




This learning unit is not open to incoming exchange students!

Teacher(s)	Oikonomou Rigas ;Van Bellegem Sébastien ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	Basic background in mathematics
Main themes	For the mathematics part, the themes of matrix algebra, functions, optimization, and difference/differential equations. For the statistics part: multivariate distributions and related concepts. The two parts are linked in particular by matrix algebra.
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <p>1 The purpose is that students learn the most important mathematical and statistical tools needed for advanced courses in macroeconomics, microeconomics and econometrics. The course serves mostly to refresh students' knowledge in certain topics, and to ensure that all students taking the advanced courses have a common mathe-matical and statistical level.</p>
Evaluation methods	Written exam
Teaching methods	Methods: Lectures and home works
Content	<p>MATHEMATICS</p> <p>Matrix algebra (inverse, rank, derivatives, eigenvalues, diagonalization and factorization, quadratic forms). Metric and topological spaces, vector spaces. Real functions on \mathbb{R}^n (continuity, concavity, differentiability, Taylor expansion, mean value theorem, implicit function theorem). Static optimization (constrained and unconstrained). Difference and differential equations (steady states, stability).</p> <p>STATISTICS</p> <p>1. Data analysis</p> <ul style="list-style-type: none"> • What is a data ? • Fundamental concepts to describe data : distribution, empirical probability, random vector, law of total probability, law of iterated expectation, marginalization, conditioning, independence, missing data • What is a parameter ? <p>2. Geometry of data</p> <ul style="list-style-type: none"> • Vectorial and Hilbert space • The projection theorem • Mean, variance, covariance, correlation, partial correlation (marginal and conditional) • Consistency (Fisher) <p>3. Assumption : the Normal world</p> <ul style="list-style-type: none"> • Continuous random vector, expectation and conditional expectation • Normality : marginal, conditional • Chi2 : Cochran theorem <p>4. Contingency table (Pearson)</p> <ul style="list-style-type: none"> • Data homogeneity • Variable association <p>5. Simplification : the asymptotic world</p> <ul style="list-style-type: none"> • Weak law of large numbers • Central limit theorem (iid)

Faculty or entity in charge	ECON
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Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Economics: Econometrics	ETRI2M	5		
Master [120] in Economics: General	ECON2M	5		