UCL Université catholique de Louvain

LELEC2620

2016-2017

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
Inline resources:	> http://moodleucl.uclouvain.be/enrol/index.php?id=2373
Prerequisites :	LELEC 1530, LELEC2531 and LELEC2532. LELEC2650 strongly recommended
Main themes :	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, analog and RF circuits to provide the necessary interfaces to the physical world made of sensor signals, audio/video interfaces, electronic signals or wireless communications. These analog/mixed-signal (AMS) systems 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 behavioral modeling, as an essential tool within the design flow of AMS systems. This course concludes the ELEC formation in electronic circuits and systems.
Aims :	a. Contribution of the activity to the learning outcomes of the program AA1 Knowledge base : electronic concepts (AA1.1), simulation and CAD tools (AA1.2) AA2 Engineering skills : analysis and modeling of an electronic system, AA3 R& mp;D skills : find appropriate references on the existing solutions in the field of the course's project (AA3.1) AA4 Project management AA5 Communication skills : analysis and writing of a technical datasheet (AA5.3-5.5). b. Learning outcomes After this course, the electrical engineers in circuit and systems should be able to: -- critically compare analog and digital circuit solutions within a given applicative system context with respect to signal quality, power consumption, cost and flexibility, -- analyze the sources and propagation of analog non-idealities into a mixed-signal chain, -- generate appropriate abstractions for analog building blocks and model their behavior at high level in Verilog-AMS language, -- setup an appropriate methodology for designing, simulating and verifying a mixed-signal system from specification phase to block partitioning to physical implementation, -- co-simulate and co-verify analog blocks with a digital circuit in Verilog to mitigate the limitations of analog blocks and to extract specifications for the mixed-signal circuit implementation, -- analyze industrial-level datasheets of an electronic system in the context of a design project , -- analyze scientific-level papers in the field of electronic circuit and systems. *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 evaluation is based on several assignments in groups during the semester and an individual exam during the session.
Teaching methods :	The course is organized as follows. -- lectures on the key AMS concepts, -- seminars given by experts from the industry illustrating recent AMS systems. -- assignment in groups for active learning with in-class kick-off and debriefing sessions
Content :	-- AMS system design methodologies

	-- Behavorial analog modeling -- Analog non idealities and auto-compensation -- Digital assistance of analog circuits -- Time-locked loops -- Sigma-delta modulation
Bibliography :	Supports -- Slides of the lectures on Moodle -- Forum on Moodle -- Technical documentation on Moodle
Faculty or entity in charge:	ELEC

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Master [120] in Electro-mechanical Engineering	ELME2M	5	-	
Master [120] in Electrical Engineering	ELEC2M	5	-	