

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 2026-2027

A (semester 1)

English

Gent

seminar

independent work

lecture

Lecturers in academic year 2026-2027

Dukes, Oliver

WE02

lecturer-in-charge

Offered in the following programmes in 2026-2027

[Bachelor of Science in Computer Science](#)

[Master of Science in Bioinformatics\(main subject Systems Biology\)](#)

[Exchange programme Faculty of Sciences \(bachelor's level\)](#)

crdts

offering

6

A

6

A

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 studies the essentials of statistical estimation and inference, including how to estimate a parameter and how to quantify uncertainty in the estimates. They learn to use the software package R to analyse data appropriately, correctly interpret the output and to report the conclusions in an exact and clear way. Focus will be given to applications and examples in computer science.

Contents

- Background (combinatorics, intro. to probability, sample spaces, axioms).
- Conditional probability, Bayes' rule, independence, expectation and variance.
- Discrete random variables and distributions.
- Continuous random variables and distributions.
- Multivariate probability (covariance, correlation, multivariate and conditional distributions).
- Concentration inequalities and limit theorems.
- Descriptive statistics.
- Estimation (properties of estimators, likelihood theory, introduction to Bayes)
- Hypothesis testing and confidence intervals.
- Regression modelling and the bridge to machine learning.
- Computational methods in probability and statistics.

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 of computer science. The student is also familiar with the basic techniques from differential and integral calculus as considered in the courses 'Calculus' in the bachelor of computer science.

Final competences

- 1 Have a solid working knowledge of probability theory.
- 2 Can apply probability to solve problems in computer science.
- 3 Fluent with the mathematical theory behind statistical models, estimation and inference.
- 4 Can estimate statistical parameters, obtain confidence intervals, and perform hypothesis tests in simple contexts. Are able to correctly interpret and report the results. Can critically evaluate the assumptions underlying the analysis.
- 5 Able to use the statistical software R.

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 (gesloten boek).
- 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%.