

## Technological Processes for Photonics and Electronics: Laboratory (E030890)

<b>Course size</b>	<i>(nominal values; actual values may depend on programme)</i>		
<b>Credits</b> 4.0	<b>Study time</b> 120 h	<b>Contact hrs</b>	45.0 h

### Course offerings in academic year 2022-2023

A (year)	English	Gent
B (year)	Dutch	Gent

### Lecturers in academic year 2022-2023

Van Thourhout, Dries	TW05	lecturer-in-charge
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### Offered in the following programmes in 2022-2023

	crdts	offering
<a href="#">Bridging Programme Master of Science in Photonics Engineering</a>	4	A
<a href="#">European Master of Science in Photonics</a>	4	A
<a href="#">Master of Science in Photonics Engineering</a>	4	B
<a href="#">Master of Science in Photonics Engineering</a>	4	A

### Teaching languages

Dutch, English

### Keywords

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

### Position 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 (2-3 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, Dielectrics
- \* Characterisation technologies: Electron microscopy, 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**

Practicum, project

### **Extra information on the teaching methods**

Part 1: lab exercises 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), elektronisch (gratis)

References

### **References**

### **Course content-related study coaching**

### **Evaluation methods**

end-of-term and continuous assessment

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

Oral examination, report

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

Report

### **Examination methods in case of permanent evaluation**

Participation, report

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

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