

## VLSI Technology and Design (E031440)

**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 2024-2025**

A (semester 1)	English	Gent	lecture
B (semester 1)	Dutch	Gent	

**Lecturers in academic year 2024-2025**

Doutreloigne, Jan TW06 lecturer-in-charge

**Offered in the following programmes in 2024-2025**

	<b>crdts</b>	<b>offering</b>
<a href="#">Bridging Programme Master of Science in Electrical Engineering(main subject Electronic Circuits and Systems )</a>	6	A
<a href="#">Master of Science in Electrical Engineering (main subject Communication and Information Technology )</a>	6	A
<a href="#">Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)</a>	6	A
<a href="#">Master of Science in Electrical Engineering</a>	6	B
<a href="#">Master of Science in Photonics Engineering</a>	6	A

**Teaching languages**

English, Dutch

**Keywords**

VLSI, IC, CMOS, technology, design, simulation, PCB, layout

**Position of the course**

This course describes the basic technology and process flow for the fabrication of integrated CMOS circuits. Also the design (simulation on the basis of SPICE models and manual mask layout) of such CMOS ICs is extensively studied. Finally the course also pays attention to the interconnection of ICs by means of printed circuit boards (PCBs).

**Contents**

- VLSI technology: semiconductor physics, MOSFET, microelectronics and microsystems, process flow of an IC technology, packaging and assembly, multilayer PCB technology, virtual wafer fab
- VLSI design: SPICE modelling, CMOS IC design, parameter extraction, PCB design

**Initial competences**

basic knowledge of electronics

**Final competences**

- 1 Understand the process flow of modern IC technologies
- 2 Simulate and layout electronic circuits in modern IC technologies

**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**

Classroom lectures; Practical sessions to be carried out in groups of 2 to 3 students

### **Study material**

Type: Slides

Name: Extensive set of detailed PowerPoint slides about 3 chapters that can be downloaded for free from the Ufora website

Indicative price: Free or paid by faculty

Optional: no

Language : English

Number of Slides : 260

Available on Ufora : Yes

Online Available : No

Available in the Library : No

Available through Student Association : No

### **References**

- S.M. Sze, "VLSI technology", McGraw-Hill, New York 1988
- C.Y. Chang and S.M.Sze, "ULSI technology", McGraw-Hill, New York 1996
- C.F. Coombs, "Printed Circuits Handbook", McGraw-Hill, New York 1995
- R.L. Geiger, P.E. Allen, N.R. Strader, "VLSI design techniques for analog and digital circuits", McGraw-Hill, New York 1993

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

Continuous guidance/support, for the theoretical classes as well as for the design project, during the whole semester by the responsible professor and a scientific coworker.

### **Assessment moments**

end-of-term and continuous assessment

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

Oral assessment

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

Oral assessment

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

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**

During examination period: oral closed-book examination.

Outside examination period: report of the IC design project that takes about 1 month time (schematic design + simulations + layout).

### **Calculation of the examination mark**

Evaluation during examination period: 70%

Evaluation outside examination period: 30%