

Advanced Biostatistics (C003345)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)
Credits 5.0 Study time 150 h Contact hrs 52.5 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	English	Gent	teaching method	hours
			seminar: practical PC room classes	17.5 h
			lecture	30.0 h
			self-reliant study activities	5.0 h
			online lecture	0.0 h
			online seminar: practical PC room classes	0.0 h

Lecturers in academic year 2020-2021

Vangestel, Carl WE11 lecturer-in-charge

Offered in the following programmes in 2020-2021

programme	crdts	offering
Master of Science in Biology	5	A
Exchange Programme in Biology (master's level)	5	A

Teaching languages

English

Keywords

Univariate statistics, general linear models, discrete data analyses, generalized linear models, general linear mixed models.

Position of the course

Students learn how to analyse continuous as well as discrete univariate dependent data using R, a modern statistical software environment.

Contents

The course deals with the analysis of univariate continuous and discrete data (Normal, Poisson and Binomial distributed data). After a short repetition of the properties of these distributions, an overview about the basic estimation procedures is given (least squares, maximum likelihood). In a first section, anova and regression models are reformulated as linear models and the general linear test procedure is discussed in detail. A second section focuses on the analysis of discrete data, including the analysis of frequency tables and generalized linear models. A third section deals with the implementation of random effects in these models (Generalized Linear Mixed Models). Throughout this course, emphasis is on choosing the right statistical model and practical aspects of model building. Within the theoretical framework, a multitude of concrete, biological relevant as well as simulated datasets will be analysed. Besides this theoretically oriented part, practical exercises and a group task form the main part of this course.

Initial competences

The course builds on the spectrum of statistic basic concepts taught in Statistics (Ba2) and Biostatistics (Ba3).

Final competences

- 1 The student is able to develop and interpret complex statistical models for the analysis of continuous and discrete univariate data.
- 2 The student is able to reproduce the statistical results scientifically and to depict

them graphically in an appropriate way.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, self-reliant study activities, seminar: practical PC room classes, online lecture, online seminar: practical PC room classes

Extra information on the teaching methods

In the case of COVID19, the practical implementation of the didactic methods may change if the necessity is imposed upon.

Exercises:

(1) practical classes in which both biological relevant as well as simulated data sets will be analysed using R.

(2) Group work (data sets which can be used to tackle some specific ecological/evolutionary questions). The student has the opportunity to gain more detailed insights in some statistical techniques. Emphasis is on choosing the correct statistical model and interpreting the results correctly.

Learning materials and price

A digital syllabus is available for the theoretical background as well as for the use of statistical software. Cost: 0 EUR

References

Agresti, A. 2002. Categorical Data Analysis. (Second. Ed.). Wiley Series in Probability and Statistics, Hoboken, Belgium.

Neter, J., Kutner, M.H., Nachtsheim, C.J. & W. Wasserman. 1996. Applied linear statistical models (Fourth Ed.) WCB McGraw-Hill, Boston.

Verbeke, G. & G. Molenberghs. 2000. Linear Mixed Models for Longitudinal Data. Springer-Verlag, New York.

Course content-related study coaching

The theoretical background is applied on concrete, biologically relevant examples during practical courses. Near the end of the course, groups of students must prepare a group task. Students are able to ask questions about the group task during the practical courses.

Evaluation methods

end-of-term evaluation

Examination methods in case of periodic evaluation during the first examination period

Oral examination, report

Examination methods in case of periodic evaluation during the second examination period

Oral examination, report

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

In the case of COVID19, the practical implementation of the evaluation methods may change if the necessity is imposed upon.

Theory & exercises: written examination with oral discussion, evaluation of this part will comprise 90% of the total score.

Group task: global group evaluation (written) and individual oral defence, evaluation of this part will comprise 10% of the total score.

During the examination, students are screened for their gained insights into the discussed statistical methods. Theoretical as well as practical questions will be asked. Individual questions related to the group task can be answered during the oral discussion and contribute to the final evaluation. As such, individual scores may differ between members of the same group.

Calculation of the examination mark

A combination of scores obtained on the oral exam (90% of the total score) and group

task (10% of the total score). Only students who submitted the group task before the proposed deadline are allowed to participate on the oral exam.