

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.




4 credits

25.0 h + 25.0 h

Q2

Teacher(s)	Schtickzelle Nicolas ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	<i>The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.</i>
Main themes	1) Aims of the course, means, support, evaluation. Reminder: bases of statistical inference. 2) Analysis of variance (1, 2 and 3 way): principle, models, tests, comparison of means, concepts of interaction, nesting, fixed or random factor levels. 3) Correlation, simple and multiple linear regression: model, estimation, inference, prediction, model selection with AIC. 4) Analysis of count data: fitting a probability law, two- and three-way contingency tables. 5) Introduction to generalized linear models. 6) Non parametric methods The theoretical lectures and practical works shall rely upon real cases. Practical works will be realized using computer software.
Aims	<p>The student shall understand, and become able to use correctly and critically the principal methods for the statistical analysis of biological and environmental univariate data. He perceives the relationship between experimental design and analysis model and the necessity of planning experiments, and becomes familiar with computer-aided data analysis. After completing this course, the student should master the basic methods for the analysis of univariate data, be able to choose the analysis model and method adapted to the design of simple factorial experiments, to analyse and interpret correctly the results of such experiments. He should be able to progress by himself and follow fruitfully advanced lectures on experimental design and data analysis.</p> <p>-----</p> <p><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i></p>
Evaluation methods	Due to the COVID-19 crisis, the information in this section is particularly likely to change. Open-book written exam for theoretical comprehension of concepts, and open-book practical exam with computer-based R software for the realization and interpretation of statistical analyzes on real datasets.
Teaching methods	Due to the COVID-19 crisis, the information in this section is particularly likely to change. Audience course and practical work in a computer room. The student is encouraged to interactivity for all these activities.
Content	<p>With this course, the student acquires the basic notions and principles of probabilities and statistical inference necessary for the scientific process. At the end of the learning phase, they are able to determine the important characteristics of an experimental design, to select and carry out the appropriate statistical analysis for the analysis of the data, and to interpret the results and possible limitations to the conclusions to be drawn.</p> <p>The course begins with the basics of probability theory. It then details the principles of statistical inference (population vs sample, variables and distributions, sources of variations in the data, hypothesis testing, p-value and type I and II error, confidence interval ...). The main types of basic statistical analysis are detailed and illustrated: t test, ANOVA (1, 2 and 3), correlation and simple linear regression, count data (X^2). The principles of permutation tests are also discussed.</p> <p>The course is complemented by practical work on computer using the software R, which allow the student to carry out in practice all the statistical analyzes discussed.</p>
Inline resources	Course slides and materials for practical work are available on Moodle.
Other infos	A basic knowledge of the R software is required: the student is expected to be able to create and modify R-data sets independently. The course LBIO1282 aims specifically to give the student this knowledge; if he has not followed it beforehand, the student must be trained autonomously in these skills, eg by means of the many resources available online for free.

Faculty or entity in charge	BIOL
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Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Interdisciplinary Advanced Master in Science and Management of the Environment and Sustainable Development	ENVI2MC	4		
Master [120] in Environmental Science and Management	ENVI2M	4		
Master [120] in Statistic: Biostatistics	BSTA2M	4		
Bachelor in Biology	BIOL1BA	5	LMAT1101 AND LMAT1102 AND LBIO1282 AND LBIO1283	