



## Teaching Guide

| Teaching Guide      |                                                                                                                                                                                                                                                                                                                                                        |       |        |                                                                                                                                                                                                                                                                                                                           |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Identifying Data    |                                                                                                                                                                                                                                                                                                                                                        |       |        | 2017/18                                                                                                                                                                                                                                                                                                                   |
| Subject (*)         | Fundamentals of Computers                                                                                                                                                                                                                                                                                                                              |       | Code   | 614G01007                                                                                                                                                                                                                                                                                                                 |
| Study programme     | Grao en Enxeñaría Informática                                                                                                                                                                                                                                                                                                                          |       |        |                                                                                                                                                                                                                                                                                                                           |
| Descriptors         |                                                                                                                                                                                                                                                                                                                                                        |       |        |                                                                                                                                                                                                                                                                                                                           |
| Cycle               | Period                                                                                                                                                                                                                                                                                                                                                 | Year  | Type   | Credits                                                                                                                                                                                                                                                                                                                   |
| Graduate            | 2nd four-month period                                                                                                                                                                                                                                                                                                                                  | First | FB     | 6                                                                                                                                                                                                                                                                                                                         |
| Language            | SpanishGalicianEnglish                                                                                                                                                                                                                                                                                                                                 |       |        |                                                                                                                                                                                                                                                                                                                           |
| Teaching method     | Face-to-face                                                                                                                                                                                                                                                                                                                                           |       |        |                                                                                                                                                                                                                                                                                                                           |
| Prerequisites       |                                                                                                                                                                                                                                                                                                                                                        |       |        |                                                                                                                                                                                                                                                                                                                           |
| Department          | Enxeñaría de Computadores                                                                                                                                                                                                                                                                                                                              |       |        |                                                                                                                                                                                                                                                                                                                           |
| Coordinador         | Sanjurjo Amado, Jose Rodrigo                                                                                                                                                                                                                                                                                                                           |       | E-mail | jose.sanjurjo@udc.es                                                                                                                                                                                                                                                                                                      |
| Lecturers           | Andión Fernández, José Manuel<br>Losada López-Valcárcel, Nuria<br>Martin Santamaria, Maria Jose<br>Padron Gonzalez, Emilio Jose<br>Pardo Martínez, Xoán Carlos<br>Pérez Diéguez, Adrián<br>Porta Trinidad, Juan<br>Ramos Garea, Sabela<br>Rodriguez Osorio, Roberto<br>Sanjurjo Amado, Jose Rodrigo<br>Vazquez Regueiro, Carlos<br>Veiga Fachal, Jorge |       | E-mail | jose.manuel.andion@udc.es<br>nuria.losada@udc.es<br>maria.martin.santamaria@udc.es<br>emilio.padron@udc.es<br>xoan.pardo@udc.es<br>adrian.perez.dieguez@udc.es<br>juan.porta@udc.es<br>sabela.ramos.garea@udc.es<br>roberto.osorio@udc.es<br>jose.sanjurjo@udc.es<br>carlos.vazquez.regueiro@udc.es<br>jorge.veiga@udc.es |
| Web                 | moodle.udc.es                                                                                                                                                                                                                                                                                                                                          |       |        |                                                                                                                                                                                                                                                                                                                           |
| General description | This subject focuses on the study of the fundamental concepts behind digital systems and computers, a computer's basic structure and how its different components work.                                                                                                                                                                                |       |        |                                                                                                                                                                                                                                                                                                                           |

