PONDICHERRY UNIVERSITY

Ramanujan School of Mathematical Sciences

Syllabus for M.Sc. Quantitative Finance

(CBCS Pattern)
Effective from the Academic Year 2025-26 onwards

PONDICHERRY UNIVERSITY

Ramanujan School of Mathematical Sciences

M. Sc. (Quantitative Finance)

CURRICULUM & COURSE STRUCTURE

Aim of the Course:
The primary focus of M.Sc. Quantitative Finance course is to develop manpower with "knowhow" and "know why" skills regarding application of Statistics and Mathematical tools in financial analysis. It focuses on the fundamentals of Mathematics, Statistics, Econometrics, Computer Science and Risk Management. It provides the necessary analytical tools to solve practical problems in a complex and rapidly evolving world of financial services industry. Students are trained for corporate roles across several verticals of business like Financial Analysts, Research Analysts, Analytics in marketing, Operations Research, Insurance and Risk Management, etc. This program utilize quantitative techniques, statistical inference, econometric models, programming skills and trains the students to focus on real time application (Database of CMIE- PROWESS and BLOOMBERG) oriented problems using computer oriented Financial and Statistical packages (e.g., Excel, SPSS, Eviews, Stata, Minitab, R, Python) for financial statement analysis, data analysis, and financial modelling.

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., Bachelor's degree in Management (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.

Choice Based Credit System (CBCS):
The M.Sc. Quantitative Finance program is offered through a unique CBCS. The salient feature of the CBCS is that the program is offered through credit based courses. Subjects are divided into Hard Core and Soft Core. Hard Core subjects are compulsory. The students have the choice to select from among the list of soft core subjects. Soft core subjects are similar to elective subjects.

A student is expected to complete a minimum of **90 credits** within four semesters. Students are assessed and awarded letter grades based on their performances in the respective courses.

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.

Eligibility for admission to Examination

A candidate shall be permitted to appear for the M.Sc. examination in a subject of study only if he/she secures not less than 70% attendance in the subject concerned.
Medium: The medium of instruction shall be English.

Passing Minimum and Weightage of marks
The weight age of marks for Continuous Internal Assessment (CIA) and end semester examinations shall be 40 and 60 respectively. As per the Choice Based Credit System regulations of the Pondicherry University, a student is declared as pass in a given subject he / she secures

(a) A minimum of 40% marks in end-semester exam and

(b) A minimum of 50% marks in aggregate when Internal assessment and End- Semester marks are added together

Supplementary Exam

a. A failed student who meets the attendance requirement shall be permitted to register for the next end-semester examination in the following semester itself and/or in subsequent semesters.
b. A student who fails in a course due to insufficient attendance should repeat the course as and when it is offered.
c. A student who gets '**F'** or '**FA'** grade in a course shall be given an option either to retain the previously awarded Internal Assessment mark or to improve it, and the higher mark out of these two options will be considered for the supplementary exam.

Continuous Internal Assessment

The internal assessment marks shall be given as per the following breakup:

a. Internal Assessment Tests (two) : 30 marks
b. Seminars/Assignments/Case Demos/Presentations/Quiz/ Write ups/ Viva, etc. : 10 marks

Internal Total : 40 marks

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.

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, 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 each carrying 2 marks (one question from each unit): **5 × 2 = 10 marks**

Section B : Five questions are to be answered in either or type (questions from each unit): **5 ×10 = 50 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.

Distribution of Credits among the subjects grouped under various categories:

Courses are grouped under various categories and the credits to be earned in each category of courses are as follows:

Sl.No.	Category	Credits	Course Category Code (CCC)
1	Core- Classroom	60	CC
2	Electives - Classroom	12	EC
3	Action Learning Segment	18	AL
	Total	**90**	

M.Sc. Quantitative Finance Programme: Programme Educational Objectives (PEOs) and Programme Outcomes (POs)

Programme Educational Objectives (PEOs)

PEO 1	**Advanced Financial Expertise**	To equip graduates with advanced theoretical knowledge and practical skills in Quantitative Finance, drawing from inter-disciplinary areas of Finance, Commerce, Economics and Statistics, along with computer programming skills, enabling them to excel in diverse roles within the global financial services industry.
PEO 2	**Analytical & Problem-Solving Capabilities**	To develop graduates with strong analytical, computational, and problem-solving abilities, specifically in areas such as financial modeling, risk management, data analytics, and financial engineering, preparing them to address complex financial challenges.
PEO 3	**Professional Competence & Industry Readiness**	To foster professional competence and industry readiness in graduates, ensuring they can contribute effectively and responsibly to financial institutions, clear industry-recognized certifications (e.g., NSE Academy Certification in Financial Markets (NCFM), National Institute of Securities Market (NISM), Bloomberg Market Concepts), and secure placements in various quantitative roles.
PEO 4	**Adaptability & Continuous Learning**	To cultivate graduates' adaptability to evolving financial markets and technologies, including areas like Fintech and Blockchain, and encourage continuous learning and professional development to stay competitive in the dynamic quantitative finance landscape.
PEO 5	**Ethical Conduct & Industry Preparedness**	Adhere to ethical principles and be well-prepared for diverse quantitative roles in leading banks, mutual funds, insurance companies, and other financial services firms, as evidenced by a strong placement record.

Programme Outcomes (POs)

PO 1	**Inter-disciplinary Foundational Knowledge**	Acquire in-depth knowledge of financial theories, quantitative methods, and econometrics, enabling sound financial analysis and modeling
PO 2	**Quantitative & Computational Proficiency**	Develop strong skills in financial programming, data analysis, and modeling using tools like Python, R, and spreadsheets
PO 3	**Investment & Asset Management Skills**	Gain hands-on experience through labs, internships, and capstone projects, preparing for real-world roles in finance, banking, and analytics.
PO 4	**Data Interpretation & Decision Making**	Apply principles of ethics, sustainability, and inclusive finance in financial decision-making and strategic planning.
PO 5	**Modern Finance Applications**	Stay industry-relevant through electives, MOOCs (SWAYAM/NPTEL), and soft core courses, fostering lifelong learning and adaptability in a dynamic global financial environment.

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PONDICHERRY UNIVERSITY
M.Sc. QUANTITATIVE FINANCE
(CHOICE BASED CREDIT SYSTEM)
Academic Year 2025-26 onwards

Non - Credit Bridge Courses (covering various concepts in bullet points)			Nature of the Course
Pre Semester	MSQF 401	Basics of Business and Accounting	Compulsory Bridge Courses for 2 weeks
	MSQF 402	Basics of Computer Programming	
	MSQF 403	Basics of Economics	
	MSQF 404	Basics of Research Methods	

Semester	Course Code	Title of the Course	Nature of the Course	No. of Credits
I	MSQF 411	Accounting and Financial Analysis	Hard Core	4
	MSQF 412	Financial Management	Hard Core	4
	MSQF 413	Managerial Economics	Hard Core	4
	MSQF 414	Statistical Methods	Hard Core	4
	MSQF 415	Lab I:Financial Statement Analysis (Using Spreadsheet)	Hard Core	2
	MSQF 416	Lab II: Data Analysis Using Python	Hard Core	2
		Any one Soft Core paper among the list of soft core courses / Relevant courses can be opted from SWAYAM/NPTEL/CFA	Soft Core	3
II	MSQF 421	Investment Management	Hard Core	4
	MSQF 422	Optimization Methods	Hard Core	4
	MSQF 423	Econometrics	Hard Core	4
	MSQF 424	Financial Institutions and Markets	Hard Core	4
	MSQF 425	Lab III: Data Analytics using R	Hard Core	2
	MSQF 426	Lab IV: CAPSTONE Simulation Lab.	Hard Core	2
		Any one Soft Core paper among the list of soft core courses / Relevant courses can be opted from SWAYAM/NPTEL/CFA	Soft Core	3
III	MSQF 531	Applied Time Series Analysis and Forecasting	Hard Core	4
	MSQF 532	Financial Mathematics	Hard Core	4
	MSQF 533	Financial Risk Management	Hard Core	4
	MSQF 534	Corporate Internship	Hard Core	6
	MSQF 535	Global Financial Management	Hard Core	4
	MSQF 536	Machine Learning Techniques	Hard Core	4
		Any two Soft Core paper among the list of soft core courses/Relevant courses can be opted from SWAYAM/NPTEL/CFA	Soft Core Soft Core	3 3
IV	MSQF 541	Project Work cum Internship	Hard Core	12
		List of Soft Core Courses		
	MSQF 417	Behavioural Finance	Soft Core	3
	MSQF 418	Quantum Finance	Soft Core	3
	MSQF 419	Micro Finance and Entrepreneurship Management	Soft Core	3
	MSQF 427	Research Methods for Finance	Soft Core	3
	MSQF 428	Investment and Commercial Banking	Soft Core	3
	MSQF 429	Infrastructure Finance	Soft Core	3
	MSQF 537	Block Chain Technology for Finance	Soft Core	3
	MSQF 538	Stochastic Calculus for Finance	Soft Core	3
	MSQF 539	Fintech and Sustainable Finance	Soft Core	3
	MSQF 540	Big Data Analytics and Cloud Computing	Soft Core	3
	MSQF 542	Financial Engineering and Derivatives	Soft Core	3

BRIDGE COURSES

MSQF 401: BASICS OF BUSINESS AND ACCOUNTING

- **Types of Business Activities**: services, trading, banking, and commission agency businesses.
- **Forms of Business Organizations**: sole proprietorships, partnerships, companies, and cooperatives.
- **Company Formation and Governance**
- **Business Laws Basics**
- **Taxation Framework**: Direct and indirect taxes and tax incentives for SEZs and EOUs.
- **Indian Industrial Policy and IPRs**: Explores public vs private sector roles, privatization, and intellectual property rights.
- **Role of Institutions**
- **Fundamental Accounting Principles**
- **Basic Bookkeeping**
- **Financial Statements**

Books for Reference

1. Akhileshwar Pathak (2007): Legal Aspects of Business, 2/ e., Tata Mc Graw-Hill, New Delhi Publishing, New Delhi
2. Bhattacharya . L., (2009):Elements of Financial Accounting, PH1 Learning, New Delhi.
3. Dearden , J and S.K. Bhattacharya(1997): Accounting for Management, (1997) 3/e.Vikas Publishing House,New Delhi.
4. Prasad L M (2001): Principles and Practice Of Management, Chand and Company Ltd., New Delhi.
5. Rustomji .M.K, (2005):All about Balance sheets, Mac Millan.

MSQF 402: BASICS OF COMPUTER PROGRAMMING

- Computer Programming Introduction

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

- Introduction to SPSS: Import and Export of data files, Recoding into different variables, Descriptive Statistics, Correlation and Regression Analysis

- Basics of R and Python : 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.

- EVIEWS Basics: Introduction to EVIEWS software, menus, options, and basic data visualizations.

