



Teaching Guide

| Identifying Data | | | | | 2023/24 |
|---------------------|---|--------|---|-----------|---------|
| Subject (*) | Introduction to Computers | | Code | 614G03012 | |
| Study programme | Grao en Intelixencia Artificial | | | | |
| Descriptors | | | | | |
| Cycle | Period | Year | Type | Credits | |
| Graduate | 1st four-month period | First | Basic training | 6 | |
| Language | Spanish | | | | |
| Teaching method | Face-to-face | | | | |
| Prerequisites | | | | | |
| Department | Enxeñaría de Computadores | | | | |
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| Lecturers | Amor Lopez, Margarita Gonzalez Gomez, Patricia | E-mail | margarita.amor@udc.es patricia.gonzalez@udc.es | | |
| Web | | | | | |
| General description | This subject reveals the fundamentals of the architecture of a computer, its basic operation, how it is programmed in assembly language and how the memory and I/O subsystems are and how they work. In addition, the structure and basic components of an operating system will be shown. On the other hand, the development of efficient codes that take optimal advantage of the hardware resources available in the computer will be presented. | | | | |

Study programme competences / results

| Code | Study programme competences / results |
|------|--|
| A4 | Conocer la estructura, organización, funcionamiento e interconexión de los sistemas informáticos (computador, sistemas operativos y redes de computadores). |
| A6 | Capacidad para realizar el análisis, diseño, implementación de aplicaciones que requieran trabajar con grandes volúmenes de datos, aplicando arquitecturas hardware/software adecuadas. |
| B2 | Que el alumnado sepa aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posea las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio. |
| B3 | Que el alumnado tenga la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética. |
| B5 | Que el alumnado haya desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía. |
| C3 | Capacidad para crear nuevos modelos y soluciones de forma autónoma y creativa, adaptándose a nuevas situaciones. Iniciativa y espíritu emprendedor. |

Learning outcomes

| Learning outcomes | Study programme competences / results | | |
|--|---------------------------------------|----------|----|
| Understand the internal workings of a computer and its functional blocks. | A4 | B3 | |
| Know the machine language of the computer and be able to develop very simple codes in said language. | | B2 | |
| Have the ability to develop codes that take optimal advantage of the hardware resources available on the computer. | | B2 B5 | C3 |
| Understand the interrelationship between the operating system software and the hardware on which it executes. | A6 | B2 | C3 |
| Understand the different models of parallel systems and their programming. | A6 | | |

Contents

| Topic | Sub-topic |
|-------|-----------|
| | |



| | |
|---|--|
| 1.- Introduction to computers and operating systems | <ul style="list-style-type: none"> - Basic functional blocks of a general purpose computer - Basic concepts of the Operating System - Performance metrics |
| 2.- Information Representation | <ul style="list-style-type: none"> - Coding of integers - Coding of real numbers - Coding of characters |
| 3.- The processor | <ul style="list-style-type: none"> - Instruction set - Types of processors - Instruction-level parallelism |
| 4.- The memory system | <ul style="list-style-type: none"> - Memory hierarchy - Cache - Principal memory - Virtual memory |
| 5.- Input/Output | <ul style="list-style-type: none"> - Basic concepts - I/O Techniques - File systems |
| 6.- Operating system | <ul style="list-style-type: none"> - Operating system components - Processes |
| 7- Parallel Systems | <ul style="list-style-type: none"> - Introduction to parallel systems - Multicore Systems - Shared Memory Systems - Distributed Memory Systems |

Planning

| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
|--------------------------------|------------------------|--------------------------------------|-------------------------------|-------------|
| Laboratory practice | A4 B2 B3 B5 C3 | 20 | 28 | 48 |
| Guest lecture / keynote speech | A4 A6 B5 | 30 | 30 | 60 |
| Objective test | A4 B2 B3 | 3 | 9 | 12 |
| Problem solving | A4 A6 B2 B3 C3 | 10 | 17 | 27 |
| Personalized attention | | 3 | 0 | 3 |

