

## Algorithms and Data Structures (F000888)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

<b>Course size</b>	<i>(nominal values; actual values may depend on programme)</i>		
<b>Credits</b> 4.0	<b>Study time</b> 120 h	<b>Contact hrs</b>	45.0 h

### Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	Dutch	Gent	project	15.0 h
			seminar: practical PC room classes	15.0 h
			online lecture	0.0 h
			lecture	15.0 h
			online seminar: practical PC room classes	0.0 h
E (semester 1)	English		guided self-study	30.0 h
			project	15.0 h

### Lecturers in academic year 2020-2021

Gailly, Frederik	EB24	lecturer-in-charge
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### Offered in the following programmes in 2020-2021

	crdts	offering
<a href="#">Bachelor of Science in Business Engineering</a>	4	A
<a href="#">Preparatory Course Master of Science in Business Engineering</a>	4	E

### Teaching languages

Dutch, English

### Keywords

program design, UML class diagrams, pseudo-code, algorithms, data structures, recursion, accessing databases

### Position of the course

In this course students get acquainted with the development of software applications. The focus is on learning how data structures and algorithms can be used to solve business problems.

### Contents

- 1 Program design
- 2 Exception Handling
- 3 Files I/O + Databases
- 4 Recursion
- 5 Collections and Data Structures
- 6 Program Analysis

### Initial competences

- 1 Know the concepts of object orientation
- 2 Given a program design, be able to develop a correct implementation in a modern programming language

### Final competences

- 1 Program algorithms and data structures.
- 2 Translate a business problem into a program design
- 3 Solve business problems by designing and implementing:
  - algorithms

- data structures
- 4 Translate the requirements of an IS into a program design and implementation

### 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

Guided self-study, lecture, project, seminar: practical PC room classes, online lecture, online seminar: practical PC room classes

### Extra information on the teaching methods

#### Course session A

The language of this course session is Dutch

##### Lecture

During the lecture more advanced java topics are explained in detail. Specific attention is paid to the design of the program in general and the design of the data structures and algorithms more specific.

##### Seminar: practical PC room classes:

Dodona exercises are available for practicing the newly taught java concepts. Regularly a Q&A session is organized. During these sessions the lecturer is available for questions about the dodona exercises and also for questions related to the programming part of the project.

##### Project:

The Information System project is organised together with the Database Systems course. The goal of this project is the analysis, design and implementation in Java of an information systems that uses a relational database. The project can be divided in two parts:

- Part 1: Analysis Information System + modelling, design and implementation of the relational database
- Part 2: Design, programming and testing of the information system that corresponds to the analysis conducted in part 1 and uses the database implemented in part 1.

#### Course Session E

The language of this course session is English

##### Guided self-study

In the beginning of the semester a specific session is organized for students who follow the course in Python. During this sessions a learning path is introduced. Every module of the learning path contains a link to the relevant chapters in the book, a checklist with useful exercises in the book and a link to an integration exercise on dodona. After finishing a module the students can make an appointment with the lecturer for additional explanation.

##### Project:

The Information System project is organised together with the Business Information Systems course. The goal of this project is the analysis, design and implementation in Python of an information systems that uses a relational database. The project can be divided in two parts:

- Part 1: Analysis Information System + modelling, design and implementation of the relational database
- Part 2: Design, programming and testing of the information system that corresponds to the analysis conducted in part 1 and uses the database implemented in part 1.

### Learning materials and price

#### Course Session A:

- Java: An Introduction to Problem Solving and Programming, 8/E Walter Savitch ISBN-13: 9781783761784
- Study material available on Ufora
  - screencasts
  - videos lectures
  - slides
  - tutorials
- dodona.ugent.be

#### Course session E:

- The Practice of Computing using Python (derde editie)

- Ufora
- slides
- Manuals

## References

### Course content-related study coaching

- ufora.ugent.be
- Java IDE of Python IDE
- dodona.ugent.be

### Evaluation methods

continuous assessment

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

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

Written examination, open book examination

### Examination methods in case of permanent evaluation

Written examination, open book examination, oral examination, assignment, peer assessment, report

### Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

### Extra information on the examination methods

#### Course Session A:

The course evaluation is organized in two modules. After finalizing the course topics an open book exam on PC is organized. This exam evaluates the ability to program new applications with object-oriented programming, with the same level of difficulty as the applications realized during the theoretical part and computer practice.

The second part of the course focuses on the project. This evaluation corresponds to an integrated evaluation for the course Database Systems and Algorithms and Data Structures. The evaluation of the projects focus on the ability of students to independently and in group create an information system.

#### Course Session E:

- Open book exam on PC during the exam period
- Project with deadline during the second exam period

For the project part, a second change is only possible in modified form. In case the student does not pass the project but passes the PC exam, he or she only needs to retake the alternative assignment during the second examination period.

### Calculation of the examination mark

The examination mark is determined by adding up the results of the PC-exam and project. Both parts result in points on 20 that are recalculated to points on 10 which results in a final examination mark on 20.

- The examination mark for the open book examen (on 20) is recalculated to a mark on 10
- The examination mark for the projec (20) is recalculated to a point on 10. The points for the project are determined as follows. The project is part of an integrated evaluation for two course: Algorithms and Datatstructure + Database Systems. The students will receive for every course a seperate mark that starts from a shared basis. Based on the project the student get a mark on 20 for Algorithms and Data structures and a mark on 20 for Database Systems. This mark is determined for 30% by a common groupevaluation that consists of a peer assessment, an oral presentation and defense of the project, and the report. The other part (70%) is determined specific for every course based on the content. For this course the focus lies on program design, code en testing.

### Facilities for Working Students

No participation in the project is required. Instead the students prepare a computer exam.