Probabilities and Statistics

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

Semester
Printemps

In brief

- **Ametys Code:** N6AE01B
- **Open to exchange students:** No

Presentation

Objectives

This course aims to enable future engineers to build a mathematical model from the observation of a random phenomenon and the collection of experimental or sampling data in hydrology. This process involves researching and selecting the model, precisely adjusting it using observations, and validating it. This model should then allow for a better understanding or analysis of the phenomenon and, where appropriate, lead to decision-making or forecasts. Each model is introduced within an application context related to quality control, reliability, survey sampling, or monitoring of industrial production or an economic factor. Engineers facing such problems in a design office will be able to adapt these models to their specific problem and solve it effectively.

Description

Calculation of the probability of an event during a random experiment; conditional probability; independence.The main univariate models; discrete models: Bernoulli distribution, binomial distribution, Poisson distribution, geometric distribution, hypergeometric distribution; density models: uniform distribution, exponential distribution, gamma distribution, Gaussian distribution, log-normal distribution, Cauchy distribution.Multivariate models; correlation; multinomial distribution, multidimensional Gaussian distribution, Pareto distribution, Cauchy distribution; joint distribution, marginal distributions; independence; change of variables. Tools for model fitting; parameter estimation, unbiased minimum variance estimation, maximum likelihood estimation.

Pre-requisites

Counting. Combinatory. Integration.