MATH0101 Linear Algebra for Data Science

Year:	2024–2025
Code:	MATH0101
Level:	5 (UG)
Value:	15 credits (= 7.5 ECTS credits)
Term:	2
Assessment:	The final weighted mark for the module is given by: 85% examination, 15% homework (4 pieces of homework in total).
Normal Pre-requisites:	Grade A in A-level Mathematics
Lecturer:	Dr Luciano Rila

Course Description and Objectives

The aim of this course is to provide an introduction to vectors, matrices, and least square methods, all basic topics in linear algebra, in the context of data science.

Recommended Texts

The recommended texts are: Stephen Boyd and Lieven Vandenberghe, *Introduction to Applied Linear Algebra: Vectors, Matrices, and Least Squares* (Cambridge University Press, 3rd edition) and Gilbert Strang, *Introduction to Linear Algebra* (Wellesley Cambridge Press, 5th edition).

Detailed Syllabus

Vectors: addition, scalar multiplication, inner product.

Linear functions: linear functions, Taylor approximation and regression model.

Clustering: norm, distances, clustering, the k-means algorithm.

Linear independence: linear dependence, basis, orthonormal vectors.

Matrices: matrix operations, inverse matrices, simultaneous linear equations, eigenvalues and eigenvectors

Least squares: least square problem, least square data fitting.

Complex matrices: unitary and Hermitian matrices.