- GRETL Overview: Basic operations in GRETL, including menu navigation and simple computations.

Books for Reference

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
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

- Foundations of Economics
- Micro and Macro Economics
- Role of Price Mechanism
- Production
- Cost Analysis
- Firm Behavior
- Macroeconomic Models
- Monetary Economics
- Development and Growth Theories
- Contemporary Development Issues.

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. John B.Taylor, (1997):Economics, AITBS publications.
4. Koutsoyiannis, A.(2000): Modern Microeconomics, 2 /e, Macmillan Press,London.
5. Mankiw N Gregory (2014), Principle of Economics, 7 / e ,South-Western College Publishing.
6. Richard.T.Froyen (2003): Macro Economics: Theories and Policies, Pearson Education.
7. Stigler, G.(1996): Theory of Price, PHI, New Delhi.

MSQF 404 : BASICS OF RESEARCH METHODS

- **Introduction to Research**: Understand the meaning, objectives, and the sequential steps involved in the research process.

- **Types of Research**: Basic, applied, qualitative, and quantitative research.

- **Criteria for Good Research**: systematic, reliable, valid, and ethically sound.

- **Formulating a Research Problem** and construct meaningful research questions.

- **Literature Review and Hypothesis framing**

- **Research Design**: exploratory, descriptive, experimental, etc.

- **Sampling Techniques**: probability and non-probability sampling.

- **Data Collection and Instruments**: Understand tools and techniques - primary and secondary data - design effective instruments

- **Data Analysis Presentation and Interpretation** : appropriate techniques - processing, analyzing etc

- **Research Ethics, and Reporting**

Books for References:

1. Babbie, E. (2013). *Research methods for social sciences* (4th ed.). Cengage Learning.
2. Bhattacherjee, A. (2012). *Social science research: Principles, methods, and practices* (2nd ed.). Textbooks Collection.
3. Cooper, D. R., & Schindler, P. S. (2014). *Business research methods* (12th ed.). McGraw-Hill Education.
4. Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Age International Publishers.
5. Kumar, R. (2011). *Research methodology: A step-by-step guide for beginners* (3rd ed.). SAGE Publications.

SEMESTER I

MSQF 411: ACCOUNTING AND FINANCIAL ANALYSIS CREDITS: 4

Course 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*

Course Outcomes:

C01. To gain proficiency in basic accounting concepts, conventions and understanding of the accounting process.
C02. To be familiar with the rules governing accounting transactions.
C03. To understand the process and preparation of financial statements
C04. Effective Planning and Investment for Individuals and Corporate
C05. Hands on experience in excel spreadsheet for financial functions

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

Introduction to Accounting features using spreadsheet - Inventory features- Preparation of Ledger accounts - Preparation of Invoices- subsidiary books - Display- of final accounts - Ratios

Books for Reference

1. Gupta, S. K., Sharma, R. K., & Gupta, N. (2024). *Accounting for managers* (2024th ed.). Kalyani Publishers.
2. Maheshwari S. N. (2018): Financial Accounting, Vikas Publishing House
3. Noreen, E. (2025). *Managerial accounting for managers*. McGraw-Hill Education. ISBN: 9781265194949.
4. Raghuwanshi, S., Singh, P. R., & Sharma, S. (2023). *Accounting for managers: Text and problems*. AG Publishing e (AGPH Books). ISBN: 978-8119338245.
5. Singh, G., Jain, M. K., & Gupta, R. (2021). *Accounting for managers*. PHI Learning.
6. Thappa, S. (2022). *Accounting for managers: Text & cases*. Taxmann. ISBN: 9789356222700.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	XX	XX	X
CO2	XXX	X	XX	XX	X
CO3	XXX	XX	XX	XX	X
CO4	XX	XX	XXX	XXX	XX
CO5	XX	XXX	XXX	XX	XX

MSQF 412: FINANCIAL MANAGEMENT **CREDITS: 4**

Course 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*

Course Outcomes (COs):

CO1: Understand the Fundamentals of Financial Management
CO2: Evaluate Investment Decisions Using Capital Budgeting Techniques
CO3: Analyze Capital Structure and Dividend Policies
CO4: Manage Working Capital Effectively
CO5: Apply Security Valuation Methods

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 Reference

1. Prasanna Chandra (2017): Financial Management: Theory and Practice, McGraw Hill Education; Ninth edition
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
5. Khan MY, Jain PK. (2002): Financial Management, Tata Mc Hill, New Delhi.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	XX	XX	X
CO2	XXX	XX	XX	XX	X
CO3	XXX	XX	XX	XX	X
CO4	XXX	XX	XX	XX	X
CO5	XXX	XX	XX	XX	X

MSQF 413: MANAGERIAL ECONOMICS CREDITS: 4

Course 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*

Course Outcome(Cos):

C01. Understand the concept of Managerial Economics and its relationship with other Disciplines
C02. Basics application of economics in Business decision making
C03. Understand various micro and Macro elements that affect the economy
C04. Explain Demand Analysis and Supply
C05. To Identify different market situations and Price output decisions

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 References:

1. Baye, M. R., & Prince, J. T. (2021). Managerial Economics and Business Strategy (10th ed.). McGraw Hill
2. Bruce .W. Allen, Keith Weigelt, Neil Dohrty and Edwin Mansfield, (2010): Managerial Economics, 7/e.
3. Koutsoyiannis, A.(2000): Modern Microeconomics, 2//e, Macmillan Press,London.
4. Ward, M. R., Froeb, L. M., McCann, B. T., & Shor, M. (2023). *Managerial Economics: A Problem-Solving Approach* (6th ed.). Cengage Learning.
5. McGuigan, J. R., Moyer, R. C., & Harris, F. H. de B. (2023). *Managerial Economics: Applications, Strategies and Tactics* (14th ed.). Cengage.
6. Rastogi, S. K., & Salvatore, D. (2020; latest in India). *Managerial Economics: Principles and Worldwide Applications* (9th ed.). Oxford University Press India.
7. Thomas, C. R., & Maurice, S. C. (2023). *Managerial Economics: Foundations of Business Analysis and Strategy* (14th ed.). McGraw-Hill Education.
8. Varsheny RL and Maheshwari KL(2014): Managerial Economics; Sultan Chand and Sons,New Delhi

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	XX	XX	XX
CO2	XXX	X	XX	XXX	XX
CO3	XXX	X	X	XXX	XX
CO4	XX	XX	XX	XX	XX
CO5	XXX	XX	XX	XX	XX

MSQF 414: STATISTICAL METHODS **CREDITS: 4**

Course Objectives:

- *To provide fundamental knowledge in the concepts of probability theory and statistical inference*
- *Understanding Parametric and non- Parametric* Testing *methods and the conditions under which each test or estimation method can be applied.*

Course Outcomes (COs):

C01. To know elementary probability theory concepts and understand key probability distributions
C02. Learn the concepts of point estimation and interval estimation
C03. Understand and apply core concepts of hypothesis testing
C04. Perform parametric tests for large and small samples
C05. Apply non-parametric statistical methods

Unit I

Elementary Probability theory: Definition - Addition theorem – Conditional probability and Multiplication theorem - Bayes' Theorem – Simple problems - Random variables and probability distributions – Binomial, Poisson , Normal (simple applications of the distribution) – Sampling distributions: t, F and chi-square (definition only)

Unit II

Basic problem of statistical inference: Point estimation – Methods of estimation: Methods of moments – Method of Maximum Likelihood Estimation (MLE) – Simple problems – Interval Estimation - Confidence intervals for mean, proportion (large samples) - Simple problems

Unit III

Hypothesis testing: Basic concepts in Hypothesis Testing – Null and Alternative hypothesis - Simple and Composite hypothesis - Types of error - Computations of probability of Type I, Type II errors and power of the test - Critical region – Level of significance - 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 – Sign test – Mann Whitney U test – Test for Randomness (Run Test) – Kruskal Wallis test – Friedman test - Simple problems

Books for Reference

1. Anderson, D. R., Sweeney, D. J. Williams, T. A. (2017): Statistics for Business and Economics, 13/e, South Western-Cengage Learnings.
2. Shubhabrata Das and Soudeep Deb (2025): Business Analytics : Data to Decisions, University Press
3. Agarwal.B.L(1996): Basic statistics , 3/e, New Age International (P) Ltd.,.
4. Sheldon M.Ross (2006): Introductory Statistics, 2/e, Elsevier Publications.
5. Medhi.J. (1992) : Statistical Methods an Introductory Text , Wiley Eastern Ltd.,.
6. Hooda, R. P.(2013): Statistics for Business and Economics, 5/e, Vikas Publishing House Pvt. Ltd.
7. Black, K. (2008): Business Statistics for Contemporary Decision Making, 4/e, Wiley India.
8. Gupta S.C and Kapoor,V.K (2000): Fundamentals of Mathematical Statistics, Sultan Chand& Co.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	X	XX	X
CO2	XXX	XX	X	XX	X
CO3	XXX	XX	X	XX	X
CO4	XXX	XX	X	XX	X
CO5	XXX	XX	X	XX	X

MSQF 415: LAB I - FINANCIAL STATEMENT ANALYSIS (Using Spreadsheet) CREDITS: 2

Course Objectives:

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

Course Outcomes (COs):

C01. Demonstrate proficiency in data retrieval, handling, and analysis
C02. Apply advanced Excel functions and financial functions to solve real-world financial problems.
C03. Perform comprehensive financial statement analyses including comparative, common size, and ratio analyses.
C04. To evaluate the financial health and performance of organizations.
C05. Develop critical thinking skills by integrating quantitative data analysis with financial theory to assess risks, trends, and opportunities in various business contexts.

1. Data retrieval and handling
2. Financial Statement Analysis
3. Horizontal Analysis
4. Vertical Analysis
5. Trend percentage
6. Ratio Analysis
7. Portfolio Performance
8. Develop Excel models to evaluate projects using NPV, IRR, Payback Period, Profitability Index, and compare results graphically
9. Create an Excel sheet to compute EBIT-EPS analysis, DOL, and Indifference Point, and visualize impact of leverage.
10. Build valuation models for **Equity using DDM**, **P/E Ratios**, and **CAPM-based Expected Return** using real or sample stock data.

