IDENTIFYING DATA

Computer Architecture II

Subject	Computer Architecture II
Code	O06G150V01303
Study programme	(*)Grao en Enxeñaría Informática

Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Mandatory	2nd	1st

Teaching language	#EnglishFriendly Spanish Galician
Department	
Coordinator	García Rivera, Matías
Lecturers	García Rivera, Matías Sotelo Martínez, José Manuel Trillo Rodríguez, José Luís
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General description	This subject concerns in the basic concepts about the components of the architecture of a computer given in Computer Architecture I, in order to understand the operation of a current computer. Technical documentation will be used in English.

English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English. |

Competencies

Code	
A2	Students will be able to apply their knowledge and skills in their professional practice or vocation and they will show they have the required expertise through the construction and discussion of arguments and the resolution of problems within the relevant area of study.
B2	Ability to manage the project⬜s activities from the computing field in accordance with the acquired knowledge and training.
B4	Ability to define, assess and select hardware and software platforms for the development and execution of computing systems, services and applications, according to the acquired knowledge and training.
B5	Ability to conceive, develop and maintain computing systems, services and applications through use of software engineering methods as tools to ensure quality, according to the knowledge and training acquired.
B6	Ability to conceive and develop centralized or distributed computing systems and architectures, integrating hardware, software and networks, according to the knowledge and training acquired.
B7	Ability to learn, understand and apply the necessary legislation during professional practice as a Computer Science Engineer and to use the relevant binding specifications, regulations and norms.
C7	Ability to design, develop, choose and assess computer applications and systems to guarantee their reliability, safety and quality, according to ethical principles and existing legislation and regulations.
C11	Knowledge, administration and maintenance of computer systems, services and applications.
C15	Ability to know, understand and assess the structure and architecture of computers, as well as their basic components.
C19	Knowledge and application of the necessary tools for storing, processing and accessing information Systems, including web-based ones.
C25	Ability to develop, maintain and assess software systems and services that satisfy all the demands of users and work reliably and efficiently, are easy to develop and maintain, and meet the quality standards, applying the theories, principles, methods and practices of Software Engineering.
C26	Ability to assess clients⬜ needs and determine the software requirements to satisfy these needs, reconciling conflicting goals through attempts to reach acceptable compromises within the limits imposed by costs, available times, existing developed systems and organizations themselves.
C29	Ability to identify, assess and deal with associated risks that could potentially arise.

C30	Ability to design appropriate solutions in one or more domains of application by using methods of software engineering that include ethical, social, legal and economic issues.	
C32	Ability to select, design, implement, integrate, assess, build, manage, exploit and maintain hardware, software and network technologies, within the appropriate costs and quality requirements.	
C34	Ability to select, design, implement, integrate and manage networks and communications infrastructures in organizations.	
C35	Ability to select, design, implement, integrate and manage information systems that meet the needs of organizations, once the costs and quality criteria have been identified.	
D1	I1: Analysis, synthesis and assessment skills.	
D3	I3: Oral and written communication skills in one's native language.	
D5	I5: Abstraction skills: ability to create and use models that reflect real situations.	
D7	I7: Ability to search for, establish links and organize information coming from different sources and to integrate ideas, knowledge and skills.	
D8	I8: Problem-resolution skills.	
D9	I9: Ability to make decisions.	
D10	I10: Ability to present arguments and justify one's decisions and opinions in logical terms.	
D11	P1: Ability to act independently.	
D12	P2: Ability to work in situations where information is lacking and under pressure.	
D13	P3: Ability to quickly fit into a group and to work efficiently in intradisciplinary teams and to cooperate in an interdisciplinary environment.	
D15	P5: Interpersonal relations skills.	
D16	S1: Critical-thinking skills.	
D17	S2: Commitment to uphold ethical and democratic values.	
D18	S3: Independent-learning skills.	
D19	S4: Ability to adapt to new situations.	
D20	S5: Creativity.	
D21	S6: Leadership skills.	
D22	S7: Ability to take the initiative and be determined.	
D24	S9: Commitment to striving for quality and continuous improvement.	

