

This course is required for all first year students in the Faculty of Applied Science. It is an introduction to the fundamental concepts of linear algebra and its applications to engineering.

Textbook:

Linear Algebra and Its Applications, Third Edition
by David C. Lay (Pearson)

Instructors: D. Aguilar, W. Burr, S. Hambleton, J. Mingo, H. Salmasian

Evaluation:

Final Examination	55%
Midterm Examinations (3)	45%

Outline:

1. Solving systems of linear equations (and equivalent vector and matrix equations) using row reduction techniques
2. Linear combinations of vectors, span, linear independence, bases, dimension
3. Matrix algebra (matrix multiplication, inverse of a matrix)
4. Subspaces of \mathbb{R}^n (span, lines and planes through the origin, null space and column space of a matrix)
5. Linear transformations (geometric examples, matrix of a linear transformation, combined transformations, inverse transformations)
6. Determinants (formula for 2×2 , cofactor method for larger matrices, relation to invertibility)
7. Eigenvectors and eigenvalues, diagonalization, and applications (discrete dynamical systems)
8. Inner product (i.e. dot product in \mathbb{R}^n), orthogonality, and orthogonal projections
9. Gram-Schmidt process, least squares problems, and application (linear regression, curve fitting)
10. Abstract vector spaces (eg. matrices, polynomials, functions) and linear transformations (eg. derivative transformation)