Honors in Quantitative Portfolio Management   **Semester: VII**

Program: : Computer Science and Engineering (Data Science)

Course: Quantitative Portfolio Management (DJ19DSHN1C3)

Course: Quantitative Portfolio Management Laboratory (DJ19DSHN1L2)

Pre-requisite:
1. Basics of Financial Market and
2. Understanding if Return and Risk, Bonds.
3. Programming with Python

Objectives:
1. To have a practical orientation towards the principles of investment, pricing and valuation.
2. To understand various methodologies and techniques of financial analysis and Portfolio Management.

Outcomes: On completion of the course, the learner will be able to:
1. Analyze the measures of risk and return based on the characteristics of different financial assets and value assets such as stocks and bonds for investment
2. Analyse risk and returns of fixed income instruments and stocks using various models for the purpose of investment.
3. Build and analyse efficient portfolio strategies.
4. Estimate risk and return parameters, and build better diversified portfolios and bond valuation.

Quantitative Portfolio Management (DJ19DSHN1C3)		
Unit	**Description**	**Duration**
1	**Concepts of Portfolio Management:** Introduction to Portfolio Management – Concept of Portfolio and Portfolio Management, Types of Portfolio Management, Role of Portfolio Managers, SEBI Regulations relating to Portfolio Operations. **Expected Risk and Returns:** Portfolio Analysis – Meaning and its Components, Calculation of Expected Return and Risk, Calculation of Covariance, Risk – Return Trade off.	10
2	**Modern Portfolio Theory:** Capital Assets Pricing Model, Overview and Assumptions, Capital Market Theory, Security Market Line and Capital Market Line **Portfolio theory:** Contribution of William Sharpe and Harry Markowitz, Single Index Model, Arbitrage Pricing Theory, Efficient Frontier, Optimal Portfolio.	12
3	**Beyond Diversification:** Limits of diversification, An introduction to CPPI, Simulating asset returns with random walks, Monte Carlo Simulation, Analyzing CPPI strategies, Designing and calibrating CPPI strategies.	08
4	**Portfolio Optimization in Practice:** Naive Diversification, Scientific Diversification, measuring risk contributions, simplified risk parity portfolios, Risk Parity Portfolios, Comparing Diversification Options. **Bond Valuation:** Bond Valuation – Meaning, Measuring Bond Returns – Bond Portfolio Management Strategies	12

5	**Portfolio Revision and Evaluation:** Portfolio Revision – Meaning, Need, Constraints and Strategies. **Portfolio Evaluation:** Meaning, Need, Measuring Returns (Sharpe, Treynor and Jensen Ratios) Foreign Exchange Risk:	10
	Total	**52**

Quantitative Portfolio Management Laboratory (DJ19DSHN1L2)	
Exp.	**Suggested experiments**
	Data Sources: Yahoo Finance, Alpha Vantage, FXCM, OANDA, EOD Historical Data
1	Analysis of returns and risk adjusted returns on a given dataset.
2	Implementation of Modern Portfolio Theory (Efficient frontier) on a given dataset.
3	Implementation of Asset Efficient Frontier on a given dataset.
4	Perform the Max Sharpe Ratio Portfolio on specified data source.
5	Analyzing the plot EW and GMV on the Efficient Frontier on a given dataset.
6	Implementation of Limits of Diversification on a dataset.
7	Perform CPPI and Drawdown Constraints on specified data source.
8	Analyze various Interactive plots of Monte Carlo Simulations of CPPI and GBM.
9	Build a Monte Carlo simulation of coupon-bearing bonds using CIR
10	Compare and analyze the Covariance Estimation for robust estimates

Books Recommended:

Text books:

1. Prasanna Chandra, "Investment Analysis and Portfolio Management", McGraw Hill, 6th Edition, 2021.
2. Donald E. Fischer, Ronald J. Jordan, Ashwini. K. Pradhan, "Security Analysis Portfolio", Pearson Education, 1st Edition, 2018.
3. S. Kevin, "Security Analysis And Portfolio Management", PHI Learning Pvt Ltd, 2nd Edition, 2015.

Reference Books:

1. V.K. Bhalla, "Investment Management", S Chand & Company, 1st Edition, 2008.
2. Saunders. A and Cornett m. M, "Financial Markets and Institutions", McGraw Hill Education, 1st Edition, 2014.

Web Links:

1. Portfolio Management Guide: https://www.managementstudyguide.com/portfolio-management.htm
2. Securities and Exchange Board of India: www.sebi.gov.in
3. Market Action and Analysis: www.moneycontrol.com
4. Stock Portfolio: www.pms.sharekhan.com

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