

Faculty of Applied Sciences



ELEC2620 Logic circuits and systems

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s): Jean-Jacques Quisquater, Charles Trullemans
Language: French
Level: Second cycle

Aims

This is the fundamental course in digital systems and hardware architectures.

After this course, students will be able to specify, represent in several ways and synthesise

- . combinatorial circuits
- . finite state machines
- . algorithmic machines

They will be able to determine by simple way the scheduling of a computation scheme described as a precedence graph, to implement it as an algorithmic machine and to evaluate the implementation cost of this machine in time and space.

Advanced synthesis and optimisation methods are covered by the course ELEC2760 (Design and optimization of digital circuits and systems).

Main themes

Identical to the contents of the course

Content and teaching methods

Combinatorial circuits :

boolean algebra

logical gates

boolean networks

design methods for universal (multiplexers, registers, counters) or specialised components

complexity theory elements

Sequential circuits :

temporal barrier, master-slave register

finite state automaton

graph, state stable or programme representation

state coding

Algorithmic machines :

control part and operative part decomposition

temporal organization

operative part implementation (memory, connection and computation resources)

control part implementation (architectural templates, microprogramming)

Computation schemes :

precedence graphs

scheduling

cost evaluation (time, space)

An algorithmic machine is the implementation of a system whose behaviour is abstractly described as an algorithm. Examples are microprocessors, digital signal processors, industrial controllers ...

Architectural templates and design methods for simple systems are introduced by this course. The stress is on formal description and methods, illustrated by examples.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings,

...)

Methods

Lectures and exercices

Prerequisites

There is no required prerequisite. The course ELEC2531, Electronics II gives a complementary view of the electronic behaviour of digital components and systems.

Assessment

Written examination

Support

Slides on <http://icampus.ac.be/>

This course is partly referring to

Daniel Gajski, Principles of Digital Design, Englewood Cliffs, NJ : Prentice Hall, 1995

Other credits in programs

ELEC22	Deuxième année du programme conduisant au grade d'ingénieur civil électricien	(5 credits)
ELME23/M	Troisième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (mécatronique)	(5 credits)
FSA13BA	Troisième année de bachelier en sciences de l'ingénieur, orientation ingénieur civil	(5 credits)
MAP23	Troisième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)