Faculty of Sciences

MAT1271   Calculation of probability and statistical analysis

[30h+30h exercises] 6 credits

This course is taught in the 1st semester

Teacher(s):   Rainer von Sachs
Language: French
Level: First cycle

Aims

The general objective of this course is to give an introduction into the concepts of probability theory and statistical analysis and into the most common methods used in practice. At the end of the course the students will be able to: use the basic notions of probabilistic modelling, work with the concept of random variables, apply the most frequent techniques of probability theory (e.g. conditional probabilities and expectation; normal, Poisson and exponential laws), construct and use certain estimators (method of moments, maximum likelihood estimator) and analyse given data by the methods of statistical inference (confidence intervals and hypothesis tests).

Main themes

First part (Probability): Random events, probabilities, conditional probabilities.
Random variables and vectors: most important particular distributions. Independence and correlation. Law of large numbers and Central Limit Theorem.
Second part (Statistical analysis): Estimation of the parameters of a probability distribution. Most important estimation methods and their properties. Application to estimation of a mean, a variance and a proportion. Hypothesis testing relatively to means, variances and proportions. Factor analysis of variance and problems of multiple comparisons. Simple linear regression.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prequisite: Mathematical analysis 1 (and 2), linear algebra

Other credits in programs

MATH12BA	Deuxième année de bachelier en sciences mathématiques	(6 credits)	Mandatory
PHYS12BA	Deuxième année de bachelier en sciences physiques	(5 credits)	Mandatory