

## Discrete Algorithms (C003349)

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

**Credits 6.0**

**Study time 165 h**

**Course offerings and teaching methods in academic year 2024-2025**

A (semester 2)

Dutch

Gent

independent work

lecture

seminar

**Lecturers in academic year 2024-2025**

Fack, Veerle

WE02

lecturer-in-charge

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

**crdts**

**offering**

[Master of Science in Teaching in Science and Technology\(main subject Computer Science\)](#)

6

A

[Master of Science in Teaching in Science and Technology\(main subject Mathematics\)](#)

6

A

[Master of Science in Computer Science](#)

6

A

[Master of Science in Computer Science Engineering](#)

6

A

[Master of Science in Mathematics](#)

6

A

**Teaching languages**

Dutch

**Keywords**

Combinatorial problems, algorithms, exhaustive algorithms, heuristic algorithms

**Position of the course**

This course aims at understanding algorithms and data structures designed for investigating discrete structures (such as sets, lists, graphs, codes, designs).

**Contents**

- Generation of combinatorial objects (such as subsets, k-subsets, permutations, partitions, ...) + iterators for such objects (algorithms for successor and ranking)
- Combinatorial algorithms for the generation of discrete structures (such as cliques, vertex covers, interval colorings, Steiner triple systems...), using dynamic programming, backtracking algorithms + pruning techniques (such as branch-and-bound) and metaheuristics
- Discrete algorithms in computational geometry (such as convex hull, line segment intersections, point localisation on a map, triangulations, Voronoi diagrams, ...)

**Initial competences**

Basic knowledge of algorithms and data structures, as covered in the courses Algorithms and Data Structures in the Bachelor in Computer Science.

**Final competences**

- 1 The students know how to use the general techniques of backtracking and heuristic search to discrete problems.
- 2 The students are capable of tackling a new discrete problem independently.

**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: Handouts

Name: Discrete Algorithms

Indicative price: Free or paid by faculty

Optional: no

Available on Ufora : Yes

Online Available : Yes

### **References**

- "Combinatorial Algorithms: Generation, Enumeration and Search", D.L. Kreher en D.S. Stinson (CRC Press, 1999)
- "Computational Geometry: Algorithms and Applications", M. de Berg, O. Cheong, M. van Kreveld, M. Overmars (Springer, 2008, third edition)
- "Algorithm Design", J. Kleinberg and E.Tardos (Pearson, 2006)

### **Course content-related study coaching**

Individual contacts with lecturer, ELO.

### **Assessment moments**

end-of-term and continuous assessment

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

Oral assessment, Written assessment

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

Oral assessment, Written assessment

### **Examination methods in case of permanent assessment**

Oral assessment, Assignment

### **Possibilities of retake in case of permanent assessment**

examination during the second examination period is possible

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

Continuous assessment (50%)

End-of-term evaluation (50%)

Additional requirement for passing: to obtain at least 8/20 for each of both parts. If this requirement is not met, the global score is the least of the two obtained scores.

Students with a score less than 8/20 for the non-periodical evaluation are provided with an additional assignment for the second examination period.