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. Kimmel, P. D., Weygandt, J. J., & Kieso, D. E. (2023). Tools for Business Decision Making (8th US ed., test bank). Wiley.
4. Martin Baxter and Andrew Robbie (1996): Financial calculus Cambridge University, Press Cambridge.
5. Richardson, V. (2024). Introduction to Data Analytics for Accounting (2nd ed., test bank). Academic resources.
6. Romney, M. B., Steinbart, P. J., Summers, S. J., & Wood, D. A. (2021). Accounting Information Systems (15th ed., test bank). Pearson.
7. Wild, J. J. (2024). Fundamental Accounting Principles (25th ed., test bank). McGraw-Hill.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XX	XXX	XX	XX	XX
CO2	XX	XXX	XXX	XX	XX
CO3	XXX	XX	XXX	XX	XX
CO4	XXX	XX	XXX	XXX	XX
CO5	XXX	XXX	XXX	XXX	XX

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

Course Objectives:

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

Course Outcomes(COs):

C01. Demonstrate the ability to import, export, and preprocess data in Python
C02. Apply and evaluate various statistical techniques to analyze relationships and differences in data.
C03. Conduct advanced inferential analyses to identify underlying patterns and classify data
C04. Clear identification of parametric tests and non- parametric tests
C05. Interpretations of the statistical analysis results

Python Fundamentals for Data Analysis:

- Introduction to Python: Data types – Variables and assignments – Basic object types and operators: arithmetic, relational, logical, membership, identity – Control statements: decision-making and loop statements – Functions: defining, calling, return values, – File I/O operations.
- Data Analysis Packages: NumPy – Creating NumPy arrays – Array attributes – Indexing and slicing – Arithmetic operations on arrays – Libraries for data manipulation: NumPy (numerical operations on arrays)
- Pandas: Creating Series and DataFrames – Reading and writing from CSV, text, and Excel files – Summary statistics – Merging, joining, and grouping – Pivot tables
- Matplotlib: Line plots – Multiple lines on the same axis and different axes – Scatter plots – Histograms – Bar charts: simple, stacked, and grouped – Pie charts – Customizing plots: labels, titles, legends, line styles, colors – Creating subplots and layout management.
- Perspectives in Data: Creating dummy variables– Normalizing and scaling data.

Descriptive Statistics and Data Visualization:

- Measures of Central Tendency and Dispersion: Calculation of mean, median, mode, variance, standard deviation, range – Using built-in functions and libraries
- Exploratory Data Analysis (EDA): Identifying missing values – Detecting outliers – Summary statistics
- Data distribution analysis – Data type inspection and cleaning – Correlation analysis, skewness, and kurtosis.
- Data Visualization using Matplotlib and Seaborn: Histograms – Scatter plots – Box plots – Bar charts (simple and grouped) – Heatmaps – Plot customization: titles, labels, colors, legends – Subplots and layout control.

Probability and Inferential Statistics:

- Probability theory: Basic concepts of probability – Working with probability distributions: normal, binomial, Poisson – Visualizing distributions with seaborn and matplotlib.
- Sampling and sampling distributions: Random sampling using random and numpy – Simulating sampling distributions –Chi-square tests.
- Hypothesis testing: Parametric tests: t-tests (one-sample, two-sample), ANOVA (one-way, two-way).
- Confidence intervals and statistical significance.
- Non-parametric tests : Test for randomness, Kruskal Wallis test, Friedman test

Books for Reference

1. McKinney, W. (2017). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. “O’Reilly Media, Inc.".
2. Dmytro Zherlitsyn (2024): Python for Finance: Data analysis, Financial Modeling and Portfolio Management, Bpb publications.
3. Swaroop, C. H. (2003). A Byte of Python. Python Tutorial.

COs	PO1	PO2	PO3	PO4	PO5
CO1	X	XXX	XX	X	X
CO2	X	XXX	XX	X	X
CO3	X	XXX	XX	X	X
CO4	X	XXX	XX	X	X
CO5	X	XXX	XX	X	X

SEMESTER II

MSQF 421: INVESTMENT MANAGEMENT **CREDITS: 4**

Course 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*

Course Outcomes (COs):

- **C01.** Clear understanding about different investment decisions
- **C02.** Learn to compute historical and expected returns as well as the risk measures
- **C03.** Construct and Manage a Portfolio
- **C04.** To expose students on the various avenues available for effective investment
- **C05.** Possible way to avoid risk in investments through 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 Reference

1. Avadhani, V. A. (2025). *Investment management*. Himalaya Publishing House. ISBN: 978-93-5024-872-0.
2. Chandra, P. (2021). *Investment analysis and portfolio management*. McGraw Hill. ISBN: 978-9354600074.
3. Dalton, J. F. (2025). *Markets and momentum: How profiling gives traders an advantage*. Wiley. ISBN: 978-1-394-31881-0.
4. Desai, J. M., & Joshi, N. A. (2015). *Investment management: Security analysis and portfolio management*. Wiley India. ISBN: 9789351194286.
5. Singh, A. K., Jain, V., & Tripathi, V. (2025). *Investment management*. Taxmann Publications Private Limited. ISBN: 978-9357789356.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	XXX	XX	XX
CO2	XX	XXX	XXX	XX	XX
CO3	XX	XXX	XXX	XX	XX
CO4	XX	XX	XXX	XX	XXX
CO5	XXX	XX	XXX	XX	XX

MSQF 422: OPTIMIZATION METHODS CREDITS: 4

Course Objectives:

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

Course Outcomes (COs):

C01.	Formulate and solve linear programming problems
C02.	Solve transportation and assignment problems efficiently using techniques
C03.	Analyze and solve sequencing and game theory problems,
C04.	Apply inventory control models
C05.	Construct and analyze network models

Unit I:
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 – 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:
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 flow models – shortest route problem – project management – the CPM and PERT Networks – sensitivity analysis

Books for Reference

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.
5. Hamdy A. Taha (2022): Operations Research – An Introduction, 11/e, Pearson education..
6. Hillier F S and Libermann G J(2002): Introduction to Operations Research, 7/e, McGraw Hill
7. Kanti Swarup, Manmohan and Gupta P.K.(1985): Operations Research, Sultan Chand and Sons, New Delhi.
8. Prasad, D. (2015): Operation Research, Narosa Publishing House Pvt. Ltd, New Delhi

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	X	XX	X
CO2	XXX	XX	X	XX	X
CO3	XXX	XX	X	XX	X
CO4	XXX	XX	X	XX	X
CO5	XXX	XX	X	XX	X

MSQF 423: ECONOMETRICS **CREDITS: 4**

Course Objectives:

- *To introduce students to the foundational concepts and tools of econometric analysis including regression, estimation, and hypothesis testing.*
- *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*

Course Outcomes (COs):

C01. Explain the key concepts of econometrics
C02. Application of linear regression model and its properties
C03. Detect and address classical regression problems empirically.
C04. Analyze and interpret time series, cross-sectional, and panel data models
C05. Practical application of real world data using econometric packages

Unit I: Introduction to Econometrics and Financial Data

Definition and scope of econometrics -Types of data: cross-sectional, time series, panel data -Structure of economic and financial models -The classical linear regression model (CLRM) -Importance of econometrics in financial decision-making

Unit II: Simple and Multiple Linear Regression Models

Ordinary Least Squares (OLS): assumptions, estimation, and interpretation- Goodness-of-fit (R^2 and adjusted R^2)- Hypothesis testing (t-test, F-test)- Interpretation of regression results

Unit III: Violations of Classical Assumptions

Multicollinearity: causes, consequences, detection, and remedies-Heteroskedasticity: testing (Breusch-Pagan, Goldfeld-Quandt, Spearman's rank correlation test and White), Consequences, Corrections-Autocorrelation: causes in time series, detection (Runs and Durbin-Watson tests), corrections-Implications for financial data (e.g., stock returns)

Unit IV: Time Series Econometrics for Finance and Distributed Lag Models

Introduction to Time series Econometrics - Introduction to binary variables - Dummy variables regression models – Qualitative response regression models- Introduction to lag models- finite and infinite distributed lag models – Almon's model, cagan's approach, arithmetic, geometric and inverted V lag models – Pascal's lag model – Dynamic Econometric models.

Unit V: Panel Data and Financial Applications

Introduction to panel data models (Fixed Effects, Random Effects) -Model selection and the Hausman test -Applications in finance: firm performance, event studies -Use of econometric software (e.g., EViews, STATA, R)

Books for Reference

1. Brooks, C. (2019). *Introductory econometrics for finance* (4th ed.). Cambridge University Press.
2. Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.). McGraw-Hill Education.
3. Marno Verbeek (2012): A guide to Modern Econometrics, 4/e,Wiley and Sons
4. Pourmansouri, R. & Birau, R. (2024). Financial econometrics. Cambridge Scholars Publishing.
5. S.Wang, & Zeng, (2025):Financial Econometrics: Theory& Applications, Cambridge University Press.
6. Verbeek, M. (2021). Panel methods for Finance: A guide to panel data econometrics for financial applications, De Gruyter.
7. Wooldridge, J. M. (2020). *Introductory econometrics: A modern approach* (7th ed.). South- Western

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	XX	XX	X
CO2	XXX	XX	XX	XX	XX
CO3	XXX	XXX	XX	XX	XX
CO4	XXX	XXX	XX	XXX	XX
CO5	XXX	XXX	XX	XX	XXX

MSQF 424: FINANCIAL INSTITUTIONS AND MARKETS CREDITS: 4

Course Objectives:

- *To understand the structure and functioning of the Indian financial system*
- *To explore the operations of money and capital markets*
- *To evaluate the role of central and commercial banks*

Course Outcomes:

C01. To be familiar To be familiar the structure and functioning of the Indian financial system
C02. To analyze and interpret the functioning of financial institutions and markets in India
C03. To assess various financial instruments and intermediaries
C04. Understand the roles in mobilizing savings, allocating resources, and economic development
C05. To understand the functions, roles and responsibility of Central bank.

UNIT I: Financial System Indian financial system: overview of financial markets in India – Capital markets – money market – government securities markets – foreign exchange market – derivative markets – financial sector reforms. Structure and institutions in capital market and money market – new issues market – new instrument – role of new issues in industrial financing – floating of new issues – options and futures.

UNIT II: Financial Services: Introduction – Financial Services Industry – Emergence – Developments – Fund Based and Non-Fund based activities – modern activities – New Financial Products and Services, Innovative Financial Instruments – Challenges Ahead. Merchant Banking: Origin, growth and services rendered by merchant bankers: Issues Management and other services – Problems and scope of merchant banking in India – Mergers and Acquisitions: Motives, Merger Analysis, Terms of Exchange, Cash purchase, Stock Exchange Acquisitions, Leverage Buyouts and Management Buyouts.

UNIT III: Leasing and Factoring Leasing: Concept, Types, Lease Agreements – Potentiality of Leasing as a means of financing Advantages and Disadvantages – Accounting Treatment and sales tax provisions – Lease Financing in India – Factoring: Meaning, Modus operandi, types, functions Factoring in India, Other Financial Services: Hire Purchase, Commercial paper, Credit Cards, Credit Rating, Forfeiting, Bill Discounting, Housing Finance, Recent trends in marketing financial services.

UNIT IV: Mutual Funds Mutual Funds: Meaning, Origin, Types/Classification of Funds, Importance, Mutual Funds Industry in India – Venture Capital: Meaning, Origin, Importance, Methods, India Scenario.

