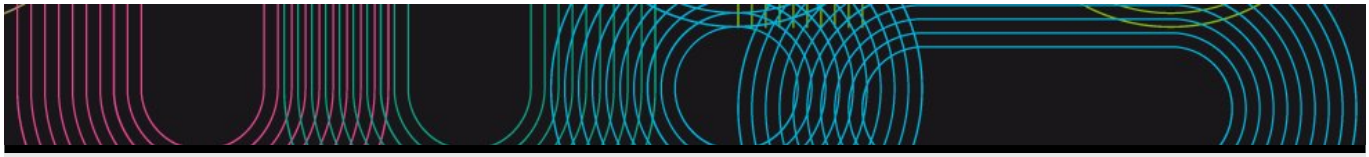

IDENTIFYING DATA				
Informatics: Computer Architecture				
Subject	Informatics: Computer Architecture			
Code	V05G300V01103			
Study programme	Degree in Telecommunications Technologies Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Spanish			
Department				
Coordinator	Llamas Nistal, Martín			
Lecturers	Álvarez Sabucedo, Luis Modesto Anido Rifón, Luis Eulogio Fernández Iglesias, Manuel José Llamas Nistal, Martín Mikic Fonte, Fernando Ariel Santos Gago, Juan Manuel			
E-mail	martin@uvigo.es			
Web	http://faitic.uvigo.es			
General description	Computers have become an essential tool. This fact is even more clear while studying the "Bachelor of Engineering in Telecommunications Technology" (Grado en Ingeniería de Tecnologías de Telecomunicación), where computers are not only manipulated from a user's --or specialized user's-- point of view, but also from the engineering perspective, as tools to be designed or to be integrated in more complex systems. Hence, the main motivation for the "Computer Architecture" (Arquitectura de Ordenadores) course is to provide students with an understanding of basic computer operation by studying the lower abstraction levels (over the electronic level). The subject "Computer Architecture" (Arquitectura de Ordenadores) is focused on the conventional machine level, describes the operating machine level and shows an example application for the Symbolic Machine domain through the introduction of the Database Management Systems.			

Competencies	
Code	
B3	CG3: The knowledge of basic subjects and technologies that enables the student to learn new methods and technologies, as well as to give him great versatility to confront and adapt to new situations
B4	CG4: The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity.
C2	CE2/FB2: The basic knowledge about using and programming computers, operative systems, databases and Engineering applied software.
D2	CT2 Understanding Engineering within a framework of sustainable development.
D3	CT3 Awareness of the need for long-life training and continuous quality improvement, showing a flexible, open and ethical attitude toward different opinions and situations, particularly on non-discrimination based on sex, race or religion, as well as respect for fundamental rights, accessibility, etc.

Learning outcomes	
Expected results from this subject	Training and Learning Results
Knowledges of the main concepts related with the architecture of the computers and capacity for his handle through models.	B3

Capacity for the handle of the systems of representation of the information used in the computers	B3		
Knowledges of the types of instructions more representative and variations more notable and capacity to determine the implications of his use by part of the programmer of conventional machine	B3 B4		
Knowledges of the main ways of addressing modes in assembler language and capacity for the efficient handling of these.	B3 B4	C2	
Acquisition of skills on the design of algorithms and the construction of programs to level of conventional machine	B3 B4	C2	D2 D3
Knowledge of the principles and fundamental components of the operating systems	B3	C2	D3
Understanding of the main functions of the operating systems	B3	C2	D3
Knowledge of the fundamental aspects of the databases.	B3	C2	D3
Understanding of the distinct models of organisation of the information in databases	B3	C2	D3
Acquisition of basic skills on the languages of query to databases	B3 B4	C2	D2 D3