Learning outcomes

Expected results from this subject		Training and Learning Results	
New	A2	C19	D1
		C29	D3
			D5
			D7
			D8
			D9
			D10
			D11
			D12
			D13
			D15
			D16
			D17
			D18
			D19
			D20
			D21
			D22
			D24

		A	B	C	D
New		A2	B5	C25	D1
				C35	D3
					D5
					D7
					D8
					D9
					D10
					D11
					D12
					D13
					D15
					D16
					D17
					D18
					D19
					D20
					D21
					D22
					D24
New			B7	C7	D1
				C11	D3
				C15	D5
				C34	D7
					D8
					D9
					D10
					D11
					D12
					D13
					D15
					D16
					D17
					D18
					D19
					D20
					D21
					D22
					D24
New				C11	D1
					D3
					D5
					D7
					D8
					D9
					D10
					D11
					D12
					D13
					D15
					D16
					D17
					D18
					D19
					D20
					D21
					D22
					D24

New	B2	C26	D1
	B4	C30	D3
	B5	C32	D5
	B6		D7
			D8
			D9
			D10
			D11
			D12
			D13
			D15
			D16
			D17
			D18
			D19
			D20
			D21
			D22
			D24

Contents

Topic	
Introduction to current processors	Processors of the families x86, x64, ARM.
System and memory hierarchy I	Introduction to systems and the hierarchy of memory in personal computers. Internal memory. Principal memory. Types of DRAM memory. Cache. Memory system of the Intel family.
System and memory hierarchy II	External memory. Magnetic and solid state disks (HDD, SSD). Physical and logical discs. File systems in HDDs and SSDs. Optical and tape drives.
Input Output Technics	Input Output Techniques on personal computers. Peripherals and I / O modules. External interfaces: USB, IEEE 1394, PATA, SATA. Power supply: power supply, uninterrupted and emergency power systems, batteries.
Interconnection with buses	Interconnection and hierarchy of buses. PCI, AGP, PCI-Express buses.
Practices I	Low-level programming in a simple computer of the input-output techniques.
Practices II	Identification of components of personal computers. Disassembly and assembly of personal computers.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	24	30	54
Problem solving	24	30	54
Laboratory practical	12	12	24
Problem and/or exercise solving	6	12	18

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

Methodologies

	Description
Lecturing	(*)Exposición ao alumnado dos contidos da materia.
Problem solving	(*)Formulación, análise, resolución e debate de problemas ou exercicios relacionados coa temática da materia.
Laboratory practical	(*)Formulación, análise, resolución e debate de problemas de programación de computadoras a baixo nivel relacionados con entrada saída

Personalized assistance

Tests	Description

	Problem and/or exercise solving	An individual analysis of the students will be carried out through a continuous control of the partial tests.		

Assessment

	Description	Qualification	Training and Learning Results			
Laboratory practical	2 laboratory practice tests to evaluate the small group classes. Each of these 2 tests will be 20% of the final grade. In order to pass the subject, it is mandatory that the student presents himself / herself to all the tests and that in each test he / she obtains a grade equal to or higher than 3 out of 10. Results: RA02 y RA05.	40	A2	B5	C25 C26 C30 C32 C35	D1 D3 D5 D7 D8 D9 D10 D11 D12 D13 D15 D16 D17 D18 D19 D20 D21 D22 D24
Problem and/or exercise solving	2 short answer tests to evaluate the large group classes. Each of these 2 tests will be 30% of the final grade. In order to pass the subject, it is mandatory that the student presents himself / herself to all the tests and that in each test he / she obtains a grade equal to or higher than 3 out of 10. Results: RA01, RA03 y RA04.	60	A2	B2 B4 B6 B7	C7 C11 C15 C19 C29 C34	D1 D3 D5 D7 D8 D9 D10 D11 D12 D13 D15 D16 D17 D18 D19 D20 D21 D22 D24

Other comments on the Evaluation

All references to numeric grades in this guide are about 10.

ASSESSMENT CRITERIA FOR ASSISTANTS 1st EDITION OF ACTS

For the students attending the first edition of the acts, 4 mandatory partial tests will be carried out:

- 2 short answer tests to evaluate the large group classes. Each of these 2 tests will be 30% of the final grade.
- 2 laboratory practice tests to evaluate the small group classes. Each of these 2 tests will be 20% of the final grade.

To pass the subject it is mandatory that the student is present to all the tests and that in each test obtain a grade equal to or higher than 3.

In the case of not performing any test or obtain in a test a grade lower than 3, if the overall score is higher than 5, the final grade in the act will be 4.9, fail.

The dates of these 4 tests for the attending students can be consulted in the calendar of activities of the ESEI.