UNIT V: Insurance Market in India: Public and Private players; Functions of Insurance companies; Pricing of Insurance; Insurance Regulation (IRDA) Features of Insurance Contracts; property and liability coverage; Classification of Policies; Surrender Values; Valuation and Surplus; Types of Insurance - Life Insurance – Marine Insurance – Fire Insurance – Motor Insurance – Fidelity Insurance – Burglary Insurance- Double Insurance – Re-insurance – Business Insurance Programs – Health Care financing – Health Care insurance – Employee Benefit Plans.

Books for Reference

1. Chandni Rani, V., & Chetana. (2022). *Financial markets and services*. Bharti Publications.
2. Mahalakshmi, P. B. (2024). *Financial markets and services*. Shine Publication Pvt. Ltd.
3. Purushottam, A. S. (2023). *Financial markets and services* Shine Publication Pvt. Ltd.
4. Pathak, B. (2024). *Indian financial system: Markets, institutions & services* (6th ed., Bharti Publications.
5. Madura, J. (2024). *Financial institutions and markets* ,Cengage Publications

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	XX	XX	XX
CO2	XXX	XX	XXX	XX	XX
CO3	XXX	XX	XXX	XX	XX
CO4	XXX	X	XXX	XXX	XX
CO5	XXX	X	XX	XXX	XX

MSQF 425: Lab III: DATA ANALYTICS USING R CREDITS: 2

Objectives

- *To enrich data analysis using R language*
- *Trains the students in statistical modelling and analysis*

Course Outcomes (Cos)

CO1: Understand and Apply R Programming Fundamentals
CO2: Perform Data Manipulation and Visualization
CO3: Conduct Statistical Analysis in R
CO4: Implement Time Series and Econometric Models
CO5: Apply Advanced Data Analytics Techniques

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
10. Correlation
11. Regression Analysis
12. One and two sample t tests
13. One way and two way ANOVA
14. Timeseries Analysis

Books for References:

1. Cohen, Y. and Cohen, Jeremiah, Y. (2008): Statistics and Data with R, An applied approach through examples, John Wiley and Sons.
2. Chang, W. (2022). R Graphics Cookbook: Practical Recipes for Visualizing Data (2nd ed.). Sebastopol, CA: O'Reilly Media.
3. Crawley, M. J (2013): The R book, 2/e, John Wiley and Sons.
4. Dalgaard, P. (2008): Introductory statistics with R, 2/e, Springer.
5. Faraway, J. F. (2004): Linear Models with R, CRC Press.
6. Gergely D., et al. (2013): Introduction to R for Quantitative Finance, Packt publishing.
7. Heiss, F. (2024). Using R for introductory econometrics (3rd ed.).
8. Ismay, C., Kim, A. Y., & Valdivia, A. (2025). Statistical inference via data science: A modern dive into R and the
9. Parvin, R. (2024). R Programming for Data Science: A Practical Guide with Hands-On Exercises.
10. Tidyverse (2nd ed.). Boca Raton, FL: CRC Press.
11. Wickham, H., & Grolemund, G. (2025). R for Data Science. [Online or bound edition].
12. Ugarte, M.D., Militine, A. F. and Arnholt, A. T. (2008): Probability and Statistics with R, CRC press, Taylor and Francis Group.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XX	XXX	XX	X	XX
CO2	XX	XXX	XX	XX	XX
CO3	XXX	XXX	XX	XX	XX
CO4	XXX	XXX	XXX	XX	XX
CO5	XXX	XXX	XXX	XX	XXX

MSQF426: LAB IV: CAPSTONE SIMULATION LAB. CREDITS: 2

Course Objectives: By the end of this course, students will be able to:

1. Understand the basic principles of simulation and its applications in finance.
2. Acquire skills in financial data handling, cleaning, and visualization.
3. Apply simple simulation models for understanding asset prices, portfolio performance, and basic risk measures.
4. Use spreadsheet tools and introductory programming for simulation exercises.
5. Develop and present a small-scale capstone simulation project.

Course Outcomes (COs):

CO1: Explain fundamental simulation concepts and their role in finance.

CO2: Collect, clean, and prepare basic financial datasets for analysis.

CO3: Apply spreadsheet-based and introductory coding-based simulations to model financial scenarios.

CO4: Interpret and present simulation outputs for basic decision-making.

CO5: Demonstrate problem-solving through a simple simulation-based project.

Unit I: Introduction to Simulation in Finance

Meaning, types, and purpose of simulation - Real-world use cases in finance and business - Introduction to random variables and probability distributions (basic level) - Difference between deterministic and stochastic models - Simple spreadsheet-based simulation example (e.g., estimating future value of investment with random returns)

Unit II: Financial Data Handling and Visualization

Types of financial data (price data, returns, indices, FX rates, interest rates) - Sources of financial data (Yahoo Finance, RBI, NSE/BSE websites) - Data import/export in Excel and introductory Python/R - Basic data cleaning: handling missing values, formatting, and scaling - Graphical representation: line charts, histograms, scatter plots for financial data

Unit III: Basic Simulation Models for Asset Prices

Concept of random walks in finance (basic explanation) - Generating simulated asset prices using simple returns model - Introduction to compounding and growth rates - Simulating investment growth under different scenarios - Spreadsheet and Python/R examples for basic price simulation

Unit IV: Simple Portfolio and Risk Simulation

Basics of portfolio returns and risk (variance, standard deviation – intuitive explanation) - Simulating portfolio outcomes with random returns - Introduction to diversification through simulation examples - Estimating simple Value-at-Risk (VaR) with historical simulation (conceptual level) - Case Study: Simulating 2-asset portfolio returns

Unit V: Capstone Mini Project

Selecting a simple finance problem (e.g., simulating stock price trends, comparing investment plans, evaluating savings growth) - Defining objectives and collecting relevant data - Performing simulation using spreadsheet/Python tools - Presenting results with graphs and summary tables - Submission of final report and viva presentation

Teaching Methodology

- Short demonstrations followed by hands-on lab practice
- Group and individual mini-assignments
- Emphasis on simple, clear logic before moving to coding
- Real dataset exercises to build familiarity

Suggested Software & Tools

- **Spreadsheet**: MS Excel / Google Sheets (core)
- **Introductory Programming**: Python (pandas, NumPy, Matplotlib) or R (optional in first semester)
- **Data Sources**: Yahoo Finance, NSE/BSE historical data, RBI database

Books for References:

1. Winston, W. L. (2017):*Microsoft Excel Data Analysis and Business Modeling*. Microsoft Press.
2. Benninga, S. *Financial Modeling*. MIT Press.
3. Hull, J. C. *Fundamentals of Futures and Options Markets* (selected introductory sections).
4. Downey, A. *Think Stats: Probability and Statistics for Programmers*. O'Reilly.
5. Relevant online tutorials for Excel/Python financial data analysis.

COs	PO1	PO2	PO3	PO4	PO5
CO1	X	XX	XXX	XX	X
CO2	X	XX	XXX	XX	X
CO3	XX	XXX	XXX	XX	X
CO4	XX	XX	XXX	XX	X
CO5	XX	XX	XXX	XXX	XXX

SEMESTER III

MSQF 531: APPLIED TIME SERIES ANALYSIS AND FORECASTING CREDITS:4

Course Objectives:

- *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*

Course Outcomes (COs):

CO1: Understand and interpret the fundamental concepts and components of time series data
CO2: Apply smoothing techniques for real world data using R and Excel
CO3: Distinguish between stationary and non-stationary time series,
CO4: Application and modeling time-varying volatility using financial data
CO5: Evaluate and compare various forecasting methods using real time data

Unit I: Introduction to 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 univariate 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: Multivariate and Multiple Equation Models

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: Applications and Forecast Evaluation

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 -Forecast accuracy measures (MAE, MSE, RMSE, MAPE)-Model validation and backtesting -Scenario analysis and stress testing in financial forecasting-Case studies: stock prices, interest rates, macroeconomic forecasting-Use of software tools (R, Python) for applied time series modeling

Books for Reference

1. Hyndman, R. J., & Athanasopoulos, G. (2021). *Forecasting: Principles and practice* (3rd ed.).
2. Hamilton, J. D. (2023). *Time series analysis* (2nd ed.). 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. Makridakis. S. and Wheelwright. S. C. (1997): Forecasting: Methods and Applications, 3/e John Wiley & Sons.
5. Mills, T., (1997): The Econometric Modeling of Financial Time Series.2/e Cambridge University Press.
6. Shumway & Stoffer, D. S. (2023). *Time series analysis and its applications: With R examples* (4th ed.). Springer.
7. Tsay, R. S. (2024). *Analysis of financial time series* (4th ed.). Wiley.Montgomery D.C., C.L.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	XX	XX	XX
CO2	XXX	XXX	XX	XX	XX
CO3	XXX	XX	XX	XX	XX
CO4	XXX	XXX	XXX	XX	XX
CO5	XXX	XXX	XXX	XX	XXX

MSQF 532: FINANCIAL MATHEMATICS **CREDITS: 4**

Course Objectives:

- *To equip students with a solid understanding of fundamental mathematical concepts and techniques used in financial analysis, valuation of financial instruments, and portfolio management.*
- *To develop the ability to apply quantitative methods for solving practical problems in finance, including risk assessment, derivatives pricing, and financial decision-making.*

Course Outcomes (COs):

CO1: Apply financial mathematics to evaluate investments and corporate finance decisions
CO2: Use quantitative tools for bond, equity, and portfolio valuation
CO3: Analyze risk and return to support financial strategy
CO4: Interpret and construct financial statements for cash flow management
CO5: Apply mathematical models to real-world financial problems

Unit I: Introduction to Financial Mathematics

Role and importance of mathematics in finance -Time value of money concepts-Simple interest and compound interest-Nominal and effective rates-Discounting and present value-Basic annuities: ordinary annuities, annuities due- Growth and decay curves

Unit II: Valuation of Financial Instruments

Present value and future value of annuities-Perpetuities and growing annuities Loan amortization and sinking funds-Bond valuation: yield to maturity (YTM), yield to call (YTC)-Equity valuation: dividend discount model (DDM), price-earnings model

Unit III: Financial Ratios and Cash Flow Analysis

Key financial ratios: liquidity, profitability, leverage, efficiency-Application of ratios in decision making-Cash flow statements: operating, investing, and financing cash flows-Free cash flow analysis-Break-even and sensitivity analysis

Unit IV: Risk, Return, and Portfolio Mathematics

Measurement of return: arithmetic vs geometric mean-Standard deviation and variance of returns-Coefficient of variation-Covariance and correlation-Portfolio return and risk-Diversification and optimal portfolio construction-Capital Asset Pricing Model (CAPM)

Unit V: Advanced Topics and Applications

Linear programming in financial decision-making -Introduction to financial derivatives (options, forwards, futures)-Option valuation basics: Binomial and Black-Scholes models-Duration and convexity of bonds-Probability distributions in finance: normal, log-normal-Simulation and scenario analysis in financial planning

