

Embedded Systems: Algorithms (E735020)

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

Credits	3.0	Study time	90 h	Contact hrs	36.0 h
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Course offerings and teaching methods in academic year 2020-2021

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

Lecturers in academic year 2020-2021

Veelaert, Peter	TW07	lecturer-in-charge
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Offered in the following programmes in 2020-2021

	crdts	offering
Master of Science in Electronics and ICT Engineering Technology (main subject Electronics Engineering)	3	A
Master of Science in Electronics and ICT Engineering Technology (main subject ICT)	3	A
Exchange Programme Electronics and ICT Engineering Technology	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

Group work, 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.

The project must be defended with a final presentation. Part of the assessment is based on the individual contribution of each student during the implementation of the project.

Calculation of the examination mark

Theoretical part: 2/3

Practical part: 1/3