

Technology of Integrated Circuits and Microsystems (E031420)

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 6.0 Study time 180 h Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2020-2021

Offering	Language	Location	Teaching Methods	Hours
A (semester 1)	Dutch	Gent	self-reliant study	30.0 h
			activities project	30.0 h
B (semester 1)	English		lecture	45.0 h
			seminar: coached	5.0 h
			exercises	
			project	5.0 h
			excursion	5.0 h

Lecturers in academic year 2020-2021

Op de Beeck, Maaïke	TW06	lecturer-in-charge
Vanfleteren, Jan	TW06	co-lecturer

Offered in the following programmes in 2020-2021

Programme	crdts	offering
Bridging Programme Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)	6	B
Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)	6	B
Master of Science in Electrical Engineering	6	A

Teaching languages

Dutch, English

Keywords

cmos, fabrication, mems, microsystems, technology, PCB

Position of the course

The purpose of this course is to acquaint students with the various technologies for the realization of integrated circuits, printed circuit boards, microfluidic systems and microelectromechanical systems (MEMS). First, the different fabrication technologies are described that serve as the basis for any advanced micro-and nanotechnology (deposition, lithography, etching ...), followed by the realization of different microsystem components (cmos chips, microfluidic components, MEMS and chip packages) and interconnection systems (printed circuit boards, flexible and stretchable electronics)

Contents

- Basic technology steps: deposition, lithography, etching, laserstructuring, ...
- Microsystem components: cmos chips, microfluidic components, MEMS and chip packages
- Advanced integrated microsystems: electrical PCB's, optical PCB's, flexible & stretchable microsystems
- Practicum : clean room visit and exercises
- Literature paper study

Due to COVID19 it is possible that the course content regarding the practical session needs to be adjusted.

Initial competences

Basic knowledge physics, chemistry and electronics

Final competences

- 1 detailed knowledge on microsystems process steps
- 2 basic knowledge on different types of microsystems
- 3 insight in the physics of microfabrication
- 4 practical experience in cleanroom laboratories. COVID19: the cleanroom visit will be replaced in AY 20-21 by a dedicated educational movie showing cleanroom activities, due to the Coronacrisis.
- 5 analysis and synthesis of a scientific article
- 6 writing of a scientific report

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

Excursion, lecture, project, self-reliant study activities, seminar: coached exercises

Extra information on the teaching methods

Classes: due to the Coronacrisis, an important part of the classes will be replaced by knowledge clips followed by an interactive Q&A session.
Demonstration : clean room visit: due to the Coronacrisis, this visit will be replaced by a dedicated educational movie showing cleanroom demonstrations. Students will get questions about the demonstrations, to be answered in a report (group activity).
Excursion : company visit: due to the coronacrisis this visit is cancelled for AY 20-21
Individual work : literature study
project: in small groups critical reading and judgements of statements about microfabrication, followed by presentation/discussion of the judgements to/with all students

Learning materials and price

handouts of class room lecture presentations; selected scientific publications for self study and for project

References

- S. Franssila : "Introduction to Microfabrication", 2nd edition, Wiley, 2010
- M. Madou : "Fundamentals of Microfabrication", 3rd edition, CRC Press, 2011

Course content-related study coaching

Personal contact with 2 professors; interactive support through the electronic learning platform

Evaluation methods

end-of-term evaluation

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

Open book examination, oral examination, participation, report

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

Open book examination, oral examination, participation, report

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Periodic evaluation: answer questions regarding course material using handouts (open book); understand and explain 1 scientific article.
Oral examination, open book, no preparation time.

Calculation of the examination mark

Evaluation during examination period (max. score is 90% of the total score)
For the report regarding questions related to the cleanroom recording, a maximum of 10% of the total score can be earned.