
COURSE NAME	Brush up in <i>Calculus and Linear Algebra</i>
PROFESSOR	Prof. Eulalia Nualart Practicals: Sébastien Willis
PROGRAM	<i>Brush-up Courses 2020-2021 - Master Program in Economics and Master Program in Finance</i>
COURSE OUTLINE	<p>The goal of this course is to review the basic tools of Calculus and Linear Algebra that will be used in the standard courses of the Master programs in Economics and Finance.</p> <p>Part 1: Linear Algebra</p> <ol style="list-style-type: none">1. <i>Vectors and matrices</i><ol style="list-style-type: none">a. Vector spacesb. Subspacesc. Linear transformationsd. Matrices and matrix operations2. <i>Determinants</i><ol style="list-style-type: none">a. Basic rulesb. Inverse of a matrixc. Cramer's rule3. Eigenvalues, eigenvectors<ol style="list-style-type: none">a. Characteristic equationb. Diagonalization of a matrixc. Rank and trace of a matrixd. Spectral theoreme. Quadratic forms <p>Part 2: Calculus</p> <ol style="list-style-type: none">1. <i>Basics</i><ol style="list-style-type: none">a. Limitsb. Continuityc. Differentiation, Taylor's formulad. Integration2. <i>Functions of several variables</i><ol style="list-style-type: none">a. Partial derivativesb. Tangent planesc. Implicit defined functions

- d. Homogenous functions
- e. Implicit function theorem

3. *Optimization*

- a. Unconstrained maximization
- b. Convex and concave functions
- c. The Lagrange multiplier method
- d. The Kuhn-Tucker conditions

4. *Differential equations*

- a. First-order differential equations
 - b. Separable equations
 - c. Linear differential equations
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REFERENCES

- 1 Simon, C.P. and Blume L. *Mathematics for Economists*, Norton, 1994
2. Werner, F. and Sotskov, Y. N. *Mathematics for Economics and Business*. Routledge 2006
3. Sydsaeter, K. and Hammond, P.J. *Mathematics for Economic Analysis*. Prentice Hall, 1995.