

# Syllabus of the Course *MATHEMATICS FOR FINANCE*

Prof. Stefano Patrì

(The date of each lesson is expressed in the form day/month/year)

## 1) Linear Algebra

- 1) Presentation of the Course. Concept of Vector Space: fundamental operations and their properties (18/9/2023)
- 2) Concept of Vector, graphical representation of the vectors and of the operations defining the Vector Space (19/9/2023)
- 3) Linear combinations of vectors, linearly dependent set and linearly independent set of vectors (21/9/2023)
- 4) Concept of dimension and basis of a Vector Space, components of a vector corresponding to a given basis (25/9/2023)
- 5) Vector Subspace, dimension and basis of a Vector Subspace, intersection of Vector Subspaces, sum and direct sum of Vector Subspaces (26/9/2023)
- 6) Overview on algebraic linear systems: rank of a matrix, Rouché-Capelli's Theorem, Cramer's rule, concept of inverse matrix of a square matrix (28/9/2023)
- 7) Change of basis on a Vector Space and its effect on the components of a vector, matrix associated to a change of basis (02/10/2023)
- 8) Scalar product of two vectors, Cauchy-Schwartz inequality, triangular inequality (03/10/2023)
- 9) Orthogonal projection of a vector on a Vector Subspace, least square methods, orthogonal complement of a Vector Subspace (05/10/2023)
- 10) Introduction to the theory of Linear Applications between two Vector Spaces and matrix associated to a Linear Application, composition of Linear Applications and inverse Linear Application, endomorphisms and isomorphisms (09/10/2023)
- 11) Kernel and Image of a Linear Application, dimension and basis of the Kernel and of the Image, theorem on the dimensions of the Kernel and of the Image (10/10/2023)