MANGALORE UNIVERSITY
Department of Statistics
MSc Statistics

Soft Core	STS553 : Statistical Finance	No. of credits: 3

Course Outcomes:

CO1:   The ability to model the returns.

CO2:   The ability to understand the basic concepts of financial system.

CO3:   The ability to explain portfolio theory.

CO4:   The ability to understand Black Scholes properties and assumptions.

CO5:   The ability to deal with forward contracts and futures

Unit I

Basic concepts of financial markets and financial systems. Functions of financial markets.

Interest rates, continuous compounding, present value analysis - effective interest rate, present value and future value.

Modeling returns: lognormal model, random walk model, modeling through geometric Brownian motion process.   (10 hrs)

Unit II

Portfolio theory – mean variance portfolio theory. Risk and return, risk free interest rate. One risky asset and one risk free asset. Two risky assets. Sharpe's ratio, tangency portfolio, optimal mix of portfolio. Market portfolio, beta, security market line, and capital asset pricing model (CAPM) and their assumption.

Value at Risk (VaR) – Nonparametric and parametric estimation of VaR , VaR for a derivative and for a portfolio of assets.   (10 hrs)

Unit III

Forward contracts and Futures. Call and put options, European option and American options, short and long positions. Financial derivatives, options, pricing via arbitrage, law of one price. Risk neutral valuation, arbitrage theorem. Risk neutral probabilities- Binomial model, and multi-period model.   (10 hrs)

Unit IV

The Black-Scholes formula and assumptions. Properties of the Black-Scholes option cost. Delta, gamma and other Greeks.

Volatility and estimating the volatility parameter. Implied volatility. Pricing American options. Call options on dividend-paying securities.   (10 hrs)

References:

1. Sheldon M. Ross (2003): "*An elementary introduction to Mathematical Finance*", Cambridge University Press.

2. David Ruppert (2004) *"Statistics and Finance an Introduction"* – Springer International Eddition.

3. John C. Hull (2008) "*Options, Futures and other derivatives*", Pearson Education India.

4. Cuthbertson K and Nitzsche D (2001): "*Financial Engineering - Derivatives and Risk Management*", John Wiley & Sons Ltd.

5. David G Luenberger(1998): "*Investment Science*", Oxford University Press.

6. Paul Wilmott (2000): "*Quantitative Finance*", John Wiley & Sons.