Books for Reference:

1. Bodie, Z., Kane, A., & Marcus, A. J. (2022). Investments (12th ed.). McGraw-Hill Education.
2. Tuckman, B., & Serrat, A. (2023). Fixed Income Securities: Tools for Today's Markets (4th ed.). Wiley.
3. Fabozzi, F. J. (2023). Financial Mathematics: A Comprehensive Treatment (2nd ed.). Wiley.
4. Hull, J. C. (2024). Options, Futures, and Other Derivatives (11th ed.). Pearson.
5. Ross, S. A., Westerfield, R. W., Jaffe, J., & Jordan, B. D. (2022). Corporate Finance (13th ed.). McGraw-Hill Education.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XXX	XXX	XX	XX
CO2	XXX	XXX	XXX	XX	XX
CO3	XXX	XX	XXX	XXX	XX
CO4	XX	XX	XX	XXX	XX
CO5	XXX	XXX	XXX	XX	XXX

MSQF 533: FINANCIAL RISK MANAGEMENT CREDITS: 4

Course Objectives:

- *This paper focuses the basic concept of risk management and expose various types of risk faced*
- *It helps to take positions for investing and trading in options and future market*

Course Outcomes (COs):

CO1: Analyse how futures and forward markets operate and be able to calculate its theoretical prices and values
CO2: Analyse the sources of financial risk and the importance of implementing effective financial risk management
CO3: Evaluate hedging strategies using forwards, futures, options and swaps
CO4: to identify financial risks in currencies, interest rates, commodities and shares
CO5: to evaluate the outcomes of strategies to manage Risk with the help of case Studies

Unit I: Introduction to Risk Management

Introduction to risk management- Sources of risk- risks of commodity investment - risks of equity investment - risks of fixed income investment- risks of currency 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, VAR applications - stress testing, Hedging: liner risk, optimal hedging, hedge ratio as regression coefficient, non-linear risk hedging.

Unit III: Credit Risk Management and

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, Settlement risk.

Unit: IV Management of Financial Risk

Measuring & Managing Interest Rate Risks – Discounted Cash Flow, Time Value of Money, Yield to Maturity, Fixed Term Annuities & Present Value of Basis Point - Measuring & Managing Market Risk – Risk/Return Trade-off, Systematic Risk, Idiosyncratic Risk, Modern Portfolio Theorem & Risk Adjusted Return on Capital (RAROC) - Measuring & Managing Liquidity Risk: Forecasting cash requirements from Cash Flow Analysis - Working Capital Management –

Unit V: Operation & Integrated Risk Management

Measuring & Managing Operational Risk - Brainstorming, SWOT, Root Cause Analysis & Assumption Analysis - Measuring & Managing Credit & Counterparty Risk – Syndication of Credit, Netting of Payments (Cross Collateralization), Third Party Guarantees (Banks) & Credit Derivatives - Measuring Systemic & Sovereign Risk – Assessing Debt/GDP, Debt/Revenue, Debt Servicing, BoP Position and FOREX Reserves & Demographic Profile.

Books for Reference :

1. Crouhy, M., Galai, D., & Mark, R. (2023). *The essentials of risk management* (3rd ed.). McGraw-Hill.
2. Hopkin, P., & Thompson, C. (2022). *Fundamentals of risk management: Understanding, evaluating and implementing effective enterprise risk management* (6th ed.). Kogan Page Ltd.
3. Lee, H. (2021). *Risk management: Fundamentals, theory, and practice in Asia*. Springer Singapore. https://doi.org/10.1007/978-981-16-3467-3
4. Hunziker, S. (2021). *Enterprise risk management: Modern approaches to balancing risk and reward*. Springer Gabler. ISBN: 978-3658335229.
5. Indian Institute of Banking & Finance (IIBF). (2023). *Risk management*. Macmillan.
6. Jorion, P. (2003): Financial Risk Management Handbook, Wiley.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XXX	XX	XX	X
CO2	XXX	XX	XX	XXX	XX
CO3	XXX	XXX	XXX	XX	XX
CO4	XX	XX	XX	XXX	X
CO5	XX	XX	XXX	XXX	XX

MSQF 534: CORPORATE INTERNSHIP AND VIVA CREDITS: 6

Course Objectives:

- *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.*

COURSE OUTCOMEs (COs):

CO1: Demonstrate the ability to integrate academic knowledge with practical applications by undertaking real-world financial tasks in banks, financial institutions, stock markets, investment banks, insurance, merchant banking, or broking firms.
CO2: Apply quantitative, statistical, and analytical techniques learned during the coursework to analyze financial products, services, and markets.
CO3: Develop industry-relevant skills including financial modeling, data analysis, report writing, and business communication through structured internship activities.
CO4: Exhibit professionalism, teamwork, and ethical responsibility by working under the supervision of company and academic guides and adhering to industry protocols.
CO5: Prepare and present a comprehensive internship report and presentation, showcasing key learnings, observations, and contributions made during the internship period.

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.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	XXX	XX	XX
CO2	XXX	XXX	XXX	XX	X
CO3	XX	XXX	XXX	X	XX
CO4	X	XX	XX	XXX	XX
CO5	XX	XX	XX	XX X	XXX

MSQF 535: GLOBAL FINANCIAL MANAGEMENT CREDITS: 4

Course Objectives: The aim of this course is to provide an understanding of the fundamental concepts and managerial issues pertaining to international finance.

Course Outcomes (COs):

CO1: Understand the global financial landscape: Comprehend the roles and functions of international financial institutions and development banks like the World Bank, IMF, and ADB, as well as the process of internationalization.

CO2: Analyze foreign exchange markets and rates: Explain the mechanisms of the foreign exchange market, including spot and forward markets, cross-rates, bid-ask spreads, and apply theories determining exchange rates.

CO3: Manage foreign exchange exposure: Evaluate and manage various types of foreign exchange exposure (translation, transaction, and economic) using different methods and strategies.

CO4: Assess multinational firm's financial management: Analyze foreign direct investment decisions, cost of capital, capital structure, budgeting, cash management, country risk, and international taxation for multinational firms.

CO5: Evaluate international financing operations: Understand the characteristics and instruments of Eurocurrency markets, interest rate and currency swaps, depository receipts (GDR and ADR), and the implications of the Euro for India.

Unit-I

International Finance – overview- International Financial Institutions/Development Banks – World Bank – IBRD – IDA – IFC – MIGA – International Monetary Fund – Special Drawing Rights – Asian Development Bank – Internationalization process.

Unit-II

The Foreign Exchange Market – SWIFT – Arbitrage – Spot market – Forward market – Cross rates of exchange – Bid – Ask spreads – Balance of payments – Foreign exchange rates – Theories of Foreign Exchange Rate.

Unit-III

Foreign exchange exposure and management – Management of translation exposure – Methods – Management of transaction exposure – Management of economic exposure - Methods – Strategies.

Unit-IV

Financial Management of the Multinational Firm – Foreign direct investment – Cost of capital and capital structure of the multinational firm – Multinational capital budgeting – Multinational cash management – Country Risk Analysis – International Taxation.

Unit-V

Financing Foreign Operations – Eurocurrency markets – Instruments – Interest rate swaps – Currency swaps and its pricing – Depository receipts – GDR and ADR – Euro and its implications for India.

Books for References:

1. Buckley, A.(1992): Multinational Finance, Prentice Hall, New Jersy.
2. Levich., R.M (2001): International Financial Markets: Prices and Policies, McGraw Hill, New York.
3. Vij, M.(2001): Multinational Financial Management, Excel Books, New Delhi.
4. Shapiro, A.C.(1996): Multinational Financial Management, Prentice hall of India, New Delhi.
5. Apte, P.G.(1999): International Financial Management, Tata McGraw Hill Publishing Company Ltd.
6. Jain, P.K., et.al (1998): International Financial Management, Macmillan, New Delhi.
7. Eun, C.S. and Resnick, B.G.(2001): International Financial Management,Irwin Mcgraw Hill, Singapore.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	X	X	XX
CO2	XX	X	XX	X	X
CO3	X	XX	XX	X	X
CO4	XX	X	XX	XX	X
CO5	XXX	X	X	XX	XX

MSQF 536: MACHINE LEARNING TECHNIQUES CREDITS: 4

Course Objectives:

- *To provide knowledge of machine learning techniques*
- *This course familiarizes in supervised and unsupervised learning*

Course Outcomes (COs):

CO1: *Learn the basic concepts of machine learning*
CO2: *Understand the various supervised learning methods*
CO3: *Knowledge of unsupervised learning algorithms*
CO4: *Application of dimensionality reduction methods*
CO5: *Study the fundamental concepts of Artificial Neural Network*

Unit I

Data Pre-processing - Different types of variables – Preparing training and test datasets – Missing Value Imputation - Imbalance in categorical data

Unit II

Supervised Learning – Framework of Regression – Model – Loss Function – Logistic Regression – K Nearest Neighbour (KNN) – Naïve Bayes - Tree based models – Decision Tree – Random Forest – Support Vector Machine

Unit III

Unsupervised Learning – Cluster Analysis - Similarity and Dissimilarity measures – Proximity measures - Types of clustering – Hierarchical clustering: Agglomerative methods and Divisive methods – Non-hierarchical clustering: k-means clustering algorithm – Density based clustering - DBSCAN

Unit IV

Dimensionality Reduction - Principal Component Analysis – Singular Value Decomposition (SVD) – Reinforcement Learning – Recurrent Reinforcement Learning - Bagging, Boosting, XGBOOST

Unit V

Artificial Neural networks – Fundamental concepts on neural networks – Activation Function - Multilayer Feedforward Networks – Convolutional Neural Network – Recurrent Neural Network

Books for reference

1. Hao Ni, Xin Dong, Jinsons Zheng, Guangxi Yu (2021), An Introduction to Machine Learning in Quantitative Finance, World Scientific.
2. Mathew F Dixon, Igor Halperin, Paul Bilokon (2020), Machine Learning in Finance: From Theory to Practice, Springer.
3. Saurav Singla (2020), Machine Learning For Finance, BPB Publications.

