

4.00 credits

30.0 h + 40.0 h

Q2

Teacher(s)	Schtickzelle Nicolas ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	To follow this course, it is necessary to master the knowledge and skills developed in the course LBIO1282
Main themes	This course lays the foundations of the probabilities and statistics necessary for the analysis of biological data. The topics covered are: probability theory, principles of statistical inference and the main types of basic statistical analysis. The practical work will allow practical application using the R software.
Learning outcomes	At the end of this learning unit, the student is able to : • Calculate and interpret the most common indicators of descriptive statistics, including graphs. • Choose the appropriate theoretical distribution to model a random variable. • Demonstrate an understanding of the principles of statistical inference. • Formulate a hypothesis test in terms of null hypothesis and alternative hypothesis. • Choose, perform and interpret a statistical analysis via a basic inference method (t test, analysis of variance, correlation and regression, χ^2).
Evaluation methods	Open book written exam consisting of multiple choice questions, open questions and practical solution of exercises with R software on a computer. The exam is conducted on Moodle, in a computer room on campus. Unless otherwise stated in the exam instructions on Moodle, only the use of the UCLouvain computer in the computer room is authorized to access the exam and electronic documentation and the use of artificial intelligence is prohibited. The final marks having to be rounded to the unit, this rounding is done towards the higher unit if the student has obtained at least 50% of the possible points for the part "questions of theoretical comprehension" and 50% of the possible points for the part "practical resolution of exercises", and towards the lower unit if this is not the case.
Teaching methods	Audience course and practical work in a computer room. The student is encouraged to interactivity for all these activities. The course will be as interactive as possible with the possibility for each student to ask their questions live.
Content	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. 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 (χ^2). The course is complemented by practical work on computer using the software R, which allows the student to carry out in practice all the statistical analyzes discussed.
Inline resources	The course slides and practical work support material are available on Moodle. A full set of courses recorded from a previous year are available on Moodle. Introductory tutorial videos are also available.
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 she/he has not followed it beforehand, the student must be trained autonomously in these skills, e.g. by means of the many resources available online for free.
Faculty or entity in charge	BIOL

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Biology	BIOL1BA	4		
Interdisciplinary Advanced Master in Science and Management of the Environment and Sustainable Development	ENVI2MC	4		
Minor in Biology	MINBIOL	4		
Bachelor in Geography : General	GEOG1BA	4		
Bachelor in Biology, Anthropology and Archaeology	BABA1BA	4		