UCL Université catholique de Louvain

LELEC2620

2012-2013

Modeling and implementation of analog and mixed analog/digital circuits and systems on chip

5.0 credits	30.0 h + 30.0 h	2q

Teacher(s) :	Bol David ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Prerequisites :	For this course, it is compulsory to have followed the whole electronic formation (ELEC1530 Electronics 1, LELEC2531 Electronics 2 and LELEC2532 Electronics 3). Moreover, it is highly recommended to have followed an advanced course in digital circuit implementation (LELEC2570 Design of digital integrated circuits). An advanced course of analog integrated circuit design (LELEC2650 Analog integrated circuit design) is also an advantage.
Main themes :	Identical to description
Aims :	After this course, the students will be able to generate appropriate abstractions for analog building blocks and to model their behavior at high level in Verilog-A language. They will need to co-simulate them with a digital circuit in Verilog to mitigate the limitations of analog blocks and to extract specifications for the mixed-signal circuit implementation. Finally, they should be capable to use a top-down design approach to propose an implementation at the transistor level for analog blocks and at the gate level for digital blocks. *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 :	The examination will be based on the assignments during the semester and on the presentation of the project at the end of the semester.
Teaching methods :	This course is organized around a central project about the implementation of a mixed analog/digital system for wireless communication, biomedical signal processing or integrated sensors (temperature, image, radiations). This self-learning project will be based on CAD tools with short assignments regularly during the semester, to ensure a smooth progression of the project. The interaction between the students, the teachers and assistants will be encouraged by the use of a discussion forum on Moodle platform. The lectures will introduce the concepts to apply at each step of the project regarding design, modeling and implementation. They will be broadly illustrated by recent mixed-signal SoC examples from both the industrial and research worlds. The teaching will be completed by a few seminars given by both industrial and academic experts who will introduce their design methodology of mixed-signal SoCs.
Content :	Over the last decades, integrated circuits have evolved from chips with a single function to complex systems on a single silicon chip. Such modern systems-on-chip (SoCs) features digital signal processors, microcontrollers and analog/mixed-signal circuits to provide the necessary interfaces to the physical world made of sensor signals, audio/video interfaces, electronic signals or wireless communications. These SoCs require the co-integration, co-design and co-verification of analog and digital circuits on the same CMOS technology platform. In this course, we will study the implementation of mixed analog/digital circuits with the help of behavorial modeling, as an essential tool within the design flow of complete SoCs.
Bibliography :	To be determined
Cycle and year of study :	> Master [120] in Electrical Engineering > Master [120] in Electro-mechanical Engineering > Master [120] in Computer Science and Engineering > Master [120] in Mathematical Engineering
Faculty or entity in charge:	ELEC