

## 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 2024-2025**

A (semester 1)

English

Gent

independent work

lecture

seminar

**Lecturers in academic year 2024-2025**

Dukes, Oliver

WE02

lecturer-in-charge

**Offered in the following programmes in 2024-2025**

[Bachelor of Science in Computer Science](#)

**crdts**

6

**offering**

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**

Assignment

#### **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 project assignment.

Only the exam can be retaken in the summer; the points from the project from the first semester will be carried over if the student retakes in the summer.

#### **Calculation of the examination mark**

The exam is worth 90% of the grade, the project 10%.