lelec2560

2022

Micro and Nanofabrication Techniques

5.00 credits	30.0 h + 30.0 h	Q2

Teacher(s)	Francis Laurent (coordinator) ;Hackens Benoît ;Raskin Jean-Pierre ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Main themes	Processing of micro and nanoscopic devices, MEMs, NEMs, and integrated circuits : • - semiconductor materials and their processing, • - oxidation, ion implantation ionique, doping, metallisation, plasma... • - micro & nanolithography, laser machining, etc. • - micro & nanocharacterisation : SEM, AFM, Ellipsometry, Dektak,...
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 Regarding the learning outcomes of the program of "Master in Electrical Engineering", this course contributes to the development and acquisition of the following learning outcomes : • AA1.1, AA1.2, AA1.3 • AA2.1, AA2.2, AA2.3, AA2.4, AA2.5 • AA3.1 , AA3.2, AA3.3 • AA4.1, AA4.2, AA4.3, AA4.4 • AA5.1, AA5.2, AA5.3, AA5.4, AA5.5, AA5.6 • AA6.1, AA6.3 At the end of this course, students will be able to : • Design the process of a particular micro & nanoscopic device. • Use process simulation tools • Make specific process steps in the clean rooms • Characterize step results in WinFab and Welcome platforms
Evaluation methods	Continuous evaluation of a semester work carried out in a group, with intermediate presentations and written reports. Individual oral evaluation in examination session. The group work accounts for 60% of the final mark, the individual examination for the remaining 40%. The mark for continuous assessment is individualised according to the student's involvement in the group during the term (compulsory attendance at activities, active participation in intermediate work and assessed work). The work for which the continuous assessment mark is awarded cannot be repeated in the second session; the continuous assessment mark acquired in the first session is retained in the event of a second session. Given the importance of the year's work, Article 72 of the RGEE applies.
Teaching methods	Students will discuss in groups the elements related to the manufacture of miniaturized devices and will be led to design a complete process using bibliographic materials, supervised laboratory sessions in clean rooms, and interactions with the teaching team. Intermediate reports and presentations with the management team will provide feedback on progress.
Content	- types of substrates. - MOS transistor. - physical and chemical techniques for thin film deposition: PVD, CVD, PECVD, ALD, etc. - structure transfer: masking, optical and electronic lithography. - etching techniques: etching mechanisms, dry and wet etching, RIE, DRIE, IBE, selectivity of etchings, etc. - special techniques for depositing or engraving thin films. - metrology elements (microscopy techniques, optics, electrical measurements, physical and chemical analyses,...).
Inline resources	https://moodleucl.uclouvain.be/course/view.php?id=9212
Bibliography	Supports disponibles sur Moodle/supports available on Moodle Livre de référence/reference book: "Introduction to microfabrication, 2nd ed.", S. Franssila, John Wiley & Sons, 2010

Faculty or entity in charge	ELEC

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Chemical and Materials Engineering	KIMA2M	5		
Master [120] in Biomedical Engineering	GBIO2M	5		
Master [120] in Electrical Engineering	ELEC2M	5		
Master [120] in Physical Engineering	FYAP2M	5		
Advanced Master in Nanotechnologies	NANO2MC	5		