EVALUATION CRITERIA FOR NON-ASSISTANTS 1st EDITION OF ACTS

The evaluation for the non-attending students in the first edition of the acts will be 2 tests:

Methodology / Test 1: short answer test

Description: A mandatory test with short answers on all the contents of the large group classes.

% Grade: This test will be 60% of the final grade.

Evaluated competences: CB2, CG5, CE25, CE26, CE30, CE32, CE35, CT1, CT3, CT5, CT7, CT8, CT9, CT10, CT11, CT12, CT13, CT15, CT16, CT17, CT18, CT19, CT20, CT21, CT22, CT24

Evaluated learning outcomes: RA01, RA02 y RA04.

Methodology / Test 2: laboratory practice

Description: A mandatory practical test on the contents of the classes of the small groups. This practice will be developed with a PC and specific hardware. The download of the hardware manuals and software programs used will be available at faitic.uvigo.es.

% Grade: This test will be 40% of the final grade.

Evaluated competences: CB2, CG2, CG4, CG6, CG7, CE7, CE11, CE15, CE19, CE29, CE34, CT1, CT3, CT5, CT7, CT8, CT9, CT10, CT11, CT12, CT13, CT15, CT16, CT17, CT18, CT19, CT20, CT21, CT22, CT24

Evaluated learning outcomes: RA01 y RA03.

To pass the subject, it is mandatory that the student presents himself / herself to the 2 tests and that in each test he / she obtains a grade equal to or greater than 3.

In the case of not performing any test or obtain in a test a grade lower than 3, if the overall score is higher than 5, the final grade in the minutes will be 4.9, fail.

EVALUATION CRITERIA FOR THE 2nd EDITION AND OTHERS ACTS

The same evaluation system applied for non-assistants will be used.

ACTS QUALIFICATION PROCESS

Regardless of the call, in the case of not performing any test or obtain in a test a grade lower than 3, if the overall score was greater than 5, the final grade in minutes will be 4.9, fail.

EVALUATION DATES.

The calendar of evaluation tests officially approved by the Center Board of the ESEI is published on the web page http://www.esei.uvigo.es/index.php?id=29.

PROHIBITION OF USE OF ANY ELECTRONIC DEVICE

All students are reminded to prohibit the use of any electronic device in exercises and practices.

JUSTIFICATION OF ABSENCE

To be able to justify the absence to a test, a certificate issued by a doctor is necessary. A proof of the doctor's appointment will not be valid.

Sources of information
Basic Bibliography
Stallings, William, **Organización y arquitectura de computadores**, 7ª edición, Prentice Hall, 2006
Eben Upton, Jeff Duntemann, Ralph Roberts, Tim Mamtora, and Ben Everard, **Learning Computer Architecture with Raspberry Pi®**, John Wiley & Sons, Inc., 2016

Meyers, Mike, **CompTIA A+ Certification All-in-One Exam Guide : Exams 220-801 and 220-802 with CD**, 8th Edition, McGraw-Hill Osborne, 2012

Quentin Docter; Emmett Dulaney; Toby Skandier, **CompTIA A+ : Exams 220-801 and 220-802 Study Guide 2nd**, 2nd Edition, John Wiley, 2012

ASUS, **H81M-PLUS User's Manual:**
http://dlcdnet.asus.com/pub/ASUS/mb/LGA1150/H81M-PLUS/E8448_H81M-PLUS.pdf, First Edition V1, ASUS, June 2013

Complementary Bibliography

Romero Ternero, Díaz Ruiz, Molina Cantero, **Estructura y Tecnología de Computadores. Teoría y Problemas**, Mcgraw-Hill, 2009

Bertrán, Guzmán, **Diseño y evaluación de Arquitectura de Computadoras**, Pearson, Prentice Hall, 2010

Parhami, Behrooz, **Arquitectura de computadoras: de los microprocesadores a las supercomputadoras**, McGraw-Hill Interamericana, 2007

Patterson, David A, **Estructura y diseño de computadores: interfaz circuitería-programación**, Reverté, 2004

Simon Monk, **Raspberry Pi Cookbook**, O⬚Reilly Media, 2016

Recommendations

Subjects that continue the syllabus

Parallel architectures/O06G150V01401

Subjects that are recommended to be taken simultaneously

Algorithms and data structures II/O06G150V01302
Operating systems I/O06G150V01305

Subjects that it is recommended to have taken before

Physics: Digital Systems/O06G150V01105
IT: Computer Architecture I/O06G150V01203
IT: Programming I/O06G150V01104
Programming II/O06G150V01205