

MTH 201: Business Mathematics I

(BBM)

Credits:3
Lecture Hours: 48

Course Objectives

The course introduces mathematical techniques through examples of their application to economic and business concepts. It also tries to get students tackling problems in economics and business using these techniques as soon as possible so that they can see how useful they are.

The purpose of the course, then, is to present mathematical skills and concepts, and to apply them to ideas that are important to the management students. In addition, the course includes the basics of spreadsheet operations relating to solving equations, systems of equations, quadratic equations, non-linear functions, applications of derivatives, financial mathematics and some numerical methods as well.

Course Contents

Straight lines and Functions, their Applications in Market Analysis, Excel for Linear Functions Simultaneous Equations and Use them in Equilibrium Market Analysis, Quadratic Equations and Economic Applications, Non-linear Functions, Numerical Methods for Solving Nonlinear Equations, their Graphs and Applications, Financial Mathematics, Differentiation and Applications in Marginal Analysis, Derivatives for Economic and Business Applications.

Detailed Course

Unit 1: Straight lines and Functions

6 LHs

Straight lines, Linear functions, Applications: demand, supply, cost, revenue, Elasticity of demand, Supply and income, Budget and cost constraints, Least square method and line of best fit (two variables only), Least square method for time series analysis.

Lab. Work: Introducing Excel, Excel for linear functions.

Unit 2: Simultaneous equations

5 LHs

Simultaneous linear equations, Equilibrium and break-even points, Consumer surplus, Producer surplus and Total surplus, National income and the IS- LM model

Lab. Work: Excel for simultaneous linear equations.

Unit 3: Quadratic Equations

5 LHs

Graphs of Quadratic functions, Quadratic equations, Applications to economics and business;

Lab. Work: Excel for quadratic equations.

Unit 4: Non-linear functions, their graphs and applications**10 hrs**

Cubic and other polynomial functions, Exponential functions, Logarithmic functions, Hyperbolic functions of the form $a/(bx + c)$; Bisection method, Newton-Raphson method for solving nonlinear equations.

Lab. Work: Excel for non-linear functions; Smart math calculator (software): Bisection method, Newton-Raphson method.

Unit 5: Financial mathematics**10 LHs**

Arithmetic and geometric sequences and series; Simple interest, compound interest and annual percentage rates, Depreciation, Net present value and internal rate of return, Annuities, debt repayments, sinking funds; Relationship between interest rates and the price of bonds.

Lab. Work: Excel for financial mathematics.

Unit 6: Limit and Differentiation, Applications of derivatives**12 LHs**

Idea of limit, Limit of algebraic functions at a point and at infinity (basic concept only), Slope of a curve and differentiation, Rules of differentiation (power rule, sum rule, product rule, quotient rule, and chain rule), Differentiation by first principle (algebraic, logarithmic and exponential functions), Differentiation and marginal analysis (marginal cost, marginal revenue and marginal profit), Increasing and decreasing function, Stationary point, Point of inflection, Differentiation of implicit and parametric functions, Economic applications of derivatives for maximum and minimum points, Higher order derivatives (up to 3rd order), Curvature, Elasticity of demand and the derivatives.

Lab. Work: Excel for applications of derivatives.

References

Alpha C. Chiang, **Fundamental Methods of Mathematical Economics**, McGraw-Hill, Inc.

Frank S. Budnick, **Applied Mathematics for Business, Economics, and the Social Sciences**, McGraw-Hill Ryerson, Limited.

G. S. Monga, **Mathematics for Management and Economics**, Vikas Publishing House Pvt. Ltd., New Delhi.

Mike Rosser, **Basic Mathematics for Economists**, Routledge Taylor & Francis Group.

Ronald J. Harshbarger, James J. Reynolds, **Mathematical Applications for the Management, Life, and Social Sciences**, Houghton Mifflin Company.

Srinath Baruah, **Basic Mathematics and its Application in Economics**, Macmillan India.

Teresa Bradley, **Essential Mathematics for Economics and Business**, John Wiley & Sons Ltd.

Vassilis C. Mavron, Timothy N. Phillips, **Mathematics for Economics and Finance**, Springer-Verlag.