Statistics and Probability (C003778)

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

Credits 6.0   **Study time 180 h**

Course offerings and teaching methods in academic year 2025-2026

A (semester 1)	English	Gent	independent work
			lecture
			seminar

Lecturers in academic year 2025-2026

Dukes, Oliver	WE02	lecturer-in-charge

Offered in the following programmes in 2025-2026	**crdts**	**offering**
Bachelor of Science in Computer Science	6	A
Exchange programme Faculty of Sciences (bachelor's level)	6	A

Teaching languages

English

Keywords

Probability, statistics, inference, data analysis

Position of the course

This course builds on the introduction to discrete probability in the course 'Discrete mathematics'. The probability theory is extended to continuously distributed random variables and multivariate random variables. The student learns to build statistical models and to perform statistical analysis on experimental data. The student can design simple studies in a correct and efficient manner. The student learns to use a statistical software package to analyse data appropriately, correctly interpret the output and to report the conclusions in an exact and clear way.

Contents

- Probability theory (Bayes' rule, law of total probability, central limit theorem ...)
- Distributions for continuous random variables in a study population
- Distributions for multivariate random variables and conditional distributions
- Descriptive statistics: basic methods to get insight in univariate and multivariate data structures
- Important characteristics of populations/distributions
- Estimating population parameters, confidence intervals and hypothesis tests
- Computer intensive methods: permutation and bootstrap techniques
- Likelihood methods: estimation and hypothesis testing
- Regression modelling with applications.

Initial competences

The student can fluently work with discrete probabilities and matrix calculus, as obtained from the courses 'Discrete mathematics' and 'Linear algebra and geometry' in the Bachelor Informatics. The student is also familiar with the basic techniques from differential and integral calculus as considered in the courses 'Calculus' in the Bachelor Informatics.

Final competences

1 Understands basic probability theory.

2 Have acquired and correctly apply the principals of data analysis.

3 Correctly build statistical models and apply them on carefully collected data to

answer scientific questions in an appropriate manner.

4 Correctly interpret the results of a statistical analysis.

5 Being able to verify the assumptions underlying a statistical analysis.

6 Report in a clear and correct manner the results of a statistical analysis.

7 Correctly judge which data manipulations are (not) allowed to obtain objective information from the data.

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, Independent work

Study material

Type: Syllabus

Name: Syllabus'
Indicative price: Free or paid by faculty
Optional: no
Additional information: available via Ufora

Type: Slides

Name: Slides'
Indicative price: Free or paid by faculty
Optional: no
Additional information: available via Ufora

References

Çetinkaya-Rundel, Mine, and Johanna Hardin. *Introduction to modern statistics.* OpenIntro, 2021.APA

Course content-related study coaching

Extra support by the lecturer by e-mail or after appointment.
Assistants provide support for the PC-labs.

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

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

• Written examination: 50% closed book, 50% open book.
• 1 midterm test.
Only the exam can be retaken in the summer; the points from the midterm test
from the first semester will be carried over if the student retakes in the summer.

Calculation of the examination mark

The final exam is worth 80% of the grade, the midterm test 20%.