Fonctionnement des ordinateurs

Lecturer
Gilles GEERAERTS (Coordinator)

Course mnemonic
INFO-F102

ECTS credits
5 credits

Language(s) of instruction
French

Course period
First term

Campus
Plaine

Course content

The content of the course is freely inspired from the book *Structured computer organization*, 5th edition, Andrew Tanenbaum, Prentice Hall. It presents a view of computer architecture that is structured into layers of abstraction, from the low-lelve hardware layer to the high-level software layer.

The course syllabus is thus:

- **Introduction**: What is a computer, what are its essential components and what are their rol ? How is information represented in a computer (binary coding) ?
- **Numerical circuits and Boolean algebra**: how can Boolean algebra be used to realise computations, and how can this algebra be implemented by means of electronic circuits ?
- **Microinstructions**: What is the minimal set of instructions that the CPU must be able to execute, and how to implement them by means of the circuits studied in the previous chapter ?
- **Machine language**: What is the typical full instruction set of a CPU, and how to execute these instructions in terms of microinstructions ?
- **Operating Systems**: Which services do they offer to the user, and how are they implemented by machine instructions ?

These theoretical principles are completed by some elements of the history of computing, that illustrate the concepts, and help the students to abstract from their daily experience of computers.

Objectives (and/or specific learning outcomes)

The main objective is to provide the students with a global view of the techniques and principles at work in the design, architecture, and functionning of computers. The concepts are kept as general as possible, and apply to most computer systems, present and past.

The introduction of purely technological concerns will thus be avoided as much as possible (although some of them will be presented for the sake of example).

The expected learning outcomes are:

- The student should be able to explain the fundamental principles studied at the course, and their relationships with each others, in order to sketch a global view on the functionning of a computer, from the hardware level to the software level.
- The student should be able to apply these concepts to concrete cases, and to recognise them in practical cases, i.e. drawing the link between theory and current practice.

As an example, the student will not be expected, for instance, to explain the details of a given CPU from a given manufacturer. However, the student should be able to explain what a CPU is, what are its basic components, what is its role in the computer, how it interacts with other components, and so forth. The student should also be able to recognise the main principles of a CPU when confronted, for instance, to the description of an actual example of CPU, and to explain how these theoretical principles have been put into practice.

Pre-requisits and co-requisits

Course having this one as pre-requisit

INFO-F201 | Systèmes d'exploitation | 5 crédits

Required knowledge and skills

Basic mathematical knowledge, which is normally covered during secondary education, is expected: logarithms, exponents, integer division...

Teaching method and learning activities

Ex cathedra course: 36h + practical works: 12h.

Contribution to the teaching profile

For mathematics:

1.5. Apprendre des connaissances de base dans l'un des domaines annexes : physique, informatique ou économie. Comprendre le rôle qu'y jouent les mathématiques.

1.6. Identifier un cadre mathématique sous-jacent à un problème donné.

2.2. Comprendre comment se dégage un concept à partir d'observations, d'exemples.

3.1. Concevoir et rédiger avec rigueur un résultat ou une théorie mathématique.

4.1. Etre responsable de ses affirmations.

4.4. Prohiber toute forme de plagiat.

References, bibliography and recommended reading

Structured computer organization, 5th édition, Andrew Tanenbaum, Prentice Hall.

Detailed lecture notes are available on the UV and at the PUBs

Course notes

Podcast, Université virtuelle and Syllabus

Other information

Place(s) of teaching

Plaine

Contact(s)

Prof. Gilles Geeraerts

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- tel: 55 96
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- web: http://di.ulb.ac.be/verif/ggeeraer

Evaluation method(s)

Oral examination and written examination

Evaluation method(s) (additional information)

The examination in January is a written exam on 15 points

The examinations in June (first session) and August/September (second session) are oral with a preliminary written preparation, on 15 points

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

The final grad for all sessions (January, June, August/September) is the sum of the interrogation/exam of this session, and of 5 points obtained during the year as follows:

- test in November: 3 points
- additional test during the semester: 2 points

The students who pass in January (session grade >=10/20) are exempted of taking the June exam: their January grade is automatically transferred to June.

Main language(s) of evaluation

French

Programmes

Programmes proposing this course at the faculty of Sciences

BA-INFO | Bachelor in Computer science | unit 1 and BA-MATH | Bachelor in Mathematics | unit 1