LELEC2570

2015-2016

Synthesis of digital integrated circuits

5.0 credits	30.0 h + 30.0 h	1q

Teacher(s) :	Bol David ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Inline resources:	Moodle > http://moodleucl.uclouvain.be/enrol/index.php?id=3
Prerequisites :	-- The basic formation in digital electronic circuits is compulsory: LELEC2531 at UCL. -- A course in embedded system design is an advantage: LINGI2315 at UCL. *The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.*
Main themes :	The exponential increase in computing performances of digital integrated circuits (ICs) fundamentally modified our everyday's life in numerous domains (consumer, business, medical, industrial). Nowadays these circuits feature several millions of transistors, which results a high design complexity.
Aims :	With respect to the AA referring system defined for the Master in Electrical Engineering, the course contributes to the development, mastery and assessment of the following skills : AA1.1AA1.2 AA2.1, AA2.2, AA2.3, AA2.4, AA2.5 AA3.1 AA5.5 b. After this course, the electrical engineers in circuit and systems should be able to: -- produce the layout of a digital IC in a modern CMOS technology starting from a behavorial description and using industrial-level EDA tools, -- discuss the trade-offs linked to the synthesis of digital ICs between silicon area, computing performance, power consumption, flexibility and robustness, -- setup a strategy for verifying the obtained results using HDL simulations, -- rapidly evaluate the efficiency of high-level architectural solutions and HW/SW optimizations, -- communicate clearly and efficiently technical results in a circuit design report. *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 individual evaluation is based on -- short weekly assignments during the semester, -- a final project report to deliver at the end of the semester, -- an oral exam during the session consisting in a discussion of the project results. The content of the lectures is subject matter for the exam
Teaching methods :	The course is organized as follows. -- 10 lectures and specific seminars given by experts from the industrial world regarding the design of digital ICs. They will be broadly illustrated by recent digital IC examples from both the industrial and research worlds. -- A central individual project on the full design of a digital SoC with weekly milestones linked to the steps of the design flow. This self-learning project will be based on industrial CAD tools. -- The interaction between the students, the teachers and assistants will be encouraged by the use of a discussion forum on Moodle platform and interactive debriefing sessions during the lectures

Content :	-- Microcontroller-based embedded systems -- High-level design and verification of digital SoCs -- Robust HDL coding in Verilog -- Logic synthesis of digital circuits -- Clocking and timing closure -- Digital standard cell libraries and hard macros -- Place and route of digital circuits -- CMOS technology scaling -- DSP architecture, arithmetic circuits and hardware accelerators
Bibliography :	Supports -- Slides of the lectures on Moodle -- Reference text book: Digital VLSI Chip Design with Cadence and Synopsys CAD Tools by Erik Brunvand -- Forum on Moodle -- Technical documentation on Moodle
Other infos :	A course in embedded system design is an advantage: LINGI2315.
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	LELEC2531	