UCL Faculté des sciences appliquées

FSA

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: 2nd cycle course

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 evaluaiton 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).

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
Prerequisits
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)
ELEC23	Troisième 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)
MAP22	Deuxième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)
MAP23	Troisième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)