Digital electronics

Lecturer
Dragomir MILOJEVIC (Coordinator)

Course mnemonic
ELEC-H310

ECTS credits
5 credits

Language(s) of instruction
English

Course period
Second term

Course content

Boolean algebra. Formal representation of logic functions in two-level logic (sum-of-products). Analysis and synthesis of combinatorial digital systems. Logic function simplification: Karnaugh maps and Quine Mc-Cluskey: prime implicants extraction and function synthesis. Examples of combinatorial systems: adders, encoders, etc. Analysis and synthesis of sequential logic systems. State encoding and state simplification. Asynchronous implementation. Race conditions & solutions. Flip-flop synthesis. Synthesis of synchronous sequential circuits with different flip-flops. Micro-processors microcontrollers architecture. Memory. Timers. Interrupts. Digital IO and communication. Analog IO. C programming language. Concrete examples of implementation.

Objectives (and/or specific learning outcomes)

Manual synthesis of combinatorial and sequential (asynchronous & synchronous) digital logic circuits; physical implementation of digital logic circuits; Practical implementation of embedded systems applications that combine hardware and software

Teaching method and learning activities

Ex-cathedra lectures + practical exercises + labs with computers and microcontroller boards

References, bibliography and recommended reading

Advised but not mandatory: - Daniel D. Gajski, "Principals of Digital Design", Prentice Hall- Sajan G. Shiva, "Introduction to Logic Design", CRC Press

Other information

Contact(s)

Prof. Dragomir MILOJEVIC - T: 02 650 30 60 - Dragomir.Milojevic(at)ulb.ac.beQuentin Delhaye - qudelhay(at)ulb.ac.beKen Hasselman - ken.hasselmann(at)ulb.ac.be

Evaluation method(s)

Other

Evaluation method(s) (additional information)

Written exam that covers all topics split into two parts: - Digital logic circuits (closed book) – dozens of weighted exercises depending on complexity (similar to what has been seen during exercise sessions), and - Practical exam (open book) – few practical questions used to assess the student's capacity to solve real-life problems in embedded system design

Determination of the mark (including the weighting of partial marks)

Each of the two parts will contribute to 50% of the final score.

Main language(s) of evaluation

English

Programmes

Programmes proposing this course at the Brussels School of Engineering

BA-IRCI | Bachelor in Engineering Sciences | option Bruxelles/ unit 3 and MA-IRCB | Master of science in Biomedical Engineering | finalité Professional/unit 1

Programmes proposing this course at the faculty of Sciences

BA-INFO | Bachelor in Computer science | unit 3