



Universitat de Lleida

DEGREE CURRICULUM  
**COMPUTER ORGANIZATION I**

Coordination: Concepció Roig Mateu

Academic year 2015-16

## Subject's general information

<b>Subject name</b>	COMPUTER ORGANIZATION I
<b>Code</b>	102002
<b>Semester</b>	1
<b>Typology</b>	Basic training
<b>ECTS credits</b>	6
<b>Groups</b>	1 large group (LG) for theoretical part, 3 medium groups (MG) problems/practices of GEI, 1 MG problems/practices GEI-ADE
<b>Theoretical credits</b>	3
<b>Practical credits</b>	3
<b>Coordination</b>	Concepció Roig Mateu
<b>Office and hour of attention</b>	Concepció Roig: Friday from 13:00 h. a 14:00 h. Josep M. Solà: Friday from 13:00 h. a 14:00 h.
<b>Department</b>	Informàtica i Enginyeria Industrial
<b>Teaching load distribution between lectures and independent student work</b>	Globally, the subject has 60 hours of lecturer classes and 120 hours of independent student work.
<b>Modality</b>	Presencial
<b>Important information on data processing</b>	Consult <a href="#">this link</a> for more information.
<b>Language</b>	Catalan
<b>Degree</b>	Degree in Computer Engineering
<b>Distribution of credits</b>	Attending the partition in different groups, the number of credits of each professor is the following.  Josep M. Solà 9 Concepció Roig Mateu 6
<b>Office and hour of attention</b>	Concepció Roig: Friday from 13:00 h. a 14:00 h. Josep M. Solà: Friday from 13:00 h. a 14:00 h.
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Josep M. Solà  
Concepció Roig Mateu

## Subject's extra information

The course as part of the academic plan

Subject to be held during the first semester in the first course of the degree. It belongs to the main subject of Computer Organization inside the module of Basic Training.

To follow up the subject no previous knowledge of digital circuits is required. The knowledge acquired in the post-compulsory secondary education will be enough.

## Learning objectives

- Learning the ways to represent information in a computer system and the mechanisms to manage this information.
- Studying the operation of the combinational and sequential modules and their function inside a computer
- Developing of the analysis and design processes of combinational and sequential circuits.
- Solving of circuits and ability of analysing several proposal.

## Competences

University of Lleida strategic competences

Degree-specific competences

- Knowledge of the structure, organization, workings and inter-connexion of computer systems, the basis of their programming, and their applications in the resolution of engineering problems.
- Ability to know, understand and evaluate computer structures and architecture, as well as the basic components which constitute them.

Degree-transversal competences

- Ability to resolve problems and elaborate and defend arguments inside their field of study.
- Ability to work in a unidisciplinary and multidisciplinary team.

## Subject contents

### 1. Binary codification of the information

1.1. Binary codification

1.2. Number systems

1.3. Binary arithmetic

1.4. Signed number representation

1.5. Alphanumeric codes

## **2. Logic functions**

2.1. Switching algebra

2.2. Logic gates

2.3. Logic functions

2.4. Minimization of logic functions

2.5. Incompletely specified functions

## **3. Combinational circuits**

3.1. Two level gate structures

3.2. Analysis and design of combinational circuits.

3.3. Combinational systems.

3.3.1. Decoder

3.3.2. Encoder

3.3.3. Multiplexer

3.3.4. Demultiplexer

3.3.5. Comparator

## **4. Sequential circuits**

4.1. Basic memory cell

4.2. Flip-flops

4.3. Direct set/reset

4.4. Analysis aof sequential circuits

4.5. Design of sequential circuits

4.6. Basic sequential systems

4.6.1. Registers

4.6.2. Counters

## Methodology

Classes are divided in different groups, big group (GG), where they attend all the students of the subject and medium group (GM) where there only assist part of the students. The contents of the different kind of groups are divided in the following way:

GG: They are expositive classes where they are shown the main contents on the subject.

GM: they are classes to solve exercises related to the contents exposed in the GG classes, in a participative and interactive way. they also carry out lab practices to solve digital circuits with the simulator ISIS of Proteus.

Practical activities:

- Design of a combinational circuit to carry out a specific function.
- Design of a sequential circuit that passes for a predetermined sequence of states..

## Development plan

Week 1: Binary codification of the information. 2 h. theory + 2 h. problems.

Week 2: Binary codification of the information. 2 h. theory + 2 h. problems.

Week 3: Logic functions. 2 h. theory + 2 h. problems.

Week 4: Logic functions. 2 h. theory + 2 h. problems.

Week 5: Logic functions. 2 h. theory + 2 h. problems..

Week 6: Logic functions. 2 h. theory + 2 h. problems..

Week 7:Combinational circuits. 2 h. theory + 2 h. problems

Week 8: :Combinational circuits. 2 h. theory + 2 h. problems

Week 9. Partial evaluation activities.

Week 10: :Combinational circuits. 2 h. theory + 2 h. problems.

Week 11: :Combinational circuits. 2 h. theory + 2 h. practices of laboratory.

Week 12: Sequential circuits. 2 h. theory + 2 h. problems.

Week 13: Sequential circuits. 2 h. theory + 2 h. problems.

Week 14: Sequential circuits. 2 h. theory + 2 h. problems.

Week 15:Sequential circuits. 2 h. theory + 2 h. practices of laboratory.

Weeks 16 and 17. Partial evaluation activities.

Week 18. Seminars.

Week 19. Recuperation evaluation activities.

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## Evaluation

N\_P1: mark first partial exam.

N\_P2: mark second partial exam

N\_Pr: practices mark

The final mark of the subject is calculated with the following expression:

$$\text{FINAL\_MARK} = \text{maximum}(30\% \text{ N\_P1} + 50\% \text{ N\_P2}, 80\% \text{ N\_Pr2}) + 20\% \text{ N\_Pr}$$

To pass the subject it is necessary that FINAL\_MARK is greater than or equal to 5.

In the case of not passing the subject, there is the option to do a recuperation exam. In this case the FINAL\_MARK is calculated as:

N\_rec: mark of the recuperation exam

$$\text{FINAL\_MARK} = 80\% \text{ N\_rec} + 20\% \text{ N\_Pr}$$

## Bibliography

- Lloris A., Prieto A., Parrilla L. *Sistemas digitales*. McGraw-Hill.
- Floyd T. *Fundamentos de sistemas digitales*. Prentice-Hall.
- Hammacher C., Vranesic Z., Zaky S. *Organización de computadores* (5ª edición). McGraw-Hill.
- Ercegovac M.D., Lang T. *Digital Systems and Hardware/Firmware Algorithms*. Jhon Wiley and Sons.
- Gascón M., Leal A., Peinado B. *Problemas prácticos de diseño lógico*. Paraninfo.