lelec2710

2020

Nanoelectronics

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

5 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Bayot Vincent (coordinator) ;Hackens Benoît ;
Language :	English
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.
Aims	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 1 • 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. - - - - *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.** - Oral presentation of the student work on a scientific article to the other classmates. - Written evaluation on the content of the course
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** The courses present interactively the basics of nanoscopic devices and analyzes their behavior. 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.
Content	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.
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 (e.g. : LELEC 1330)
Faculty or entity in charge	ELEC

Force majeure

Evaluation methods	In case where some students would not be able to attend the written exam for "covid reasons", an oral exam will take place at the same time as the programmed written exam for all the other students. The students concerned by this "cas de force majeure" should send an email to the teachers as soon as possible to organize the oral exam by TEAMS. In case the written exam would not be permitted at all due to covid reasons, the exam would become oral and by TEAMS for all the students.

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Physical Engineering	FYAP2M	5		
Master [120] in Electrical Engineering	ELEC2M	5		
Master [120] in Chemical and Materials Engineering	KIMA2M	5		
Advanced Master in Nanotechnologies	NANO2MC	5		