MA653   Computational Financial Modelling

Credit: 2-1-0-3

Students intended for: Ph.D./M.S./B.Tech.

Prerequisites: Knowledge of at least one of C/C++/MATLAB/R/Spreadsheets Packages, Basic knowledge of Probability, Statistics and Linear Programming.

Elective or Core: Elective

Course objective:

The course aims to provide an introduction to Computational Financial Modelling. Fundamental concepts used in portfolio optimization, technical analysis and financial data modelling would be discussed. The course concept is covered with the help of case studies and simulation with real market data. The limitation of various methods and their failure should be discussed. In the course, student would be able to build understanding and aptitude of analyzing the investment decision based on market data. Students are expected to work and submit a project report on a project on Indian/foreign market data.

Course content:

- Markowitz Theory, Securities Portfolio Selection Model in Crisp and Fuzzy Environment.

  [7 hrs]

- Time series models, Multivariate Volatility Models and Their Applications. Principal Component Analysis.   [8hrs]

- Dow Theory, Introduction to stock analysis using different types of chart, Technical Analysis of financial markets and stock trends, Analysis of chart patterns.   [7hrs]

- Index and stock tracking using soft computing techniques.   [8hrs]

Text books:

Fuzzy Portfolio Optimization, Yong Fang, Kin Lai, Kin Keung Lai, Shouyang Wang, Lecture Notes in Economics & Mathematical Systems, Volume 609, Springer, 2008.

Technical Analysis of the Financial Markets, John J. Murphy, Prentice Hall Press, Jan 1999.

Portfolio Selection: Efficient Diversification of Investments, Harry M. Markowitz, Markowitz, 2nd Edition, John Wiley & Sons, 1991.

Reference Books:

Numerical Methods and Optimization in Finance, Manfred Gilli, DietmarMaringer, Enrico Schumann, Elsevier, 2011.

Technical Analysis, Jack D. Schwager, Wiley, December 1995.

Handbook of Volatility Models and Their Applications, Luc Bauwens, Christian M. Hafner, Sebastien Laurent, John Wiley & Sons, 2012.

Nonlinear Programming, Theory and Algorithms, Mokhtar S. Bazaaraa, Hanif D. Shirali and M.C.Shetty, John Wiley & Sons, New York, 2004.

Business News Channels and websites (Like CNBC Awaz, Zee Business, Bloomberg, moneycontrol.com, yahoofinance.com etc.)