## Study programme competences

| Code | Study programme competences                                                                                                                                                                                                                            |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A5   | Coñecemento da estrutura, organización, funcionamento e interconexión dos sistemas informáticos, os fundamentos da súa programación e a súa aplicación para a resolución de problemas propios da enxeñaría.                                            |
| A15  | Capacidade de coñecer, comprender e avaliar a estrutura e a arquitectura dos computadores, así como os compoñentes básicos que os conforman.                                                                                                           |
| A31  | Capacidade de deseñar e construír sistemas dixitais, incluíndo computadores, sistemas baseados en microprocesador e sistemas de comunicacións.                                                                                                         |
| B1   | Capacidade de resolución de problemas                                                                                                                                                                                                                  |
| B3   | Capacidade de análise e síntese                                                                                                                                                                                                                        |
| B7   | Preocupación pola calidade                                                                                                                                                                                                                             |
| B9   | Capacidade para xerar novas ideas (creatividade)                                                                                                                                                                                                       |
| C2   | Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.                                                                                                                                                                    |
| C4   | Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común. |
| C6   | Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.                                                                                                                      |

## Learning outcomes

| Learning outcomes | Study programme competences |
|-------------------|-----------------------------|
|                   |                             |



|                                                                                                   |            |                      |                |
|---------------------------------------------------------------------------------------------------|------------|----------------------|----------------|
| Knowing the basic operation of the functional blocks of a computer (processor, memory, I/O, etc.) | A5<br>A15  | B3<br>B7             | C2<br>C4<br>C6 |
| Knowing how to perform basic designs of components of a computer using digital systems            | A15<br>A31 | B1<br>B3<br>B7<br>B9 | C2<br>C4<br>C6 |
| Learning how to program a computer at a low level with an assembly language                       | A5         | B1<br>B9             | C2<br>C4<br>C6 |

| Contents                                                                               |                                                              |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Topic                                                                                  | Sub-topic                                                    |
| I. Digital Systems                                                                     | - Combinational systems<br>- Sequential systems              |
| II. Structure, Organization and operation of the basic functional blocks of a computer | - Processing Unit<br>- Control Unit<br>- Input/Output system |

| Planning                                                                                                                        |                                    |                      |                               |             |
|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----------------------|-------------------------------|-------------|
| Methodologies / tests                                                                                                           | Competencies                       | Ordinary class hours | Student's personal work hours | Total hours |
| Problem solving                                                                                                                 | A5 A15 A31 B1 B3 B7<br>B9 C2 C4 C6 | 10                   | 17                            | 27          |
| Laboratory practice                                                                                                             | A5 A15 A31 B1 B3                   | 20                   | 28                            | 48          |
| Guest lecture / keynote speech                                                                                                  | A5 A15 A31 B7 C2                   | 30                   | 30                            | 60          |
| Objective test                                                                                                                  | A5 A15 A31 B1 B3 B7<br>B9 C2 C4 C6 | 3                    | 6                             | 9           |
| Personalized attention                                                                                                          |                                    | 6                    | 0                             | 6           |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. |                                    |                      |                               |             |

| Methodologies       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Methodologies       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Problem solving     | <p>Exercises are proposed to the students to be solved on their own. Then, solutions are discussed at class (problem sessions). Periodic written examinations are carried out to assess student progress.</p> <p>This methodology is mainly used to both gain and evaluate program competences B1, B3, B7 and B9 in relation to the competences A5, A15 and A31. Furthermore, this sessions is also worth to assess the adquisition of the transverse competences C4 and C6.</p> <p>The offer of an English group also helps in the acquisition of the competence C2.</p> |
| Laboratory practice | <p>Lab sessions allow students to consolidate the knowledge they have acquired in lectures and problem sessions. This activity makes it possible to achieve program competences B1 and B3 in relation to the competences A5, A15 and A31.</p> <p>The offer of an English group also helps in the acquisition of the competence C2.</p>                                                                                                                                                                                                                                    |



|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Guest lecture / keynote speech | <p>Lectures about every topic covered by the course's syllabus are the usual starting points for the rest of the activities. The workflow and contents of the lectures are focus on making it easy to acquire all the core and transverse competences of this course, namely competences A5, A15 and A31, and are supported by a comprehensive bibliography. English references will help with the competence C2.</p> <p>The offer of an English group guarantees the acquisition of the competence C2 to all students taking this group.</p> |
| Objective test                 | A 3h writer exam at the end of the term evaluates the acquisition of competences A5, A15, A31, B1 and B3, but without neglecting the rest of them, both general (B7 and B9) and transverse (C2, C4 and C6).                                                                                                                                                                                                                                                                                                                                   |

