Teaching Guide				
Identifying Data				2022/23
Subject (*)	Fundamentals of Computers		Code	614G02005
Study programme	Grao en Ciencia e Enxeñaría de Datos			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	First	Basic training	6
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría de Computadores			
Coordinador	Sanjurjo Amado, Jose Rodrigo	E-mail	jose.sanjurjo@udc.es	
Lecturers	Amor Lopez, Margarita Gonzalez Gomez, Patricia Sanjurjo Amado, Jose Rodrigo	E-mail	margarita.amor@udc.es patricia.gonzalez@udc.es jose.sanjurjo@udc.es	
Web	campusvirtual.udc.gal			
General description	This subject intends to present 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.			

Study programme competences / results	
Code	Study programme competences / results
A10	CE10 - Coñecemento da arquitectura e funcionamento dos computadores, a interconexión dos compoñentes que os forman e o seu software de sistema básico.
B1	CB1 - Que os estudantes demostrasen posuír e comprender coñecementos nunha área de estudo que parte da base da educación secundaria xeral, e adóitase atopar a un nivel que, aínda que se apoia en libros de texto avanzados, inclúe tamén algúns aspectos que implican coñecementos procedentes da vangarda do seu campo de estudo
B5	CB5 - Que os estudantes desenvolvesen aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores cun alto grao de autonomía
B6	CG1 - Ser capaz de buscar e seleccionar a información útil necesaria para resolver problemas complexos, manexando con soltura as fontes bibliográficas do campo.
C1	CT1 - Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.

Learning outcomes			
Learning outcomes	Study programme competences / results		
Coñecer e comprender a estrutura básica dun computador e como representa a información internamente	A10	B1 B5	
Coñecer os fundamentos da arquitectura e funcionamento básico dos bloques funcionais dun computador (procesador, memoria, E/S)	A10	B5	
Desenvolver as capacidades básicas para programar a baixo nivel un procesador mediante unha linguaxe ensamblador	A10	B5 B6	C1
Comprender a estrutura e funcionamento dos subsistemas de memoria, E/S e almacenamento externo dun computador	A10	B1 B5 B6	C1
Coñecer a estrutura e compoñentes básicos dun sistema operativo e saber utilizalo a nivel de usuario	A10	B5 B6	C1

Contents	
Topic	**Sub-topic**
1. Basic computer architecture	1.1 Hierarchy of structural levels 1.2 Brief history of computing 1.3 Von Neumann model
2. Information representation	2.1 Numering systems 2.2 Integer encoding 2.3 Float encoding (IEEE 754)
3. The processor	3.1 Instruction set 3.2 Datapath 3.3 Control unit
4. Memory hierarchy	4.1 Main memory 4.2 Cache memory 4.3 Virtual memory
5. I/O subsystem	5.1 I/O modules 5.2 I/O module addressing 5.3 I/O management
6. System software	6.1 Operating system 6.2 Processes 6.3 Filesystem
7. Storage systems	7.1 Types of storage devices 7.2 RAID (redundant arrays of inexpensive disks)

Planning				
Methodologies / tests	**Competencies / Results**	**Teaching hours (in-person & virtual)**	**Student?s personal work hours**	**Total hours**
Problem solving	A10 B1 B5 B6	10	17	27
Laboratory practice	A10 B1 B5 B6 C1	20	28	48
Guest lecture / keynote speech	A10 B1 B5	30	30	60
Objective test	A10 B1 B5 B6	3	9	12
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**
Problem solving	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, including questions about related theory. This metodology is mainly used to both gain and evaluate program competences B1, B5, and B6 in relation to the competence A10.
Laboratory practice	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, B5, and B6 in relation to the competence A10. The acquisition of transversal competence C1 will also be taken into account in these sessions.
Guest lecture / keynote speech	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 competence of this course, namely competence A10.
Objective test	At the end of the term, a final exam will assess the syllabus of this subject. This exam will evaluate the acquisition of competences A10, B1 and B5, but without neglecting the rest of them (B6 and C1).

Personalized attention	
Methodologies	**Description**
Problem solving Laboratory practice	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. Part-time Students may choose the lab group that better fits their timetables, even with the possibility of change during the term. Moreover, part-time students with an approved dispensation for non-attendance at classes only need to perform the practices corresponding to the continuous assessment of the subject.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Problem solving	A10 B1 B5 B6	Exercises will be proposed to the students to be solved on their own. This personal work will be evaluated by written exams during the term. These exams will assess the competences B1, B5 and B6 in relation to competences A10.	20
Laboratory practice	A10 B1 B5 B6 C1	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, B5, B6 and C1 in relation to the competence A10.	20
Objective test	A10 B1 B5 B6	A written exam covering the complete syllabus will be carried out at the end of the term. This exam will mainly assess the competences A10, B1, B5 and B6.	60

Assessment comments
To pass the course it is mandatory to do the final objective test and to obtain a final grade (lab sessions + midterm exams + final objective test) at least a 50% of the maximum possible grade.The final objective test for the 2nd opportunity call will cover the complete syllabus and will provide the 80% of the final grade. The grades from the problem solving exams during the course will be discarded. The laboratory practices grade is the obtaining during the course. Students taking advantage of the ahead December call will be evaluated using their laboratory practices grade from the previous term. The condition to pass the course in this call is to obtain a final grade, adding this exam grade and the laboratory practices grade, equal to or greater than 50% of the maximum possible grade.Cheating at any evaluated task will directly mean a failing grade of '0' for the corresponding part of the course (lab sessions, problem solving exams or final objective test).Part-time students may choose the lab group that better fits their timetables, even with the possibility of change during the term. Moreover, part-time students with an approved dispensation for non-attendance at classes only need to perform the practices corresponding to the continuous assessment of the subject.

Sources of information	
Basic	- David A. Patterson, John L. Hennessy (2014). Computer organization and design : the hardware/software interface. Morgan Kaufmann Publishers - J. Carretero Pérez, F. García Carballeira, P. de Miguel Anasagasti, F. Pérez Costoya (2007). Sistemas operativos: una visión aplicada. Mc Graw Hill - F. García Carballeira, J. Carretero, J.D. García Sánchez y D. Expósito Singh (2015). Problemas resueltos de estructura de computadores (2ª ed.). Paraninfo
Complementary	- Miles J. Murdocca y Vicent P. Heuring (2002). Principios de arquitectura de computadoras. Prentice Hall

Recommendations

Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
High Performance Computing Infrastructures/614G02015
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.