

## Embedded Systems: Algorithms (E735020)

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.

Course size (nominal values; actual values may depend on programme)  
Credits 3.0 Study time 90 h Contact hrs 36.0 h

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

A (semester 1)	Dutch	Gent	lecture	24.0 h
			seminar: coached	12.0 h
			exercises	

### Lecturers in academic year 2020-2021

Veelaert, Peter TW07 lecturer-in-charge

### Offered in the following programmes in 2020-2021

	crdts	offering
<a href="#">Master of Science in Electronics and ICT Engineering Technology (main subject Electronics Engineering)</a>	3	A
<a href="#">Master of Science in Electronics and ICT Engineering Technology (main subject ICT)</a>	3	A
<a href="#">Exchange Programme Electronics and ICT Engineering Technology</a>	3	A

### Teaching languages

Dutch

### Keywords

Graph algorithms, dataflow graphs, embedded systems, testability

### Position of the course

The course continues the study of digital design and embedded systems. The emphasis is on the design and the implementation of algorithms on embedded systems, and on a some basic techniques for system design.

### Contents

1. Algorithms and complexity. Turing machines. NP-complete.
2. Graph Algorithms
3. Matching and search algorithms
4. Calculation of mathematical functions: numerical precision, convergence of Newton's method, Cordic
5. Sort Algorithms in software and hardware
6. Fast Fourier Transform
7. Dataflow graphs (DFGs)
8. Design for testability, error excitation and propagation, generation of pseudo-random test patterns, verification and response compaction

### Initial competences

Familiarity with embedded systems, algorithms, and Fourier analysis

### Final competences

- 1 To be familiar with the concepts of algorithmic complexity, Turing machines, NP-complete and undecidability
- 2 To use data flow graphs as a design methodology
- 3 To design, evaluate and optimize of algorithms for embedded systems
- 4 To design digital systems taking into account testability

### 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

Lecture, seminar: coached exercises

#### Learning materials and price

Lecture notes and lab assignments available on the electronic learning environment

#### References

#### Course content-related study coaching

The lecturer is during and after the lectures available for explanation. There is guidance during the exercises. Individual explanations are possible by appointment.

#### Evaluation methods

end-of-term evaluation and continuous assessment

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

Oral examination

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

Oral examination

#### Examination methods in case of permanent evaluation

Written examination with open questions, open book examination

#### Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

#### Extra information on the examination methods

For the theoretical part there is an oral examination with closed book. The exam is prepared in writing.

For the practical part, a number of assignments are submitted during the semester and a final report with a demo of the project work is expected.

#### Calculation of the examination mark

Theoretical part: 2/3

Practical part: 1/3