# 0.1 Syllabus for Optimization methods in Finance (MA61061,3-0-0)

- Quadratic Programming and application in Finance(Markowitz models)
- Fractional Programming and application in Finance(Capital Asset Pricing models)
- Multiobjective programming application in finance(Sharpe ratio)
- Linear programming application in finance(MAD, Minmax)
- Integer programming and application in finance(auction and index fund)
- Stochastic programming and application in finance(Value-at-Risk and Conditional Value-at-Risk)

**NOTE:**

PROJECT+ Attendance : 20 Marks

In project you will be provided a research paper and you will implement the methodology of the paper in Indian financial market.

**Books:**

1. Optimization Methods in Finance by Gerad Cornuejols and Reha T , Cambridge University Press.
2. Numerical Methods and Optimization in Finance by Manfred Gilli, Dietmar Maringer, Enrico Schumann. Academic Press.
3. Mean Variance Analysis in Portfolio Choice and Capital Markets by Harry M. Markowitz, Wiley.

## 0.1.1 Self study

1. Linear Programming: Simplex method, Revised simplex method, Artificial variable technique, Dual simplex method.

2. Integer programming: All integer and mixed integer programming technique.

3. Explore financial webpages in connection to financial markets : BSE,NSE , Global markets.

### 0.1.2 Assignment 0 for self study purpose

1. Solve the following linear programming problems manually by suitable linear programming technique.

   (a) Maximize $3x_1 + 2x_2 + 5x_3$ subject to $x_1 + 2x_2 + x_3 \leq 430,\ \ 3x_1 + 2x_3 \leq 460,\ x_1 + 4x_2 \leq 420, x_,x_2, x_3 \geq 0.$

   (b) Maximize $2x_1+3x_2+10x_3$ subject to $x_1+2x_3 = 0,\ \ x_2+x_3 = 1, x_,x_2, x_3 \geq 0.$

2. Use a suitable integer programming technique to solve the integer programming problem

   Maximize $3x_1+3x_2+13x_3$ subject to $-3x_1+6x_2+7x_3 \leq 8,\ \ 6x_1-3x_2+7x_3 \leq 8, 0 \leq x_,x_2, x_3 \leq 5,$ and integers.

3. Explain the following financial terms(Hint: see www.investopedia.com):

   (a) Financial Market, Stock Market, Bond Market, Money Market, Derivative Market, Forex Market.

   (b) Asset, Share, equity, bond, mutual fund, portfolio, return of an asset/portfolio, risk of an asset/portfolio, short selling, Different market indices.

   (c) Explore the webpages like www.bseindia.com, www.nseindia.com

   (d) Try to find the historical data of the any index and any asset from www.bseindia.com or www.nseindia.com