COs	PO1	PO2	PO3	PO4	PO5
CO1	X	XXX	XXX	XX	X
CO2	XX	XXX	XXX	XX	X
CO3	XX	XXX	XXX	XX	X
CO4	XX	XX	XXX	XXX	X
CO5	XX	XX	XX	XXX	X

SEMESTER IV

MSQF 541 PROJECT WORK CUM INTERNSHIP **CREDITS: 12**

Course Objectives:

- *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.*

Course Outcomes (COs):

C01. Helps to identify the research issues/problems
C02. Learn the nuances of application skills
C03. Develop skills of data collection and analysis
C04. Gives exposure to establish contacts
C05. Prompting critical thinking and reviewing a problem and making report

1. It is an individual compulsory project work offered in IV semester with 12 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 12 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.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	XX	XX	X
CO2	XX	XX	XXX	X	XX
CO3	XXX	XXX	XXX	XX	X
CO4	X	X	XXX	XX	XXX
CO5	XXX	XXX	XX	XXX	XX

Soft Core Papers

MSQF 417: BEHAVIOURAL FINANCE **CREDITS : 3**

Course Objectives:

- *Introducing the participants with fundamental of Behavioural finance*
- *Intends to take them to a stage where they can apply this knowledge in everyday decision making.*

Course outcomes (COs):

CO1: Describe the core concepts of behavioral finance and distinguish it from traditional finance approaches.
CO2: Identify and analyze various cognitive and emotional biases (e.g., loss aversion, overconfidence, anchoring, herding) influencing investor and financial decision-making.
CO3: Apply behavioral theories, such as prospect theory and regret theory, to explain observed financial behaviors and market anomalies.
CO4: Develop strategies to mitigate the impact of biases and heuristics, leading to more rational and informed personal and organizational financial decisions.
CO5: Understand the influence of behavioral factors on different aspects of finance, including investment management, corporate finance, and personal financial planning.

UNIT I: Introduction and Basic Foundations of Behavioural Finance: Introduction to Behavioural Finance: Nature, Scope, Objectives, Rationality, Theories of Behavioural Finance, Criticisms of Behavioural Finance, Traditional finance vs behavioural finance, Arguments in Favour of Behavioural Finance, Basic Foundations of Behavioural Finance, Context of Studying Behavioural Finance, Building Blocks of Behavioural Finance- Limits to Arbitrage, Psychology.

UNIT II: Investors Psychology and Prospect Theory: Investors' Psychology and Investment Decisions: Insufficient diversification, Naïve Diversification, Excessive Trading, The Selling Decision, The Buying Decision; Prospect Theory: Prospect theory model, Applications of Prospect Theory, Limits and Extensions of Prospect Theory, Relevance of Prospect Theory in the Area of Finance.

UNIT III: Regret Theory: Fear of Regret in Finance Decisions, Rationality of Fear of Regret in Financial Decisions, Anticipatory Regret, Minimizing Fear of Regret

UNIT IV: Mental Accounting and Magical Thinking: Mental Accounting, Magical thinking in Finance, Overconfidence in Financial Market, over reaction in Financial Market, Anchoring in Finance, Gambler's fallacy in Investing, Risk Perception.

UNIT V: Miscellaneous Dimensions in Behavioural Finance Herd Behaviour in Finance, Hindsight bias in finance, confirmatory bias in finance, E-Commerce, E-payment and behavioural finance.

Books for Reference

1. Muhsina, M., Mufeeda, & Halimunnisa. (2024). *Behavioural finance*. REDSHINE Publication.
2. Chauhan, R. B. (2024). *Behavioural finance: An investment decision*. Himalaya Publishing House.
3. Kumar, D. S., & Pakutharivu, N. (2023). *Behavioural finance*. Redshie Publication. ISBN: 9789389476200.
4. Cervellati, E. M., Angelini, N., & Stella, G. P. (2024). *Behavioral finance and wealth management: Market anomalies, investors' behavior and the role of financial advisors*. Virtus Interpress.
5. Santos, A. A. P., Sen, M. C., Tas, O., & Ugurlu, U. (2021). *New advances in behavioural finance* (Updated version released 2024). Cambridge Scholars Publishing. ISBNs: 978-1-5275-6907-2, 978-1-0364-1678-2.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	XX	XX	X
CO2	XX	XX	XXX	XX	XX
CO3	XXX	XXX	XX	XX	X
CO4	X	X	XXX	XX	XXX
CO5	XXX	X	XX	XX X	X

MSQF 418: QUANTUM FINANCE CREDITS: 3

Course Objectives:

- *To introduce the foundational concepts of quantum computing and quantum probability and explore their relevance in financial modeling and decision-making.*
- *To equip students with the knowledge to understand, evaluate, and apply quantum algorithms and tools to real-world finance problems such as portfolio optimization, risk management, and derivative pricing.*

Course Outcomes (COs):

C01. Understand core concepts of quantum mechanics as applied to financial theory.
C02. Evaluate quantum vs. classical computational approaches in solving finance problems.
C03. Apply quantum-inspired algorithms to tasks such as portfolio optimization, arbitrage detection, and pricing derivatives.
C04. Interpret the role of quantum probability and entanglement in financial risk modeling.
C05. Explore & assess the practical potential and limitations of quantum computing in industries.

Unit I: Introduction to Quantum Finance and Quantum Computing

What is Quantum Finance - Overview and motivation - Key differences between classical and quantum computing-Basics of quantum mechanics: superposition, entanglement, qubits- Quantum probability vs. classical probability - Implications for financial modeling-Introduction to quantum circuits and gates-Case Study: Why finance is a target domain for quantum solutions

Unit II: Quantum Algorithms and Their Financial Applications

Overview of key quantum algorithms: Grover's algorithm- Shor's algorithm- Quantum Fourier Transform-Quantum Monte Carlo methods- Quantum annealing and D-Wave systems- Applications in finance: fraud detection, arbitrage, option pricing- Simulation of quantum systems for risk modeling

Unit III: Portfolio Optimization with Quantum Techniques

Classical portfolio optimization (mean-variance theory)-Quantum approaches to portfolio optimization-Quadratic unconstrained binary optimization (QUBO)-Ising models in finance-Use of quantum annealers for portfolio selection-Constraint handling in quantum optimization-Tools: D-Wave Ocean SDK, Qiskit Finance

Unit IV: Quantum Machine Learning in Finance

Introduction to Quantum Machine Learning (QML)-Variational quantum classifiers-Quantum support vector machines and k-means-Time series forecasting using QML-Applications in algorithmic trading, credit scoring, and robo-advisory-Hybrid quantum-classical models for finance

Unit V: Future of Quantum Finance and Ethical Implications

Practical limitations of quantum computing in finance (NISQ era)-Noise and decoherence in quantum systems-Quantum cryptography and secure financial transactions-Ethical and regulatory considerations-Industry trends: investment by banks and hedge funds in quantum tech.

Books for Reference:

1. Tsang, R. S., & Grinshpun, A. (2012). *Quantum finance: Intelligent forecasting, trading systems and risk management*. Wiley.
2. Bernhardt, C. (2019). *Quantum computing for everyone*. MIT Press.
3. Nielsen, M. A., & Chuang, I. L. (2010). *Quantum computation and quantum information* (10th Anniversary ed.). Cambridge University Press.
4. IBM Quantum. (n.d.). *Qiskit documentation and tutorials*. Retrieved from https://qiskit.org
5. D-Wave Systems Inc. (n.d.). *Ocean software documentation*. Retrieved from https://docs.ocean.dwavesys.com

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	X	X	XX
CO2	XXX	XXX	X	XX	XXX
CO3	XX	XXX	XXX	X	XX
CO4	XXX	XX	XXX	XXX	X
CO5	XX	X	X	XX	XXX

MSQF 419: MICRO FINANCE AND ENTREPRENEURSHIP MANAGEMENT

CREDITS: 3

Course Objectives:

- *The course aims to provide a comprehensive understanding of microfinance and entrepreneurship, with a focus on India,*
- *to equip individuals with the knowledge and skills for financial inclusion and economic development.*

Course Outcomes (COs):

CO1: Basic understanding about poverty, economic growth and development

CO2: Comprehensive understanding of microfinance, particularly in developing economies

CO3: Emphasize both theoretical understanding and practical application of financial inclusion and economic development using Case Study analysis

CO4: Develop aspiring entrepreneurs by providing them knowledge, skills, and mindset

CO5: To navigate the complexities of starting and managing successful businesses, particularly at microenterprise level

Unit I:

Economics of Poverty - An overview- Economic Growth & Development: Poverty as an impediment of growth - Poverty alleviation measures - Micro finance – Concept – Need, scope, assumptions, Importance -Micro-finance as a development tool – lessons from international experience

Unit II:

Fundamentals of Banking - Social Banking: concept and its relevance in developing countries –Delivering Financial Services to the Poor - Micro-finance delivery Methodology-Legal and Regulatory framework - Governance and Managerial Aspects - Microfinance models and characteristics - Designing a Microfinance Programme. Impact and issues of Micro-finance – Gender sensitivity and focus- Gendered microfinance –concept- worldwide outreach and future direction of Micro-finance- Innovative and creative micro-finance Models-Impact of micro-finance - Emerging issues- impact assessment and social assessment.

Unit III:

Financial products and Services-Revenue models of micro-finance: profitability, efficiency and Productivity-Risk Management-Basics of Banking-Development banking and priority sector lending- Financial accounting and reporting. Micro-finance in India - History, Models, Current Practices and Trends - Indian Financial Sector and Financial inclusion – Micro-finance movement in India –Characteristics of micro-finance in India – Future of micro-finance in India.

Unit IV:

Entrepreneur and entrepreneurship: Characteristics, Functions, Types, Ethics and Social Responsibilities of an Entrepreneur - Entrepreneurship: Importance, Growth and Role of Entrepreneurship in Economic Development– EDPs in India and Social Entrepreneurship-Business Idea Generation and Opportunity Identification: Methods and tools for identifying viable business opportunities and developing innovative ideas-Business Planning and Strategy: Creating comprehensive business plans that include market analysis, competitive strategies, and operational plans for microenterprises-Marketing and Sales for Microenterprises: Strategies for reaching target markets, pricing products and services, and building customer relationships in the micro-business context.

Unit V:

Risk Management for Small Businesses: Identifying, assessing, and mitigating various risks associated with operating a microenterprise-Developing an Entrepreneurial Mindset: Cultivating personal skills and traits essential for entrepreneurial success, such as problem-solving, resilience, and adaptability.

Books for Reference:

1. K.G. Karmakar (2008): Microfinance in India, Sage Publications, India.
2. A. Ramesh Kumar and Moin Qazi (2016): The Essential Microfinance, Notion Press.
3. S. S. Khanka and C. B. Gupta (2022): Entrepreneurship and Small Business Management, Sultan Chand & Sons.
4. Beatriz Armendáriz and Jonathan Morduch (2010): The Economics of Microfinance, 2/e, MIT Press
5. Graham A. and N. Wright (2000): Microfinance Systems: Designing Quality Financial Services for the Poor, The University Press Limited and Zed Books.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	X	XX	X
CO2	XXX	X	XX	XXX	X
CO3	XXX	XX	XX	XXX	XX
CO4	XX	X	XXX	XX	XX
CO5	XX	X	XXX	XX	XX

MSQF 427: RESEARCH METHODS FOR FINANCE CREDITS: 3

Course Objectives:

- *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.*

Course Outcomes (COs):

CO1: Explain the fundamentals of research, including its objectives, significance, and types, with emphasis on social science research.

