules Basics - Python DB-API - Data Processing Using Arrays.

**Unit IV: Data Analysis with Pandas**

Introduction – Series – Data Frame - 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 , 3<sup>rd</sup> /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 1<sup>st</sup> /e

**Web Resources:**

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

- ❖ *The course provides accurate and timely financial information for management purposes.*
- ❖ *This course attempts to integrate and the fulfill markets and company-wide objectives.*

**Unit I: Basic concepts of Data, Information and System** – Evolution and need of information system – Decision making concepts – organizational decision making – information concepts as a quality product – classification of the information – Methods of Data and information collection – Human as a information processor – information system concepts – Characteristics of Information system – Types of information system – Technology of information systems.

**Unit II: Database Management Systems** – Concepts – Structure of Database System – Data Independence – Structure of DBMS - Characteristics of DBMS – Data Models – Relational Model – Database Design – Database analysis and ER Modelling – SQL – Normalization – Concurrency, Transactions and Implementations – Metadata, Security and DBA – Types of DBMS.

**Unit III: Role and impact of MIS** – Role and importance of management – Approaches to Management – Functions of the manager – Management as a control system – MIS & Client Server Architecture – Process of management – Planning – Organization – Staffing – Co-ordination and Controlling – Management by exception – MIS as a support to management – Organization structure and Theory – Basic model and organization structure – Organizational Behaviour.

**Unit IV: System analysis and design** – Need for system Analysis – System Analysis of existing System – System Development Model – Structured Systems Analysis and Design –Development of MIS – Development of long Range plans of the MIS. Deterministic systems – Artificial intelligence – Knowledge Based Expert System – MIS and the role of DSS – Enterprise management systems – EMS – Enterprise Resource Planning (ERP) system – ERP basic features – benefits – selection – implementation.

**Unit V: Financial Information System** – Concepts – Financial Decision Support System –Financial Decision Process – Internet and Web based Information System – Next Generation Information System – Electronic commerce – Electronic Business –Commercial applications – Information system in Banks – Case Studies – Design and development using CASE Tools

**Basic Text Book & References:**

1. James A. O'Brien, George M. Marakas and Ramesh Behl (2017), Management Information Systems, McGraw Hill Education (India) private Limited
2. W.S.Jawadekar, Management Information Systems, Tata McGraw Hill Publishing Company Limited, 2005. (Text Book).
3. Effy Oz, Management Information Systems, Thomson Learning, 2007.
4. Gordon B. Davis and Margerethe H.Olson, Management Information System, McGraw Hill 2005.
5. Jerome Karnter, Management Information System, III edition, PHI, 2000.
6. C.J.Date, An Introduction to Database Systems, Pearson Addison Wesley, Eighth Edition, 2008.
7. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, Database System Concepts, McGraw-Hill, Fourth Edition, 2010.

## **MSQF 537: STATISTICAL TECHNIQUES FOR FINANCIAL ANALYST      CREDITS: 3**

### **Objective**

- ❖ *This course helps to evaluate and reduce risks in an organization*

### **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, Milwaukee, Wisconsin, USA.
2. Jayachandra M (2001) , Statistical 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 Design 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

**Objective**

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

**Unit I: Linear programming**

Linear programming problems - model formulation and graphical solution – various types of solutions – simplex method of solving linear programming - Big M method – concept of duality (conversion of primal to dual).

**Unit II: Transportation problem**

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

**Unit III: Game Theory**

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: Inventory control**

Inventory control – Concept of Inventory control- Objectives of Inventory control- techniques of fixing of minimum, maximum and reorder level, economic order quantity, and ABC classification- perpetual inventory

**Unit V: Network Problems**

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. V.Rajasekarn and R.Lalitha (2011) Cost Accounting, Pearson Education India
4. Chandrasekhara Rao, K. and Mishra, S. L. (2012): Operations Research, Narosa Publishing House Pvt. Ltd, New Delhi.

**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): Operations Research, Sultan Chand and Sons, New Delhi.
4. Prasad, D. (2015): Operation Research, Narosa Publishing House Pvt. Ltd, New Delhi.

**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 Elsbberg's paradoxes, rationality from an economics and evolutionary perspective, different ways to define rationality: dependence on time horizon, individual or group rationality, examples from experimental economics: ultimatum and public goods games, experiments in isolated societies, bounded rationality, investor rationality and 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 external 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) Behavioral Finance, PHI Learning
2. Lucy Ackert and R.Deaves,(2011) Understanding Behavioral Finance, Cengage Learning
- Shefrin,H.,(2007))Behavioral 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)) Behavioral 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), Behavioral Technical Analysis, Harriman House Ltd
6. Shleifer, A.,(2000) Inefficient Markets: An Introduction to Behavioral Finance, Oxford University Press.

# **SEMESTER IV**

**Objective**

- ❖ *The course aims to inculcate conceptual frameworks of contemporary finance trends and to instill application level knowledge in the minds of students about contemporary finance trends.*

**Unit I: Value chain financing**

Value chain financing – rural finance – need for rural finance – Chit fund finance and its regulation in India – Sharadha chit fund case study, Shadow banking.

**Unit II: Islamic financing**

Islamic financing – origin and development – salient features of Islamic finance – Islamic finance in global financial market and Islamic finance in India

**Unit III: Startups in India**

Startups in India – Fund raising norms for start-ups - SEBI regulations on startup listing and fund raising – Angel funding – Origin of angel funding – SEBI regulations on angel funding – Financial Technology – Fintech companies in India - Prepaid payment mechanism – Smart cards, magnetic stripe cards, internet accounts - e-wallets, mobile accounts, mobile wallets and paper vouchers – Types of e-wallets – RBI regulations and Growth of prepaid payment mechanism

**Unit IV: Climate Finance**

Structure of International response - threat of global climate change - Compare social, ecological and economic impacts of climate change- Geographical and societal vulnerabilities - rapidly changing socio-economic environments- Characterize different approaches to climate change mitigation and adaptation - Evaluation - Protecting critical ecosystem services and human well-being - Enhancing resilience future ecological systems.

**Unit V: Green Economics**

The science of climate change-Economics, ethics and climate change-How climate change will affect people around the world-Implications of climate change for development-Costs of climate change in developed countries-Economic modeling of climate change impacts-The role of adaptation in sustainable development-Towards a goal for climate change policy. Key Facts about Paris Agreement.

**Books for Study**

1. Mann, M.E. and L.R. Kump. (2009) Dire Predictions: Understanding Global Warming – The Illustrated Guide to the Findings of the IPCC. Pearson Education.
2. Workman, J.G. (2009) Heart of Dryness: How the Last Bushmen Can Help Us Endure the Coming Age of Permanent Drought. Walker & Company.

**Web Recourses**

1. Resources for the Future (RFF): <http://www.rff.org/research/rffs-energy-and-climate-program>
2. Energy Information Administration (EIA): <http://www.eia.doe.gov/environment>
3. Center for Climate and Energy Solutions: <https://www.c2es.org/>
4. Intergovernmental Panel on Climate Change: <http://www.ipcc.ch/>
5. UNFCCC Paris Agreement: [http://unfccc.int/paris\\_agreement/items/9485.php](http://unfccc.int/paris_agreement/items/9485.php)

## **MSQF 542: RESEARCH METHODS FOR QUANTITATIVE RESEARCH CREDITS 3**

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

### **Unit V:**

Research case studies in Social Sciences

### **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



- ❖ *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.*

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 who will periodically review their project work.
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 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 will be scrutinized by 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.