

Advanced linear algebra



Component

École Nationale
Supérieure
d'Électrotechnique
d'Électronique
d'Informatique
d'Hydraulique
et des
Télécommunications

In brief

- **Amety's Code:** N8EE06B
- **Open to exchange students:** Yes

Presentation

Objectives

To supplement the fundamentals of linear algebra for solving problems arising from signal processing or numerical modelling.

Description

The following topics will be covered

- * Eigenvalue/singular value decomposition:
 - definition, existence, characterisation.
 - Low-rank approximation and link to PCA.
 - Some elements of perturbation theory (related to data uncertainty and finite arithmetic calculation).
 - Main numerical methods for calculating eigenpairs (QR, iterative power and subspace methods, Lanczos/Arnoldi method).
- * Solving systems of linear equations

- characterisation of solutions: inverse, least squares and pseudo-inverse
- some elements of perturbation theory - link with conditioning and finite arithmetic
- main numerical methods for solving linear systems (based on factorisation or iterative methods) fixed point and nested subspace methods
- convergence acceleration principle (preconditioning)

Pre-requisites

basic knowledge of vector spaces and matrix calculus.