CO2: Formulate clear and testable research problems and hypotheses using scientific methods.

CO3: Differentiate between various research methods such as case study, survey, deductive, and inductive approaches.

CO4: Design effective research tools like questionnaires and apply appropriate data measurement and scaling techniques.

CO5: Analyze, interpret research data and prepare structured research reports with proper presentation and documentation.

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 study Analysis

Books for Reference:

1. Bhandarkar, P. L., & Wilkinson, T. S. (2023): Methodology and techniques of social research (24th ed.). Himalaya Publishing House.
2. Flick, U. (2020): An introduction to qualitative research (6th ed.). Sage Publications.
3. Kothari, C. R. (2023): Research methodology: Methods and techniques (5th ed.). New Age International Publishers.
4. Kumar, R. (2023): Research methodology: A step-by-step guide for beginners (6th ed.). Sage Publications.
5. Neuman, W. L. (2023): Social research methods: Qualitative and quantitative approaches (8th ed.). Pearson.
6. Panneerselvam. R. (2014): Research Methodology, 2/e PHI, New Delhi
7. Saunders, M., Lewis, P., & Thornhill, A. (2022): Research methods for business students (8th ed.). Pearson Education.
8. Wilkinson T.S. and P.L. Bhandarkar (1994): Methodology and Techniques of social Research, Himalaya Publishing

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	XX	XX	X
CO2	XXX	XX	XX	XX	X
CO3	XXX	X	XX	XX	X
CO4	XX	XXX	XX	X	X
CO5	XX	XXX	XX	XX X	XX

MSQF 428 INVESTMENT AND COMMERCIAL BANKING CREDITS: 3

Course Objectives:

The course intends to introduce the students to the recent developments in the banking sector and equip them to perform the key managerial functions effectively.

Course Outcomes (COs):

CO1: Analyze the impact of liberalization on the Indian banking sector and identify various banking services, risk management techniques, and banking norms.
CO2: Evaluate the role of development banking, including financial, technical, and economic appraisals, social cost-benefit analysis, and supervision systems.
CO3: Describe the characteristics and functions of commercial banking, including credit creation, capital adequacy norms, non-performing assets (NPAs), profitability, cash management, asset-liability management, and debt recovery mechanisms.
CO4: Explain the various aspects of electronic banking, such as ATMs, online banking, RTGS, NEFT, and how technology impacts banking operations and marketing strategies, including positioning and competition.
CO5: Assess the role of bank supervision, bank audits, and accounting standards, including the involvement of banks in insurance through agency contracts

Unit-I
Liberalization in Banking Sector – Banking Services – Risk Management – Bank Norms - Investment banking – activities – potential for investment banking in India - Stock broking.
Unit-II
Development banking – financial appraisal – technical, economic appraisal – Social cost-benefit analysis – guidelines for financing – supervision system.
Unit-III
Commercial banking – characteristics – functions - credit creation – capital adequacy norms – credit appraisal – deposits – assets – investments – NPAs and profitability – cash management – Asset Liability Management - Debt recovery Tribunal and civil suits – alternate dispute resolution methods.
Unit-IV
Electronic banking – ATM – Online banking – RTGS-NEFT-Work Technology. Bank Marketing – Positioning – Competition.
Unit-V
Bank Supervisions and bank audit – Accounting Standards. Banks foray into insurance – agency contracts.

Books for References:

1. Giri, P. S. (2021). *Investment banking*. Himalaya Publishing House.
2. Joshi, V. C., & Kulkarni, L. (2022). *The future of Indian banking*. Springer.
3. Sahni, S. (2020). *Evolution of commercial banking*. LAP Lambert Academic Publishing.
4. Fleuriet, M. (2019). *Investment banking explained: An insider's guide to the industry* (2nd ed.). McGraw-Hill Education.
5. Rosenbaum, J., & Pearl, J. (2022). *Investment banking: Valuation, LBOs, M&A, and IPOs* (2nd ed.). Wiley.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	XX	XX	X
CO2	XXX	XX	XX	XX	X
CO3	XXX	XX	XX	XX	X
CO4	XXX	XX	XX	XX	X
CO5	XXX	XX	XX	XX	X

MSQF 429 INFRASTRUCTURE FINANCE CREDITS: 3

Course Objectives:

- *To identify the sources of infrastructure finance*
- *To know the mechanism of infrastructure finance*
- *To understand the importance of infrastructure finance*

Course Outcomes (COs)

CO1: Understand the concept of infrastructure finance and its importance in economic development.
CO2: Analyze the various sources of infrastructure financing, including Public-Private Partnerships
CO3: Evaluate the financial feasibility of infrastructure projects.
CO4: Understand the role of financial institutions in infrastructure financing.
CO5: Assess the risks and challenges associated with infrastructure financing.

UNIT I: PROJECT FINANCE

Infrastructure finance Vs Project Finance- Evaluation of Private and Commercial Financed infrastructure Projects- Structural Issues- Dissatisfaction with the Performance of Existing PSUs- Lack of Funds with Government

UNIT II:

Concept- Risk Participation- Assistance- types of Guarantees- Contemporary Products- Pricing of Issues- Commercialization.

UNIT III: PRIVATIZATION

Outlook for Infrastructure Projects- Demand for Infrastructure in future- Supply of infrastructure finance- Scope and Avenues- Business and Major Players

UNIT IV: PRODUCTS

Funded and Non-funded- Types- Take Out Products- Tax Implication- Role of FI and Banks- Portfolio of FI and Banks- Skill Required for infrastructure finance- Flow chart of infrastructure Projects.

UNIT V: PROJECT PROCESS

MOU Projects- Types of Projects- BOT – BOOTBOLT- BOO- LROT- RMOT- Concession on Agreement- Key Contracts- EPC- O&M- Financial Closure- Functions of TAMP, CERC, SERC, TRAI- Risk analysis- infrastructure Project appraisal.

Books for Reference:

1. Tirumala, R. D., & Tiwari, P. (Eds.). (2023). *Advances in infrastructure finance*. Springer Nature Singapore Pte Ltd. ISBN: 978-9819904396, 978-9819904426.
2. Pratap, K. V., & Gupta, M. (2024). *Infrastructure financing in India: Trends, challenges, and way forward*. Oxford University Press. ISBN: 0198884931.
3. Abor, J., Macomber, J., Arun, T., & Murinde, V. (Eds.). (2025). *The Routledge handbook of infrastructure finance*. Routledge. ISBN: 1032679298.
4. Bagchi, S. K. (2023). *Project infrastructure finance*. Ane Books. ISBN: 9789380156460.
5. Bartle, J. R. (2023). *Innovative infrastructure finance: A guide for state and local governments*. Springer Nature Switzerland AG. ISBN: 3030914135.

WEB RESOURCES

1. www.iifcl.org/
2. ifmr.ac.in/pdf/workingpapers/21/SourcesInfraFin.pdf
3. www.idfc.com
4. Moneycontrol.com
5. planningcommission.nic.in/reports/genrep
6. www.pppinindia.com/pdf/deepak_parekh_report.pdf
7. www.iimcal.ac.in/.../FINANCING%20INFRASTRUCTURE%20PROJECTS. Pdf

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	XX	XX	XX
CO2	XXX	X	XX	XXX	X
CO3	XXX	XX	XXX	XX	X
CO4	XX	XX	XX	XX	XXX
CO5	XX	X	XX	XXX	X

MSQF 537 BLOCKCHAIN TECHNOLOGY FOR FINANCE CREDITS: 3

Course Objectives:

- *This course provides theoretical as well as practical aspects of blockchain.*
- *It will enable students in understanding the opportunities and challenges in adoption of blockchain technology in different areas of business.*

Course Outcomes (COs):

CO1: Understand the fundamental concepts, technologies, and applications of blockchain.
CO2: Analyze the potential business implications and opportunities of blockchain technology.
CO3: Evaluate the legal, regulatory, and ethical challenges associated with blockchain implementation.
CO4: Develop blockchain-based solutions for business problems and challenges.
CO5: Communicate effectively about blockchain technology to various stakeholders.

UNIT I Blockchain- Definition- Types of blockchain – Blockchain and Traditional data storage systems - Consensus mechanisms - Blockchain applications – Merits of Blockchain Technology to Business – How Blockchain Work - What is a block - Peer to Peer network -Distributed consensus - Public and Private Blockchains - Immutability, Security, Privacy, Antifragility - Security and Safeguards - Challenges in adoption – Scalability problems - Types of Blockchain and Enterprise

UNIT II History of Centralized Services – trusted third party- Smart Contracts- Why is this revolutionary- Comparison to legal - Cryptography- Hashing- Data Integrity- Public vs Private Key - Decentralized Applications - Potential Application In Different Fields - Barriers and potentials for blockchain - Regulation and legal frameworks - Distributed ledger technology - Ethereum Platform - Scalability and distributed ledgers - Consensus Protocols and Byzantine Fault Tolerance (BFT) – cryptocurrencies- Regulation of blockchain - Regulation and Anonymity.

UNIT III Blockchain applications- Industry Applications of Blockchain - Applications in Fintech Regtech and insurtech- Application for banking - Application HRM, Operations, Marketing, SCM- Blockchain for sustainable business - How people are using blockchain - Numerai, DAO, etc. - Lightning networks and plasma – Sidechains.

UNIT IV Digital Rights - Paradigm shift/future/big picture - ownership and accessibility, education - Industry – healthcare – identity - finance - Elections and Voting - Auto execution of contractsBlockchain applied to mobility etc.

UNIT V Development of Blockchain – Pros and cons of different implementations- Use Case - Business Case - Business Model.

Books for Reference:

1. Vira, K. (2024): *Behavioural Finance*. AG Publishing House.
2. Muhsina, M., & Halimunnisa. (2024): *Behavioural Finance*. Redshine Publication.
3. Chauhan, R. B. (2024): *Behavioural Finance: An investment decision*. Himalaya Publishing House.
4. Kumar, D. S., & Pakutharivu, N. (2023): *Behavioural Finance*. Redshine Publication.
5. Cervellati, E. M., Angelini, N., & Stella, G. P. (2024): *Behavioral Finance and wealth management: Market anomalies, investors' behavior and the role of financial advisors*. Virtus Interpress.
6. Santos, A. A. P., Sen, M. C., Tas, O., & Ugurlu, U. (2024): *New advances in Behavioural Finance* , Cambridge Scholars Publishing.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	X	X	XXX
CO2	XXX	X	XX	XX	XXX
CO3	XX	X	X	XXX	X
CO4	XX	XXX	XX	XX	XXX
CO5	XX	X	X	XX	X

MSQF 538 STOCHASTIC CALCULUS FOR FINANCE CREDITS: 3

Course Objectives:

- *To introduce the theoretical foundations of stochastic processes,*
- *To equip students with tools from stochastic calculus, in*

Course Outcomes (COs):

C01. Understand and analyze the convergence of random variables and foundational limit theorems
C02. Model and evaluate discrete and continuous time Markov chains
C03. Interpret and apply Poisson processes
C04. Define and utilize martingales and Brownian motion,
C05. Apply Itô calculus and stochastic differential equations (SDEs)

Unit I:

Convergence of Random Variables, Limit Theorems, Introduction to Stochastic Process, Sample Paths, Discrete Time Markov Chains (DTMC), Transition Matrices, Equilibrium Distribution, Gambler's Ruin problem, Recurrent and Transient States, Continuous Time Markov Chain (CTMC), Forward and Backward Kolmogorov equations

Unit II:

Poisson Processes, Counting Process, Stationary and Independent Increments Property, Inter arrival and Waiting Time Distributions, Nonhomogeneous and Compound Poisson Process

Unit III:

Conditional Expectation, Filtrations, Martingales, Martingale Representation and Convergence Theorem, Stopping Times, Super and Sub Martingales, Brownian Motion as a limit of a Random Walk

Unit IV:

Brownian Motion, Stationary and Independent Increments Property, Reflection Principle, Hitting Times, Brownian motion with Drift, Geometric Brownian Motion, Quadratic Variation of Brownian Motion.

