UCLouvain

# lelec2560

*2019*

# Micro and Nanofabrication Techniques

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

| 5 credits | 30.0 h + 30.0 h | Q2 |
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| Teacher(s) | Francis Laurent (coordinator) ;Hackens Benoît ;Raskin Jean-Pierre ; |
| Language : | English |
| Place of the course | Louvain-la-Neuve |
| Main themes | Processing of micro and nanoscopic devices, MEMs, NEMs, and integrated circuits :<br>• - semiconductor materials and their processing,<br>• - oxidation, ion implantation ionique, doping, metallisation, plasma...<br>• - micro & nanolithography, laser machining, etc.<br>• - micro & nanocharacterisation : SEM, AFM, Ellipsometry, Dektak,... |
| Aims | 1<br>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 :<br>• AA1.1, AA1.2, AA1.3<br>• AA2.1, AA2.2, AA2.3, AA2.4, AA2.5<br>• AA3.1 , AA3.2, AA3.3<br>• AA4.1, AA4.2, AA4.3, AA4.4<br>• AA5.1, AA5.2, AA5.3, AA5.4, AA5.5, AA5.6<br>• AA6.1, AA6.3<br>At the end of this course, students will be able to :<br>• Design the process of a particular micro & nanoscopic device.<br>• Use process simulation tools<br>• Make specific process steps in the clean rooms<br>• Characterize step results in WinFab and Welcome platforms<br>- - - -<br>*The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".* |
| Evaluation methods | **Due to the COVID-19 crisis, the information in this section is particularly likely to change.**<br>Continuous evaluation of a semester work carried out in a group, with intermediate presentations and written reports. Individual oral evaluation in examination session. |
| Teaching methods | **Due to the COVID-19 crisis, the information in this section is particularly likely to change.**<br>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.<br>- MOS transistor.<br>- physical and chemical techniques for thin film deposition: PVD, CVD, PECVD, ALD, etc.<br>- structure transfer: masking, optical and electronic lithography.<br>- etching techniques: etching mechanisms, dry and wet etching, RIE, DRIE, IBE, selectivity of etchings, etc.<br>- special techniques for depositing or engraving thin films.<br>- 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<br>Livre de référence/reference book: "Introduction to microfabrication, 2nd ed.", S. Franssila, John Wiley & Sons, 2010 |

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| Faculty or entity in charge | ELEC |

| Programmes containing this learning unit (UE) | | | | |
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| Program title | Acronym | Credits | Prerequisite | Aims |
| Master [120] in Biomedical Engineering | GBIO2M | 5 | | |
| Master [120] in Physical Engineering | FYAP2M | 5 | | |
| Master [120] in Electrical Engineering | ELEC2M | 5 | | |
| Master [120] in Chemical and Materials Engineering | KIMA2M | 5 | | |