Mathématique : fonctions de plusieurs variables

Lecturers
Thomas DEMUYNCK (Coordinator), Bram DE ROCK and Luca Paolo Merlino

Course mnemonic
MATH-S201

ECTS credits
5 credits

Language(s) of instruction
French

Course period
First term

Campus
Solbosch

Course content

Functions of several real variables, more precisely:

> properties and topology of IR^n (open and closed balls, convergent sequences, open and closed sets; interior, adherent and accumulation points).

> limits and continuity (properties of limits, continuous image of a compact set).

> partial derivatives (partial differentiability, gradient, Schwarz's theorem).

> differentiability (definition, properties of differentiable functions, sufficient condition for differentiability).

> functions mapping IR^n into IR^m (limits, jacobian matrix, differentiability, composition of functions, the chain rule).

> homogenous functions (homogeneity of partial derivatives, Euler's theorem).

> directional derivatives.

> Taylor expansions.

> convex sets and convex functions.

> implicit function theorems.

> optimization (unconstrained optimization, optimization subject to nonnegativity constraints, to equality constraints (theorem of Lagrange, sufficient conditions, interpretation of Lagrange multipliers), to inequality contraints (theorem of Kuhn and Tucker)).

Objectives (and/or specific learning outcomes)

At the end of the course, students will be abble to apply the mathematical tools which are indispensable for several courses in economics and econometrics.

Pre-requisits and co-requisits

Pre-requisites courses

MATH-S1011 | Mathématique générale : analyse | 5 crédits

Teaching method and learning activities

Theory: ex-cathedra course.

Notes for the theoretical part: slides which are projected (and commented!) during the course.

Exercises: students are divided into groups for exercise sessions.

Exercise booklet divided into 12 lessons, each of which starts by a short reminder of the corresponding theory followed by some solved exercises, plus some proposed exercises (final answers (at least) are provided).

Some solved exams from previous years are available on the "université virtuelle".

During the academic year, assistance is provided.

Contribution to the teaching profile

LG2. Academic mindset

LO 2.2 Display critical thinking, logical and abstract reasoning and develop an independent approach to learning

LG3. Quantitative skills

LO 3.1 Solve standard mathematical problems

LO 3.3 Assess the quality of the a quantitative analysis of an economic problem

References, bibliography and recommended reading

Cours de mathématiques pour économistes, 1989, Philippe Michel, Economica

Mathématiques pour économistes, 1998, Carl P. Simon et Lawrence Blume, ouvertures économiques, De Boeck université

Fundamental Methods of Mathematical Economics, 2005, A.C. Chiang, K. Wainwright, McGraw-Hill Education.

Course notes

Podcast, Syllabus and Université virtuelle

Other information

Place(s) of teaching

Solbosch

Contact(s)

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Evaluation method(s)

Other

Evaluation method(s) (additional information)

A written exam on the theory as well as the exercises takes place during the January exam session.

During the second exam session (August/September), a written exam of the same type as the one organized during the first exam session is organized.

Determination of the mark (including the weighting of partial marks)

The exam is graded out of 20.

Main language(s) of evaluation

French

Programmes

Programmes proposing this course at the Solvay Brussels School of Economics and Management

BA-ECON | Bachelor in Economics : General | option Français/unit 2