GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2023-2024

Technological Processes for Photonics and Electronics: Laboratory (E030890)

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

Credits 4.0 **Study time 120 h**

Course offerings in academic year 2023-2024

A (Year)	English	Gent
B (Year)	Dutch	Gent

Lecturers in academic year 2023-2024

Roelkens, Günther	TW05	lecturer-in-charge

Offered in the following programmes in 2023-2024	**crdts**	**offering**
Bridging Programme Master of Science in Photonics Engineering	4	A
Master of Science in Photonics Engineering	4	B
Master of Science in Photonics Engineering	4	A

Teaching languages

English, Dutch

Keywords

Photonics, lab work, clean room, fabrication, technology, lithography, etching, deposition, design and CAD.

Position of the course

Please mark: this course has a numerus clausus. The number of students admitted to this course per academic year is limited to 9, with 4 places for Ghent University students and 4 places for students from VUB. The students are selected on a random basis. Prospective students must subscribe to the course via Ufora no later than September 20 (12:00 pm): register in Ufora for this course and subscribe in groups (following the instructions in the announcement of the course). After that, the 9 places will be assigned randomly to the students who have subscribed to the course before this deadline. If there are not enough subscriptions for the 4 places per university, the remaining spots will be allocated to the other university. The 9th place is randomly selected from the entire group. The list of selected students will be published no later than September 23.
The faculty's student administration organises the random selection. The students must comply to the initial competences of the course.
This course consists of a series of lab exercises and small projects aiming at learning the student how to carry out work in a lab and cleanroom environment in an independent way. The exercises are carried out in small groups (3 persons). The course follows a course that describes the physics of technological processes in a theoretical way and makes the student familiar with standard fabrication technologies for photonic and semiconductor devices.In the first part individual process modules are studied. In the second part students work towards a larger project combining design, CAD, fabrication (using first semester process modules) and characterisation.

Contents

* Introduction: Safety
* Lithography
* Etching technology: Wet Etching, Dry etching (plasma etching)
* Deposition: Metallization, Dielectrica
* Characterisation technologies: Electron microcopy, Profilometry, Ellipsometry
* Bonding: Waferbonding

* Maskdesign
* Oxidation technologies
* Characterisation techniques (SEM,AFM, ellipsometry)
* Design and fabrication of own device

Initial competences

Course physics of technological processes or similar

Final competences

1 Safely entering a cleanroom and carrying out research in a cleanroom environment.

2 Carry out basic steps for the fabrication of semiconductor devices such as lithography, etching, deposition, bonding.
3 Designing a fabrication flow for a photonic device.
4 Using advanced mask software for creating gds-files.
5 Independently fabricating a semiconductor component.

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

Practical

Extra information on the teaching methods

Part 1: lab exercices in small groups (2-3 persons), learn basic processing skills (lithography, etching, deposition...)
Part 2: individual project - design of photonic IC, preparation of processing scheme, processing in cleanroom, characterisation

Learning materials and price

Syllabus (English), elektronic (frees)
References

References

Course content-related study coaching

Assessment moments

end-of-term and continuous assessment

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

Oral assessment, Assignment

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

Assignment

Examination methods in case of permanent assessment

Participation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

Project is evaluated on the basis of report and oral discussion of report

Calculation of the examination mark

50% lab exercises, 50% project report