

# Probabilities



Component  
École Nationale  
Supérieure  
d'Électrotechnique  
d'Électronique

## In brief

- > **Ametys Code:** N5EM01B
- > **Open to exchange students:** No

## Presentation

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### Objectives

Understand how to define discrete and continuous random variables and the related basic tools (mathematical expectation, probability density function, cumulative distribution function, characteristic function, change of variables)

Understand how to define random vectors and how to compute marginal distributions, conditional distributions, mathematical expectations with a particular interest to the covariance and the correlation coefficient. Understand the different steps required for changes of variables for random vectors.

Understand how standard probabilistic notions simplify for random Gaussian vectors (margins and conditional distributions, affine transformations, independence). Introduce chi-square, Student and Fisher distributions.

Understand the different notions of convergence (in distribution, in probability, in the mean square sense) and the interest of the law of large numbers and the central limit theorem.

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### Description

- Definition of a probability space
- Discrete and continuous random variables
- Random vectors
- Gaussian vectors
- Convergence and limit theorems

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## Pre-requisites

Probability bases (conditional probabilities, theorem of total probabilities, Bayes theorem), Calculus of integrals and series, change of variables, basic elements of linear algebra

## Useful info