UCLouvain

lelec2710

2024

Nanoelectronics

5.00 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Bayot Vincent (coordinator) ;Gehring Pascal ;Hackens Benoît ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Main themes	The course is focused on the physics of nanoscopic electronic systems (<100 nm), i.e. 2D, 1D and OD quantum systems, real quantum wells, ballistic quantum point contacts, electrons in a quantizing magnetic field, diffusion, coherent transport, resonant tunneling.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 In consideration of the reference table AA of the program "master in electrical engineering ", this course contributes to the development, to the acquisition and to the evaluation of the following experiences of learning: • AA1.1, AA1.2 • AA2.1, AA2.2, AA2.5 • AA3.1, AA3.2, AA3.3 • AA4.1, AA4.2, AA4.3, AA4.4 • AA5.3, AA5.4, AA5.5, AA5.6 • AA6.1 At the end of the course, students will be able to : • Explain the basic properties of low-dimensional and nanosclpic electron systems. • Predict the behavior of simple nanoscopic devices, based on the knowledge acquired in the course and their project. • Synthetize and present orally the content of a major article in the field of nanoelectronics.
Evaluation methods	- Evaluation of the written report and oral presentation of the research work carried out on the basis of a scientific article. The work may involve the simulation, calculation or measurement of transport properties of nanoelectronic devices. - Written evaluation on the content of the course
Teaching methods	Courses are oriented by student questions in order to enlight at best the numerous new concepts of nanoelectronics. Students work on specific developments that are then shared with the other classmates.
Content	The courses present interactively the basics of nanoscopic devices and analyzes their behavior. In that framework, the teachers put forward the potential positive environmental impacts of new concepts in comparison with more mainstream technologies. The project focuses on understanding more deeply a choosen key device in nanoelectronics. This is based on a bibliographic research and a specific project which can involve simulations or calculations.
Inline resources	Moodle https://moodleucl.uclouvain.be/enrol/index.php?id=10290
Bibliography	Syllabus, copies de transparents, livres suggérés dont : The physics of low-dimensional semiconductors, J.H. Davies, Cambridge
Other infos	Background in solid state physics and besic semiconductor devices.
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 Electrical Engineering	ELEC2M	5		
Master [120] in Physical Engineering	FYAP2M	5		
Advanced Master in Nanotechnologies	NANO2MC	5		