(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

| Methodologies | Description |
|--------------------------------|---|
| Laboratory practice | Activity that allows students to learn and consolidate the knowledge already acquired through practical sessions in the laboratory. This methodology allows exercising and evaluating the A4, B2, B3 and B5 skills. The acquisition of the transversal competence C3 will also be taken into account in these sessions. |
| Guest lecture / keynote speech | Master sessions will be held on the contents of the agenda, normally as a starting point for the rest of the planned activities. These contents will be focused on the A4 and the A6 competition. The sessions will be focused in such a way as to promote the acquisition of transversal and core competencies of the subject. |
| Objective test | At the end of the semester there will be an exam that will evaluate the contents of the subject. The test will place particular emphasis on the A5, A6 and B5 skills |
| Problem solving | Problems will be proposed to the students to solve as personal work. Solutions will be discussed in problem classes. This methodology allows exercising the A4, A6, B2 and B3 skills. The acquisition of the transversal competence C3 will also be taken into account in these sessions. |

Personalized attention

| Methodologies | Description |
|---------------|-------------|
|---------------|-------------|



| | |
|--|---|
| Problem solving Laboratory practice | Personalized attention is essential to guide the students in carrying out the proposed problems and for laboratory practices. On the other hand, students will be recommended to attend tutorials as a method of help. |
|--|---|

| Assessment | | | |
|---------------------|------------------------|--|---------------|
| Methodologies | Competencies / Results | Description | Qualification |
| Laboratory practice | A4 B2 B3 B5 C3 | The practices carried out by the students during the development of them in the laboratory sessions will be evaluated. With the results of these practices, it is sought to evaluate the A4, B2, B3 and B5 competencies. | 30 |
| Objective test | A4 B2 B3 | At the end of the semester there will be a written exam on the contents of the subject. This exam will assess the A4, B2 and B3 skills. | 70 |

| Assessment comments |
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| <p>In the first opportunity, in order to pass the course, it will be necessary to take the final exam and have a total grade (practicals plus exam) equal or higher than 50% of the maximum grade. In the second opportunity the grade of the exam will be 100% of the total, that is, the whole syllabus will be evaluated including 30% of the practices. In order to pass the course, the final grade (exam plus practicals) must be equal or higher than 50% of the maximum grade. For students who take the advanced opportunity in December, the grade of the exam will be 100% of the total, that is, the entire syllabus will be evaluated including 30% of practices. Students with part-time enrollment may choose the internship group that best fits their schedules, allowing them group mobility throughout the course. Those who have been granted academic dispensation are exempted from class attendance, they will only have to take the internship tests corresponding to the continuous evaluation. Failure qualification in the call in which the fault is committed and respecting the subject in which it was committed: the student will be qualified with "suspense" (numerical grade 0) in the corresponding call of the academic year, whether the commission of the fault occurs in the first opportunity or in the second one. For this, the student's grade will be modified in the record of the first opportunity, if necessary.</p> |

| Sources of information | |
|------------------------|---|
| Basic | <ul style="list-style-type: none"> - David A. Patterson and John L. Hennessy (2017). Computer Architecture and Design RISC-V. Morgan Kaufmann Publishers - J. Carretero Pérez, F. García Carballeira, F. Pérez Costoya (2020). Sistemas operativos: una visión aplicada. Mc Graw Hill |
| Complementary | <ul style="list-style-type: none"> - F. García Carballeira, J. Carretero, J.D. García Sánchez y D. Expósito Singh (2015). Problemas Resueltos de Estructura de Computadores. Paraninfo - M. Beltrán Pardo y A. Guzmán Sacristán. (2010). Diseño y Evaluación de Arquitectura de Computadores. Grupo Anaya Publicaciones Generales - David A. Patterson y John L. Hennessy (2011). Estructura y Diseño de Computadores. Reverté - John Waldron (1999). Introduction to RISC Assemblée Language Programming. Addison-Wesley |

| Recommendations |
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| Subjects that it is recommended to have taken before |
| Subjects that are recommended to be taken simultaneously |
| Subjects that continue the syllabus |
| Other comments |

According to the different regulations applicable to university teaching, the gender perspective must be incorporated in this subject: - non-sexist language will be used, bibliography of authors of both sexes will be used, the intervention of male and female students in class will be encouraged.- we work will be done to identify and modify sexist prejudices and attitudes, and the environment will be influenced to modify them and promote values of respect and equality. - If situations of gender discrimination are detected, actions and measures to correct them will be proposed.

(*)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.