Unit V:

ITO Processes, Ito's Lemma, Ito Integrals, Ito Isometry, Stochastic Differential Equations, applications to Derivative Pricing

Books for Reference:

1. Howard M Taylor and Samuel Karlin (1998), An Introduction to Stochastic Modeling, 3/e, Academic Press.
2. Sheldon M Ross (2010): Introduction to Probability Models, 10th Edition, Academic Press.
3. Martin Baxter and Andrew Rennie (1996), Financial Calculus: An Introduction to Derivative Pricing, 1st Edition, Cambridge University, Press.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	XX	XX	X
CO2	XXX	XX	XX	XX	X
CO3	XXX	XX	XX	XX	X
CO4	XXX	XX	XX	XX	X
CO5	XXX	XX	XX	XX	X

MSQF 539: FINTECH AND SUSTAINABLE FINANCE CREDITS:3

Course Objectives:

- *To equip students with a comprehensive understanding of the evolving landscape where financial technology*
- *To contribute to a future where financial innovation drives environmental, social, and governance goals.*

Course Outcomes (COs):

CO1: Analyze Fintech Ecosystem
CO2: Evaluate Fintech Business Models
CO3: Apply Sustainable Finance Principles
CO4: Assess Fintech's Role in Sustainability
CO5: Identify Fintech Challenges and Opportunities

Unit-I: Overview of Fintech-Definition and Scope of Fintech-Key Technologies in Fintech: AI, Block chain, Cloud Computing, Big Data, IoT-Fintech Ecosystem: Startups, Banks, Investors, Regulators-Evolution and Drivers of Fintech-Historical context of financial systems and technology-Role of Fintech in financial inclusion-Regulatory and policy changes shaping Fintech

Unit-II: Fintech Business Models-P2P Lending, Crowd funding, Digital Wallets-Robo-advisors and Wealth Management-Insurtech and Regtech-Block chain and Crypto currencies -Block chain Basics-Definition and Working of Blockchain-Decentralization, Transparency, and Immutability-Use Cases beyond crypto currencies: Smart Contracts, Supply Chain, etc.

Unit- III: Introduction to Sustainable Finance-Fundamentals of Sustainable Finance-Definition and Importance of Sustainable Finance-Environmental, Social, and Governance (ESG) Criteria-Role of Sustainable Finance in Addressing Climate Change-Green Finance and Impact Investing-Green Bonds, ESG Funds, and Sustainable Investing-Social Impact and Community Investment Strategies-Measurement and Reporting in Sustainable Finance.

Unit-IV: Regulations and Standards in Sustainable Finance-Global Frameworks and Standards (e.g., UN SDGs, EU Taxonomy, PRI)-National and International Regulatory Developments-Financial Reporting and Disclosure for Sustainability. Introduction to Fintech for Sustainable Development-The Role of Fintech in Promoting Sustainable Finance-Fintech Innovations for Green and Impact Investments Crowd funding for Sustainable Projects-Block chain for Transparency in Sustainability Reporting.

Unit-V: Digital Financial Services for Sustainable Development Goals (SDGs)-Financing Renewable Energy and Sustainable Agriculture via Fintech- Challenges and Opportunities-Barriers to Adoption of Fintech in Developing Economies-Ethical and Privacy Issues in Fintech-Future Trends in Sustainable Finance - Barriers to Adoption of Fintech in Developing Economies- Future Trends in Sustainable Finance and Fintech-Fintech-Case Studies: Use of Fintech for Poverty Alleviation and Climate Resilience Challenges and Opportunities.

Books for References:

1. V. Dheenadhayalan, C. Vijai , FinTech, Vijay Nicole Imprints Private Limited
2. Jaspal Singh Financial Technology (FinTech) and Digital Banking in India, New Century ,Publications2022**.**
3. Susanne Chishti and Janos Barberis, The Financial Technology Handbook for Investors, Entrepreneurs and VisionariesWiley; 1st ed . 2016
4. Dirk S and Willem Schramade, Principles of Sustainable Finance , Oxford University Press; 2021

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	XX	XX	X
CO2	XXX	XX	XX	XX	X
CO3	XXX	XX	XX	XX	X
CO4	XXX	XX	XX	XX	X
CO5	XXX	XX	XX	XX	X

MSQF 540: BIG DATA ANALYTICS AND CLOUD COMPUTING CREDITS:3

Course Objectives:

- *To introduce students to the fundamental concepts, tools, and techniques of Big Data Analytics and Cloud Computing, emphasizing their applications in the financial sector.*
- *To develop students' ability to analyze, interpret, and leverage large financial datasets using cloud-based platforms for informed decision-making and strategic advantage*

Course Outcomes (COs):

C01. Explain the core principles and architectures of Big Data and Cloud Computing and their significance in transforming financial services.

C02. Utilize major Big Data technologies and cloud platforms to collect, process, and analyze large financial datasets effectively.

C03. Apply descriptive, predictive, and prescriptive analytics techniques to solve real-world financial problems such as risk assessment, fraud detection, and customer analytics.

C04. Evaluate cloud security, governance, and regulatory issues relevant to financial institutions and implement best practices for compliance and data privacy.

C05. Demonstrate the integration of Big Data analytics with cloud infrastructure by designing and presenting case studies or projects that address practical financial industry challenges.

Unit I: Introduction to Big Data and Cloud Computing

Understanding Big Data: Definition, characteristics (Volume, Velocity, Variety, Veracity, Value)-Importance of Big Data in Finance-Introduction to Cloud Computing: Definition, service models (IaaS, PaaS, SaaS)-Deployment models: Public, Private, Hybrid Cloud-Benefits and challenges of Big Data and Cloud Computing in finance

Unit II: Big Data Technologies and Tools

Big Data architecture and ecosystem-Data storage solutions: NoSQL databases, Hadoop Distributed File System (HDFS)-Data processing frameworks: Hadoop MapReduce, Apache Spark-Data ingestion and integration tools-Overview of data visualization tools relevant for finance

Unit III: Cloud Platforms and Financial Applications

Overview of major cloud platforms: AWS, Microsoft Azure, Google Cloud-Cloud-based analytics services and tools-Cloud security and compliance in financial services-Use cases: Risk management, fraud detection, customer analytics, algorithmic trading-Cloud cost management and optimization for financial institutions

Unit IV: Big Data Analytics Techniques

Descriptive, predictive, and prescriptive analytics-Machine learning basics for finance-Sentiment analysis and natural language processing applications in finance-Real-time analytics and streaming data-Data privacy, ethics, and governance

Unit V: Integration, Case Studies, and Future Trends

Integrating Big Data analytics with cloud infrastructure-Case studies in financial services and fintech-Emerging trends: Edge computing, serverless computing, blockchain integration-Challenges and future directions in Big Data and Cloud for finance-Hands-on project/assignment using cloud-based tools

Books for Reference:

1.Marr, B. (2018). *Big Data in Practice: How 45 Successful Companies Used Big Data Analytics to Deliver Extraordinary Results* (2nd ed.). Wiley.

2.Jagadish, H. V., Lakshmanan, L. V. S., Srivastava, D., & Thompson, K. (2021). *Managing and Mining Massive Data: The Morgan Kaufmann Series in Data Management Systems* (2nd ed.). Morgan Kaufmann.

3.Marinescu, D. C. (2020). *Cloud Computing: Theory and Practice* (2nd ed.). Morgan Kaufmann.

Chen, M., Mao, S., & Liu, Y. (2014). Big Data: A Survey. *Mobile Networks and Applications, 19*(2), 171–209.

4.Rittinghouse, J. W., & Ransome, J. F. (2017). *Cloud Computing: Implementation, Management, and Security* (2nd ed.). CRC Press

5.Witten, I. H., Frank, E., Hall, M. A., & Pal, C. J. (2016). *Data Mining: Practical Machine Learning Tools and Techniques* (4th ed.). Morgan Kaufmann.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	XX	XX	X	XXX
CO2	XX	XXX	XX	X	XXX
CO3	XXX	XXX	XXX	XX	XX
CO4	XX	X	XX	XXX	XX
CO5	XX	XXX	XX	XX	XXX

MSQF 542: FINANCIAL ENGINEERING AND DERIVATIVES CREDITS: 3

Course 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.*

Course Outcomes (COs):

C01. Understand the concept, scope, and significance of financial engineering and its role in modern financial systems.

C02. Explain the structure, functions, and types of financial derivatives and assess their relevance in global markets.

C03. Analyze the mechanics and application of futures contracts and develop hedging strategies using futures.

C04. Apply option pricing models and construct various option trading strategies to manage risk and returns.

C05. Evaluate different types of swap agreements and understand their valuation, mechanics, and associated risks.

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

Unit II: Financial Derivatives

Introduction to 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 Reference

1. Mehrotra, S. (2025). *Financial derivatives and risk management: Derivative strategies*. Pen and Paper Academy. ISBN: 9788198456595.
2. Radhika, R., Balakumar, V., Elayamurugan, S., & Krishnan, C. G. (2025). *Financial risk management and derivatives*. Paradox International Publications.
3. Kumar, S. (2021). *Financial engineering and quantitative risk analytics*. SYBGEN Learning. ISBN: 978-8195131952.
4. Hull, J. (2021). *Options, futures, and other derivatives* (10th ed.). Pearson Education Limited. ISBN: 978-1292410654.
5. Malarvizhi, S. (2024). *Financial derivatives*. Imaginex Inks Publication.

COs	PO1	PO2	PO3	PO4	PO5
CO1	XXX	X	X	X	XX
CO2	XXX	X	XX	X	XX
CO3	XX	XX	XXX	XX	X
CO4	XX	XXX	XXX	X	X
CO5	XX	XXX	XX	XX	X