GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2023-2024

Embedded Systems: Microcontrollers (E731018)

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 2023-2024

A (semester 2)	Dutch	Gent	lecture
			practical
			independent work

Lecturers in academic year 2023-2024

Shahid, Adnan	TWO5	staff member
Van Torre, Patrick	TWO5	lecturer-in-charge

Offered in the following programmes in 2023-2024	**crdts**	**offering**
Bachelor of Science in Engineering Technology(main subject Electromechanical Engineering Technology)	6	A
Bachelor of Science in Engineering Technology(main subject Electronics and ICT Engineering Technology)	6	A
Master of Science in Electromechanical Engineering Technology	6	A
Linking Course Master of Science in Electrical Engineering Technology(main subject Automation)	6	A
Linking Course Master of Science in Electrical Engineering Technology(main subject Electrical Engineering)	6	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject Electronics Engineering)	6	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject Embedded Systems)	6	A
Linking Course Master of Science in Electronics and ICT Engineering Technology(main subject ICT)	6	A

Teaching languages

Dutch

Keywords

Embedded systems, Microcontrollers, ARM

Position of the course

To introduce the students to Embedded Systems, including general aspects, the use and design of such systems. Practical programming exercises in the lab.

Contents

o Structure, characteristics and examples of embedded systems
o ARM Cortex microcontrollers: architecture and instruction set
o I/O ports
o Software design basics
o Interrupts
o Timers
o Serial communication
o Analog interfacing
o ARM Cortex CPU details
o Link between C and assembler code
o Energy efficiency and optimization techniques
o Artificial Intelligence

Initial competences

This course unit builds on certain course competencies/learning outcomes of course units Informatics, Programming, Analog and Digital Electronics

Final competences

1 To be able to program C applications for embedded systems.
2 Analyse basic and advanced processor architectures.
3 To be able to develop applications on embedded systems.
4 Assimilate, implement and use existing and new technologies concerning Embedding systems.

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, Practical, Independent work

Extra information on the teaching methods

Theory: Lectures. A book is used and slides are availables on Ufora.
Independent homework: Every student receives a complete kit to performing programming exercises at home, allowing testing and debugging of code on hardware. A number of practical assignments provide a general intruction to various aspects of embedded systems programming in C.
Lab sessions: online coaching is provided for the above exercises.

Learning materials and price

Book

References

Embedded Systems Fundamentals with Arm Cortex-M based Microcontrollers: A Practical Approach
Dr Alexander G. Dean
ISBN 978-1-911531-03-6

Course content-related study coaching

Individual contact

Assessment moments

end-of-term and continuous assessment

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

Written assessment

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

Written assessment

Examination methods in case of permanent assessment

Participation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

Theory: written exam
Lab:lab reports, participation in case of teamwork

Calculation of the examination mark

Theory: 67%, Practical part: 33%
In case of no participation in the practical sessions a score of zero is assigned for this part.
First and second exam period: in order to pass the course a minimum mark of 8/20 should be obtained for the theory part as well as for the lab course. In case this condition is not fulfilled, a final mark of 10/20 or more is reduced to 9/20.