DSE 1.3 Financial Mathematics
Total Marks: 100, Theory:80. IA: 20
Credit: 5+1=6
(L=5, P=0, T=1)

Objectives: After going through this course the students will be able to
- Apply models to financial market
- Ability to use mathematical tools to market economy.

Unit 1:

Contact Hrs:10 hours, Marks:10

Mathematical models in economics: Introduction, A model of the market, Market equilibrium, Excise tax. The elements of finance: Interest and capital growth, Income generation, The Interval of compounding.
[1] Chapters1(1.1-1.4), 4

Unit 2:

Contact Hrs: 10 hours Marks :8

The Cobweb model: How stable is market equilibrium? An example, The general linear case, Economic interpretation.
[1] Chapter5

Unit 3:

Contact Hrs: 10 hours Marks :8

Introduction to optimization: Profit maximization, Critical points, Optimization in an interval.
[1] Chapter 8(8.1-8.3)

Unit 4:

Contact Hrs: 12 hours Marks :12

The derivative in economics: Elasticity of demand, profit maximization, Competition versus monopoly, The efficient small firm, startup and breakeven points.
[1] Chapters 9,10

Unit 5:

Contact Hrs: 10 hours Marks :10

Optimization in two variables: Profit maximization, How prices are related to quantities? Critical points, Maxima, Minima and saddle points, classification of critical points.
[1] Chapter 13

Unit 6:

Contact Hrs: 13 hours Marks :12

Matrix algebra: How to make money with matrices. Linear equations: A two-industry economy. The input-output model: An economy with many industries, the technology matrix.
[1] Chapters15(15.3), 16(16.1), 19(19.1,19.2)

Unit 7:

Contact Hrs: 10 hours Marks :6

Introduction to investment Science: Cash flow, investment and markets, comparison principle, arbitrage, risk aversion. Typical investment problems: Pricing, Hedging, pure investment.
[2] Chapter 1(1.1-1.3)

Unit 8:

Contact Hrs: 15 hours, Marks :14

Basic theory of interest: Principal and interest,compound interest, compounding at various intervals, continuous compounding, present value, present and future values of streams, internal rate of return, Evaluation criteria. The market for future cash: Savings deposits, money market instruments, various bonds, Bond details, Yield, duration, Macaulay duration.

[2] Chapters 2(2.1-2.5), 3(3.1,3.3-3.5)

Text books:

[1] Mathematics for Economics and Finance: Methods and Modelling.
Martin Anthony and Norman Biggs: Cambridge University Press: Reprinted 2009:
ISBN 978- 0 -521 -683197
[2] Investment Science: David G. Luenberger: Stanford University: 1998
ISBN 0 -19-510809 -4
Reference books:
1. An elementary Introduction to Mathematical Finance, S. Ross, 2nd Edition, Cambridge University Press, USA, 2003.