## Personalized attention

| Methodologies                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Problem solving<br>Laboratory practice | <p>Personalized attention is essential to guide students in carrying out the proposed exercises and lab practices and lead them to acquire this course's competences. Furthermore, this personalized attention can assess and validate student work. Besides, tutorial attendance is recommended whenever some help is needed.</p> <p>Part-time Students may choose the lab group that better fits their timetables, even with the possibility of change during the term.</p> |

## Assessment

| Methodologies       | Competencies                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                      | Qualification |
|---------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Problem solving     | A5 A15 A31 B1 B3 B7<br>B9 C2 C4 C6 | <p>Exercises will be proposed to the students to be solved on their own. This personal work will be evaluated by writer exams during the term. These exams will assess the competences B1, B3, B7 and B9 in relation to competences A5, A15 and A31, also with an eye on the traverse competences C4 and C6.</p> <p>Obviously, all the written exams will be in English in the English group. This way, the competence C2 is also evaluated.</p> | 20            |
| Laboratory practice | A5 A15 A31 B1 B3                   | <p>Experimental work done by the students in the lab sessions will also be evaluated. This evaluation is focused to assess the acquisition of the competences B1 and B3 in relation to the competences A5, A15 and A31.</p>                                                                                                                                                                                                                      | 20            |
| Objective test      | A5 A15 A31 B1 B3 B7<br>B9 C2 C4 C6 | <p>A written exam covering the whole syllabus will be carried out at the end of the term. This exam will mainly assess the competences A5, A15, A31, B1 and B3.</p> <p>Obviously, student in the English group will be examined in English, so evaluating the acquisition of the competence C2.</p>                                                                                                                                              | 60            |

## Assessment comments

To pass the course in the 1st opportunity call, it is mandatory: to obtain at least a 25% of the maximum possible grade in the laboratory practices and to obtain at least a 25% of the maximum possible grade in each written exams during the term (Problem solving) and to have a final grade (lab sessions + problem solving exams + final objective test) at least a 50% of the maximum possible grade. Only the final objective test is remediable in the 2nd opportunity call. The other parts of the grade are the ones obtained during the term. Students taking advantage of the ahead December call will be evaluated using their grades (lab sessions and problem solving exams) from the previous term. The only condition to pass the course in this call is to obtain a final grade equal to or greater than 50% of the maximum possible grade. Part-time Students may choose the lab group that better fits their timetables, even with the possibility of change during the term.

## Sources of information



|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic         | <ul style="list-style-type: none"><li>- Thomas L. Floyd (2009). Digital Fundamentals (10th Edition). Pearson International Edition</li><li>- David A. Patterson, John L. Hennessy (2014). Computer organization and design : the hardware/software interface. Morgan Kaufmann Publishers</li><li>- F. García Carballeira, J. Carretero, J.D. García Sánchez y D. Expósito Singh (2015). Problemas resueltos de estructura de computadores (2ª ed.). Paraninfo</li><li>- Javier García Zubía (2003). Problemas resueltos de electrónica digital . Thomson</li><li>- David M. Harris &amp; Sarah L. Harris (2013). Digital Design and Computer Architecture. Morgan Kaufmann Publishers</li></ul> |
| Complementary |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Recommendations                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------|
| Subjects that it is recommended to have taken before                                                                                   |
| Computer Science Preliminaries/614G01002<br>Discrete Mathematics/614G01004                                                             |
| Subjects that are recommended to be taken simultaneously                                                                               |
| Electronics Technology/614G01005                                                                                                       |
| Subjects that continue the syllabus                                                                                                    |
| Computer Structure/614G01012                                                                                                           |
| Other comments                                                                                                                         |
| We strongly recommend the use and exploitation of the teacher's office hours to get some help or advice about any topic of the course. |

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.