**UCLouvain**

# lecge1230
## 2019

# Mathematics in Economics and Management II

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

| 6 credits | 45.0 h + 30.0 h | Q1 |
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| Teacher(s) | Davila Muro Julio ; |
| Language : | French |
| Place of the course | Louvain-la-Neuve |
| Prerequisites | *The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.* |
| Main themes | Education focuses on the approach to modeling, and on solving problems or applications in economics, political and social, using mathematical or formal logic. It aims to develop a systematic analysis and resolution. Part 1: Linear Algebra. Indépendance linear bases, vector spaces. Fundamental theorem of linear algebra. Values and eigenvectors. Diagonalisation. Dynamical Systems. Quadratic forms. Part 2: Analysis and Optimization of functions on several variables functions Théorème implied partial derivative of higher order, Hessienne matrix. Optimization free Optimization under constraints (equalities and inequalities). Applications. Part 3: Introduction to linear programming. Modeling and mathematical formulation of problems of decision support and optimization. Primal Simplex, Dual simplex, economic interpretation of dual sensitivity analysis. Each topic is dealt with examples and illustrations in economics and management. |
| Aims | 1    The second mathematics course is a continuation of Mathematics 1 and is devoted primarily to algebra and matrix calculus, in linear programming and optimization of functions of several variables. We can summarize the objectives and purposes of the course to two key dimensions: - Learning about the mathematical tool (which is directly targeted a set of knowledge). The achievements should be a reasonable ability to handle the concepts discussed in the course, which are the basic concepts used in the models and quantitative methods in social sciences. - The learning of a formalized and rigorous reasoning (which is more difficult to achieve and is more of "knowledge"; of mathematical modeling)<br><br>- - - -<br>*The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".* |
| Evaluation methods | **Due to the COVID-19 crisis, the information in this section is particularly likely to change.**<br>The grade will be determined by a final written examination. Depending on time and availability of rooms, a midterm test could be organised too. |
| Teaching methods | **Due to the COVID-19 crisis, the information in this section is particularly likely to change.**<br>Lectures and exercises sessions |
| Content | Linear Algebra. Multivariate differential calculus. Unconstrained optimisation. Optimisation with equality constraints (Lagrange), with inequality constraints (Kuhn-Tucker). The enveloppe theorem. Interpretation of the multipliers. Linear programs. Duality. Optimisation over an infinite horizon. Euler equation. The transversality condition. Bellman equation. |
| Inline resources | Lecture notes and homeworks for the exercises sessions available on Moodle |
| Other infos | Prerequisite course Mathematics 1 |
| Faculty or entity in charge | ESPO |

## Programmes containing this learning unit (UE)

| Program title | Acronym | Credits | Prerequisite | Aims |
|---|---|---|---|---|
| Bachelor in Philosophy, Politics and Economics | PPE1BA | 6 | LECGE1112 | 🔍 |
| Bachelor in Economics and Management | ECGE1BA | 6 | LECGE1112 | 🔍 |
| Minor in Economics | LECON100I | 6 | | 🔍 |
| Minor in Statistics, Actuarial Sciences and Data Sciences | LSTAT100I | 6 | | 🔍 |