Applied Statistics (I002756)

Course size — *(nominal values; actual values may depend on programme)*

Credits 5.0   **Study time 150 h**

Course offerings and teaching methods in academic year 2023-2024

A (semester 1)	English	Gent	lecture
			seminar

Lecturers in academic year 2023-2024

Meys, Joris	LA26	staff member
Daly, Aisling	LA26	lecturer-in-charge

Offered in the following programmes in 2023-2024	crdts	offering
Master of Science in Sustainable Land Management(main subject Land and Groundwater Management)	5	A
International Master of Science in Soils and Global Change (main subject Physical Land Resources and Global Change)	5	A
International Master of Science in Soils and Global Change (main subject Soil Biogeochemistry and Global Change)	5	A
Master of Science in Sustainable Land Management(main subject Urban Land Engineering)	5	A
International Master of Science in Agro- and Environmental Nematology	5	A
International Master of Science in Health Management in Aquaculture	5	A
International Master of Science in Rural Development	5	A
Master of Science in Aquaculture	5	A
Master of Science in Food Technology	5	A
Master of Science in Nutrition and Food Systems	5	A
Exchange Programme in Bioscience Engineering: Agricultural Sciences (master's level)	5	A
Exchange Programme in Bioscience Engineering: Food Science and Nutrition (master's level)	5	A

Teaching languages

English

Keywords

Statistics, analysis of variance, regression analysis, statistical inference

Position of the course

In general, the course aims to reach the following end terms:

Knowledge: knowledge on basis statistical data analysis techniques

Skills: the student will be able to translate a research question into a statistical problem, which he/she can solve using basic statistical methods. In particular, these methods are related to the analysis of means (e.g. t-tests, ANOVA) and regression analysis. The student will be capable of performing the data analysis, and of interpreting the results, and he/she will be able to translate these conclusions back to the context of the original research question.

Emphasis is put on the exercises, most of which are on PC with statistical software. The examples and exercises are based on case studies relevant to the students' work environment. In particular, examples are selected from food science, food technology, aquaculture and environmental sciences. The practicals are organised in groups.

Contents

1. Descriptive statistics (means, medians, percentiles, ...)

2. Some common distributions: normal, binomial, multinomial
3. Basics of statistical inference: confidence intervals and statistical hypothesis tests
4. Statistical tests for association in contingency tables
5. Comparison of 2 means (t-test and Mann-Whitney test)
6. Comparison of k means (F-test and Kruskal-Wallis test)
7. Multiple comparison of means (Tukey, Bonferroni,..)
8. 2-way ANOVA and interaction
9. Multiple way ANOVA
9. Simple and multiple regression analysis

Initial competences

A basic knowledge of calculus and probability theory (random variables, probability and distributions) is required.

Final competences

1 The student understands the basics of statistical data exploration and statistical inference.
2 The student can perform basic statistical data analyses using the software R.
3 The student recognises important problems in the study design/analyses and knows how these may affect the conclusions from the statistical data analysis.
4 The student can correctly report the results of a statistical data analysis in a scientific report.

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

Seminar, Lecture

Extra information on the teaching methods

Theory: lectures
Exercises: seminars, including practical PC room classes

Learning materials and price

Slides and course notes are available. Further material is provided through the e-learning platform (Ufora).

References

J. Neter, M. Kutner, C. Nachstheim, W. Wasserman. 'Applied Linear Statistical Models', 5th edition. McGraw-Hill Education, 2005

Course content-related study coaching

During the exercise sessions the students are coached by assistants. Through the electronic learning environment students can exchange questions and answers outside lecture hours among themselves and with lecturers. Individual questions may be answered during a meeting with the lecturer after making an appointment.
Due to the exceptional circumstances related to the coronavirus, online educational activities will also be offered in (a first phase of) the first semester that students can follow from abroad (until they are able to travel to Belgium to follow the on-campus educational activities).

Assessment moments

end-of-term and continuous assessment

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

Written assessment with open-ended questions

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

Written assessment

Examination methods in case of permanent assessment

Skills test

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

Periodic evaluation: 1) written open book exam with open questions (theoretical examination) and 2) written open book exam with the use of R (practical examination). In this way, the

application of the methods in a practical data analysis setting will be evaluated as insight in the statististical background of the methods.
Non-period aligned evaluation: take-home work (quizzes).
In the second evaluation period, there is only a written open book exam with the use of R (so no take-home work).

Calculation of the examination mark

In the first evaluation period, a mark is given from a total of 20 points. 2/20 can be earned with the take-home work. 8/20 can be earned with the written exam on the theoretical part of the course. 10/20 can be earned with the written exam using R, on the practical (programming) part of the course. In the second evaluation period, all points are given on the written exams (so the score of the take-home work is not transferred to the second evaluation period). Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.