

Business Foundations Programme

**Applied Quantitative Methods for Management,
Economics and Finance**

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Course Objective

This mini course is aimed at familiarizing/refreshing participants with the key points of quantitative analysis (algebra, calculus, introduction to probability and statistics) that are needed for the MBA program, particularly in P1 courses such as “Prices and Markets,” “Uncertainty, Data, and Judgment,” and “Financial Markets and Valuations.” The topics we cover include:

- Commonly used functions, graphical representation
- Finding the optimum, solving systems of equations
- Interpreting rates of change, basic derivatives
- Basic probability and descriptive Statistics
- Normal distribution

The course is designed for MBA candidates with a non-mathematical background.

Format

The material is developed and presented from the perspective of a future manager, rather than from the viewpoint of a technician. We will use a combination of lectures, discussions, and exercises (since there is no substitute for learning by doing). There is a set of exercises for every session. You are expected to try at least all non-supplementary exercises before each session, and be ready to discuss them during the class. Solutions to all exercises will be distributed at the end of each class.

In addition, there are mini cases for Sessions 3 and 4. You are expected to do them in groups, and be ready to present and discuss your solutions in class.

Textbooks/Materials

There are **no** required textbooks. All necessary reading is in the course pack, and some material will be distributed in class. The following optional books, available in the library, contain the topics we cover:

1. Bradley, Teresa and Paul Patton, “Essential Mathematics for Economics and Business,” 2003, Joh Wiley & Sons, Inc.
2. Shao, Stephen P. and Lawrence P. Shao, “Mathematics for Management and Finance,” 1998, South-Western College Publishing.

During statistics sessions, we will use R to calculate normal probabilities, other values of interest, and as part of exercises. R is a powerful open-source statistical computing language, but for our purposes all tasks can be accomplished through the web snippet rdrv (<https://rdrv.io/snippets/>) so that you do not need to download or install anything.

Course Schedule

Session 1

Variables, constants

Functions, graphical representation

Inverse functions

Quadratic functions (example: revenue and cost functions)

Polynomial functions

Systems of equations, graphical interpretation (example: market equilibrium)

Reading:

- M.1-M.5 from “Math Review”, Timothy Van Zandt, January 2006.

Assignment:

- Set 1

Session 2

Exponents (basics, rules, application to interest rates)

Exponential functions

Logarithm: inverse of the exponent

Reading:

- Exponential and Logarithmic Functions from “Algebra and Calculus For Business” by Dyckman and Thomas.
- Notes on exponents and logarithms.

Case for Session 3:

- Motorcycle Helmets with Bluetooth (A): Pricing Bluetooth Chips, INSEAD 2009.

Assignment:

- Set 2

Session 3

Logarithmic functions

Exponential and Logarithmic equations

Rate of change of a function

Derivatives

Reading:

- M6-M8 from “Math Review” (in reading for Session 1), Timothy Van Zandt, January 2006.
- “Analytic Methods for Managerial DM” P5-P6, Timothy Van Zandt, January 2006.

Supplementary Reading:

- Chapter 2.3 from “Consumer Choice and Demand”, Timothy Van Zandt, January 2006.

Case for Session 4:

- Motorcycle Helmets with Bluetooth (B): Production, INSEAD 2009.

Assignment:

- Set 3

Session 4

Applications of Derivatives:

Maximum/minimum of a function

Marginal function

Reading:

- Revisit reading for Session 3

Statistics

- Data description: Frequency tables
- Measures of location: Mean, Median and Mode
- Measures of dispersion: Variance and Standard Deviation

Reading:

- Handout for finding summary statistics in R.
- Chapters 2 and 3 from “Basic Statistics”, Spyros Makridakis – take it easy!

Assignment

- Set 4

Session 5

Probability: Normal distribution

Reading:

- Chapter 5.4 (pp.12-15) from “Basic Statistics”, Spyros Makridakis
- Table “Standardized Normal Probabilities”
- Handout for using R to look up (normal) probabilities.

Assignment:

- Set 5