

## Algorithms and Data Structures 2 (C003777)

**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**

Brinkmann, Gunnar

WE02

lecturer-in-charge

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

[Bachelor of Science in Computer Science](#)

**crdts**

6

**offering**

A

[Bachelor of Science in Mathematics](#)

6

A

**Teaching languages**

Dutch

**Keywords**

Algorithm, data structure, efficiency.

**Position of the course**

Acquire more advanced skills in the domain of algorithms and data structures:

- learn to use common design techniques for algorithms;
- get acquainted with advanced implementations of standard data structures;

**Contents**

- Design of algorithms
- Dynamic programming
- Backtracking, branch and bound, game strategies
- Probabilistic algorithms
- Data structures
  - Amortised complexity analysis
  - Variants of linked lists
  - Self-adjusting data structures
  - Balanced search trees
  - Advanced priority queues
  - Representing disjoint sets

(some topics not every year)

**Initial competences**

Being able to apply the contents of the course "Algorithms and Data structures 1".

**Final competences**

- 1 The student can apply advanced design techniques for algorithms and can implement standard data structures efficiently.
- 2 He/she can apply the new knowledge to practical problems and use it also in a research environment.

**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**

Classroom lectures;  
Classroom exercises;  
Lab sessions on PC;  
Electronic teaching environment.

### **Study material**

Type: Handouts

Name: Lecture notes'

Indicative price: Free or paid by faculty

Optional: no

### **References**

Cormen T.E., Leiserson C.E. en Rivest R.L., "Introduction to Algorithms", MIT Press, 1990.  
D. E. Knuth, The Art of Computing Programming, vol I, II, III. Addison-Wesley, 1968-1973.  
Sedgewick R., "Algorithms in Java: Fundamentals, Data Structures, Sorting, Searching", Addison-Wesley, 2003.

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

Student coaching in the classroom exercise sessions and lab sessions on PC.  
Use of an electronic teaching environment.

### **Assessment moments**

end-of-term and continuous 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**

Oral assessment, Skills test, Written assessment with open-ended questions, Assignment

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

examination during the second examination period is not possible

### **Extra information on the examination methods**

Non-periodical evaluation: graded programming project with oral defence.  
The use of generative AI is allowed, but in the oral defense it is evaluated whether all parts are well understood. If not, the project is evaluated as 0 points.

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

Non-periodical evaluation 20% -- periodical evaluation 80%.  
The score for the non-periodical evaluation will be transferred to the second examination period.