UCLouvain

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2025

Digital electronic systems

The version you're consulting is not final. This course description may change. The final version will be published on 1st June.

5.00 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Andraud Martin ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Main themes	Combinational logic circuits and sequential logic design. Digital building blocks (ALU, registers, ...).Hardware description language (SystemVerilog). Microarchitecture of a 32-bit RISC processor (single-cycle processor, multicyle processor and pipelined processor). Embedded processor architecture and I/O systems.
Learning outcomes	**At the end of this learning unit, the student is able to :** 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, AA2.3, AA2.4 • AA5.3 • AA6.1 1 At the end of this course, the students will be able to: • Understand how the digital circuits (combinational circuits, sequential circuits) work • Understand the architecture of programmable circuits (FPGA) • Synthesize and simulate digital circuits in a language such as Verilog or VHDL • Understand the architecture of a RISC processor • Use and program a microcontroller • Understand and implement a digital electronic system
Evaluation methods	The evaluation is based on a continuous evaluation during the academic year. The practical details are specified on the course website.
Teaching methods	• The course is divided into three parts (plus one for the project). For each part, learning is organized with complementary methods: • Discussion session (lecture) at the beginning of each part, to have a general view on the topic • Own work with exercises during each part (also based on the reference book) • Recap session at yhe end of each part to reviw the essential knowledge to have. • Each student (or goup of 2 students) has at his disposal during the semester an electronic system comprising an FPGA connected to a RaspberryPI
Content	• Combinational logic • Sequential logic • Implementation technology • Simulation language and Verilog synthesis • Main logic circuits: arithmetic circuits, memories, programmable circuits • Architecture and microarchitecture of the ARM processor • Memories (caches, ...) • Peripherals and main communication systems
Inline resources	Moodle http://moodleucl.uclouvain.be/enrol/index.php?id=4
Bibliography	Digital Design and Computer Architecture - David Money Harris @ Sarah L. Harris - 2007, Elsevier
Other infos	None

Faculty or entity in charge	ELEC

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Biomedical Engineering	GBIO2M	5		
Master [120] in Electrical Engineering	ELEC2M	5		
Master [120] in Computer Science and Engineering	INFO2M	5		
Master [120] in Electro-mechanical Engineering	ELME2M	5		