



# Introduction to Quantitative Methods

## General data

Course code:	<i>B19GMK01E</i>
ECTS credits:	<i>signature</i>
Semester:	<i>Fall</i>
Course restrictions:	
Course leader (with availabilities):	<i>Balázs Kovács, <a href="mailto:kovacsb@tkk.pte.hu">kovacsb@tkk.pte.hu</a>, +36 72 501 599/ ext. 23152</i>
Further lecturer(s) (with availabilities):	

## 1. Description and aims

The module aims to provide the students with all the necessary prior knowledge in mathematics. It reviews the topics of high-school Mathematics and embeds for the Quantitative Methods module.

## 2. Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, students should be able to

1. understand and appreciate the key aspects of set theory, algebra and function theory (PILO1)
2. apply compound interest calculations to various fields of business problems (PILO2)
3. perform manual and computer aided calculations and visualize simple relations (PILO3)
4. choose the appropriate function type to describe different business phenomena (PILO4)
5. construct and solve equations and equation systems relating to business problems (PILO3)
6. recognise and understand simple function-like models in economics (eg. Marshall cross) (PILO2)

The remarks in brackets express each CILO's connection to the Program Intended Learning Outcomes (PILOs).

## 3. Content, schedule

The course material will cover the topics as follows.

1. Essentials of Set Theory. Set of Real Numbers and its Subsets, i.e. Natural Numbers, Integers, Rational Numbers, Irrational Numbers. Rules of Algebra for Real Numbers. Number Line. Intervals. Absolute Value.
2. Integer Powers. Fractional Powers. Calculus Rules and Identities for Powers. Compound Interest and Other Business Applications.
3. Polynomial, degree, multivariate polynomial. Polynomial arithmetic (addition, subtraction, multiplication, power). Factorization. Polynomial identities. Arithmetic of algebraic fractions (multiplication, division, simplification, expansion, addition and subtraction). Some Useful Symbols and their Applications, i.e. Summation, Double Summation, Product. Newton's Binomial Formula.
4. Functions. Functions of One Variable. Graphs of Functions. Linear Functions. Quadratic Functions. Polynomials. Power Functions. Exponential Function. Logarithmic function.



5. Inverse of a Function. Characterisation of Elementary Functions with their Graphs. Transformation of Functions.
6. Solving Equations. Linear and Non-Linear Equations. Quadratic Equations. Solution Methods for Systems of Linear Equations with Two Unknowns.
7. Essentials of Mathematical Modelling. Solving Verbally Formulated Problems.

#### 4. Learning and teaching strategy, methodology

*There will be weekly lectures (4 hrs/week). Exercises will be set as the basis for discussion. For all exercises solutions will be provided after the relevant seminar in order to guide students to check their own solution and help them identify their mistakes as well as the missing gaps in their knowledge. The solutions will be supported by applications wherever it is possible. All tests will be organised digitally in a computer room (for each student a unique set of exercises will be generated).*

#### 5. Assessment

##### Formative assessment elements

Formative feedback will be provided throughout this module through the discussion of problems given as homework.

##### Summative assessment elements

Name of the element	Weight	Type	Details	Retake opportunity	Req.*	Related CIOs
Final exam	100%	exam	A digital exam covering the material for the whole semester, 7 problems to be solved	one retake opportunity	yes	1,2,3,4, 5,6

\* Req.: Completion of the element is required to pass the course, irrespective of the performance in other elements.

#### 6. Learning materials

##### Core learning materials

- Handouts (pdf files of exercises, solutions and lecture notes) provided by the lecturers.
- K. Sydsæter, P. Hammond and A. Strøm: Essential Mathematics for Economic Analysis, Pearson Education, 4th edition, 2012.

##### Optional learning material

- E. F. Haeussler, R. S. Paul and R. J. Wood: Introductory Mathematical Analysis for Business, Economics and Life and Social Sciences, Pearson Education, Thirteenth edition, 2011.

#### 7. Further information

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