

Discrete Mathematics (C001893)

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)

Dutch

Gent

seminar

lecture

Lecturers in academic year 2024-2025

De Bruyn, Bart

WE01

lecturer-in-charge

Offered in the following programmes in 2024-2025

[Bachelor of Arts in Moral Sciences](#)

6

A

[Bachelor of Arts in Philosophy](#)

6

A

[Bachelor of Science in Computer Science](#)

6

A

Teaching languages

Dutch

Keywords

combinatorics, discrete probability, algebraic structures, number theory

Position of the course

Discrete Mathematics is the area of mathematics that does not rely on the principle of continuity (as opposed to calculus or analysis). The aim of this course is to introduce a number of counting techniques, to discuss the basics of discrete probability theory and number theory, and to describe the theoretical background for some algebraic structures. In this way, conforming with the general goals for a bachelor degree in computer science, a foundation in discrete mathematics is achieved, which can be applied in other bachelor and master courses in computer science.

Contents

The course is divided in two main parts. The first part "combinatorics and discrete probability" covers subjects such as permutations, ordered and unordered samples with and without repetition, counting principles (product principle, pigeon hole principle, inclusion-exclusion principle), an introduction to discrete probability (including conditional probability, expectation value and variance), and the theory of generating functions and recurrent expressions. In the second part "number theory and algebraic structures" the following subjects are treated: divisibility and prime numbers, modular arithmetic (including the Chinese remainder theorem), and a very short introduction to polynomials and general algebraic structures such as groups and rings.

Initial competences

This course is partly attuned to the item combinatorial counting in college mathematics courses.

Final competences

- 1 The student has the mathematical skills to translate problems from computer science into a mathematical context.
- 2 The student possesses the ability to make structural, abstract and logical reasonings.

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

The teaching method will be blended learning; lectures on theory and tutoring classes will be combined with self-study supported by the standard electronic educational tools. The theory lectures are illustrated with the use of the software package Sage; the knowledge of this package is not part of the course material.

Study material

Type: Syllabus

Name: Discrete mathematics

Indicative price: Free or paid by faculty

Optional: no

Language : Dutch

Number of Pages : 162

Available on Ufora : Yes

Online Available : No

Available in the Library : No

Available through Student Association : No

References

- D. Liben-Nowell. *Connecting Discrete Mathematics and Computer Science*. Cambridge University Press, 2022.
- S. Shahriari. *An invitation to combinatorics*. Cambridge University Press, 2022.
- C. Stein, R. L. Drysdale, K. Bogart. *Discrete mathematics for computer scientists*. Pearson, 2011.
- G. E. Martin. *Counting: the art of enumerative combinatorics*. Springer, 2001.
- L.R. Jaisingh and F. Ayres. *Abstract algebra*. Schaum's outlines. McGraw-Hill, 2004.
- K. H. Rosen. *Elementary number theory and its applications*, 6th edition. Pearson, 2010.
- S. Ross. *A first course in probability*, 9th edition. Pearson, 2012.

Course content-related study coaching

Students can ask questions on the theory and the exercises before, during and after the lectures. Moreover, the use of the discussion forum in the electronic learning environment is encouraged.

Assessment moments

end-of-term 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 with open-ended questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

Periodic evaluation: There will be a written closed book exam for the theory and for the exercises. The evaluation assesses insight, knowledge and skills. For the theoretical part of the exam, certain parts of the lecture notes need to be studied.

Calculation of the examination mark

50% for theory + 50% for exercises.