GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Biometrics (I630019)

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

Credits 3.0 **Study time 90 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 2)	Dutch	Kortrijk	lecture
			group work
			seminar

Lecturers in academic year 2024-2025

Meys, Joris	LA26	staff member
Luca, Stijn	LA26	lecturer-in-charge

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Bachelor of Science in Bioindustrial Sciences	3	A
Linking Course Master of Science in Bioindustrial Sciences: Circular Bioprocesstechnology	3	A

Teaching languages

Dutch

Keywords

Multivariate data-analysis, multiple linear regression, non-linear regression, logistic regression, one-way and two-way analysis of variance (ANOVA).

Position of the course

This course aims to make students familiar with the analysis of multivariate data by means of appropriate statistical techniques using modern statistical software.

Contents

Introduction to multivariate data-analysis:
(1) **Multiple linear regression:** extension of the simple lineair regression model, least squares estimation and inference, modelling qualitative covariates, effect-modification, polynomial regression, residual analysis, model selection, model building, multicollinearity, detecting outliers, heteroscedasticity.
(2) **ANOVA:** fixed effects and random effects one-way ANOVA, estimation and inference, residual analysis, multiple comparisons, multiple testing problem, Kruskal-Wallis test, fixed effects two-way ANOVA (with and without interaction), randomized block design.
(3) **Logistic regression:** motivation, modelling a binary outcome, estimation and inference.
(4) **Non-linear regression**: motivation , estimation and inference.

Initial competences

Students can only subscribe for this course if the courses "Statistical data analysis and experimental design" were completed in the second Bachelor year (or comparable).

Final competences

1 Understanding and recognizing the basic concepts of statistical inference and the general lineair model in the context of a practical data analysis.
2 Selecting an appropriate statistical technique for a data analysis given a research question.
3 Performing a statistical data analysis supported by statistical software.
4 Interpreting and having insight in the numerical results of a statistical data

analysis.
5 Reporting the results of a statistical analysis in a clear fashion, with corresponding figures and tables, as is typically seen in the scientific literature.

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

Group work, Seminar, Lecture

Extra information on the teaching methods

Theory: lectures
Exercises/practical session: PC-labs in which datasets will be analyzed (linked to the theory) using modern statistical software. The students work under supervision.

Study material

Type: Syllabus

Name: Biometrics
Indicative price: Free or paid by faculty
Optional: no
Language : Dutch
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

References

http://udel.edu/~mcdonald/statintro.html
A. Field. *Discovering Statistics Using SPSS*. SAGE Publications Ltd.
B. Rosner. *Fundamentals of biostatistics* 5th ed, 2000, Duxbury, USA
Johnson, R. A. & Wichern, D. W. (2002). *Applied Statistica Multivariate analysis* (5th Ed.). Upper Saddle River, N.J.: Prentice-Hall.

Course content-related study coaching

During the PC-labs the theoretical background is illustrated and applied to practical examples.
Personal after appointment.

Assessment moments

end-of-term and continuous assessment

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

Written assessment

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

Written assessment

Examination methods in case of permanent assessment

Assignment

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: written open book exam. The knowledge and understanding of the discussed statistical methods and the mathematical concepts underpinning them will be tested during a written exam.
The non-period aligned evaluation in the first exam period consist of a take-home work.

Calculation of the examination mark

First and second examination period: periodic evaluation (counts for **75%**)
Group work: global evaluation (writing a report, counts for **25%**)
To pass this course, the student must complete the exam and the take-home work.
If not, the grades will be adjusted to 'failed'.