UCL Faculté des sciences

SC

SC1200	Statistique en sciences naturelles

[30h+30h exercises] 6 credits

This course is taught in the 1st semester

Teacher(s):   Eric Le Boulengé
Language: french
Level: 1st cycle course

Aims

To lay down the fundamentals of statistical data analysis in the natural sciences, and of statistical inference.
The student is initiated to the theory of probability, the concept of random variable, the principal models of discrete and continuous random variables. He understands the role of sampling and the principles of statistical inference, and applies these to some simple problems.
After completing this course, the student should be able to fruitfully take courses on the application of methods of data analysis and of statistical inference in the various fields of natural sciences.

Main themes

1) Introduction to probability theory and practice.
2) Random variables : concept, types (discrete, continuous, uni- or multivariate), properties of random variables and of functions thereof, principal models.
3) Introduction to statistical inference : theory, applications.
The practical works help the student to test his understanding of the concepts, his ability to apply them, and to revise the methods for the statistical description of samples of data.

Content and teaching methods

1) Introduction : What is statistics ? What is its usefulness in the natural sciences ?
2) Introduction to probability theory : Random experiment, events, axioms of probability, probability and frequency, joint, marginal, conditional, total, composed probabilities, Bayes formula, independence. Illustrations.
3) Random variables : concept, types, properties, functions of random variables, principal probability models of discrete and of continuous variables, introduction to two-dimensional variables, covariance and correlation.
4) Principles of statistical inference : Population and sample, sampling, statistics, sampling distribution, qualities of an estimator, estimation methods, point and interval estimation, hypothesis testing, error risks, power of a test.
5) Introduction to the inference concerning averages : one, two, or several populations (using the Normal or the Student laws or the analysis of variance).
The presentations r

Other credits in programs

BIOL12	Deuxième candidature en sciences biologiques	(6 credits)	Mandatory
GEOG12	Deuxième candidature en sciences géographiques	(6 credits)	Mandatory