Contents

Topic	
1. PRELIMINARIES	Information Representation in computers. von Neumann Model. Structural, procesal and functional models
2. von Neumann Model	Components of von Neumman machine. Simple Machine: Simplez. Central Processing Unit, Arithmetic and Logic Unit, memries, registries, buses. External Communication, active waiting, Introduction to addressing modes
3. Symbolic Representation and Processing .	Representation of basic data elements: integer, character, floating point. Conventions for data storage. Processing operations. Introduction to simbolic processing. Assembler language
4. Instructions and addressing	Instructions and addressing Software considerations. Registries at the conventional machine level. Lenguage for register transfer (RT level). Instruction format. Addressing modes. Stacks and subprograms. Assembler languages
5. Typical conventional machine	Structural Model. Functional Model. Set of instuctions. Addressing modes, Assembler. Examples of programmes. Algortimez
6. Peripheral management	Types of peripherals. Management of variety. Models. Secondary memories. Interruptions. Service Rutines. ADM: justification.
7. Operating Systems	Operative Machine. Introduction to Operating Systems. Definition of an operating system. Interface operating system.
8. Data Bases	Introduction to Data Bases. Relational Model. Entity-relation model. Query languages. Introduction to SQL

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practises	22	27.5	49.5
Introductory activities	5	5	10
Troubleshooting and / or exercises	10	17.5	27.5
Master Session	12	24	36
Self-assessment tests	0	3	3
Practical tests, real task execution and / or simulated.	4	8	12
Short answer tests	3	9	12

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

Methodologies

	Description
Laboratory practises	The course includes programming practices that will performed using a simple computer (SIMPLEZ) and a regular computer (ALGORITMEZ). Through this methodology the competencies CG3, CG4, CT2, CT3 and CE2 are developed.
Introductory activities	Presentation of the course contents, methodology, office hours, evaluation, usage of the labs, and any other issue related to the subject. Through this methodology the competences CG3 and CT3 are developed.
Troubleshooting and / or exercises	Programming, information representation, and other problems and exercises will be solved during the classes. Some must be solved by students previously at home, and they will participate actively in the solution of some other problems. Through this methodology the competencies CG, CT2 and CE2 are developed.

Master Session	Theoretical concepts and their practical application will be introduced during the classes. Students will be encouraged to participate by alternating lectures with problem and exercise solving. Therefore, sessions will include lectures and time for exercises and problems. Through this methodology the competencies CG3, CT3 and CE2 are developed.

Personalized attention

Methodologies	Description
Master Session	Students will have the chance to attend tutorial sessions at the teacher´s office. Teachers will establish timetables for this purpose at the beginning of the course. This schedule will be published on the subject website.
Laboratory practises	Students will have the chance to attend tutorial sessions at the teacher´s office. Teachers will establish timetables for this purpose at the beginning of the course. This schedule will be published on the subject website.
Troubleshooting and / or exercises	Students will have the chance to attend tutorial sessions at the teacher´s office. Teachers will establish timetables for this purpose at the beginning of the course. This schedule will be published on the subject website.

Assessment

	Description	Qualification	Training and Learning Results	
Self-assessment tests	Exam questions will be available for students, in order to perform autoevaluation.	0	B3 B4	C2
Practical tests, real task execution and / or simulated.	Three practical exams (ongoing evaluation) will be performed in laboratory.	50	B3 B4	C2
Short answer tests	Three exams (ongoing evaluation) will be performed to evaluate the theory.	50	B3 B4	C2

Other comments on the Evaluation

This subject is organized in two parts: Theory and Practice.We consider the harmonic average of A and B as HA(A,B)=2*A*B/(A+B). If A=B=0 then HA(A,B)=0And the Arithmetic Average of A and B as AA(A,B)=(A+B)/2
The final grade for the course (FG) is as follows, according to theory grade (TG) and Practice Grade (PG):

If TG >= 5 AND PG >=5 **then** FG =AA(TG, PG)

else {

If HA (TG,PG) > 3 **then** FG = HA(TG,PG)

else FG = AA(TG,PG), max. 3 (i.e. if AA(GT,PG)>3 then FG=3)

}

To pass the course, FG must be greater than or equal to 5.
Both parts can be evaluated by Continuous Evaluation (CE) or by Final Exam (FE). In addition, the part of theory can be followed and evaluated by Blended Flipped Classroom (BFC).
The FE will consist of Theory and Practice, and will take place in date and time officially established.
EC will consist of the tasks described in this guide, and are not recoverable, ie, if a student cannot comply within the stipulated period the teacher is not required to repeat them.
If one of the subject parts is passed in the final semester examinations, its grade will be kept for the remedial examinations where the student only must be evaluated of the other part. If the student has followed CE in part that remains, he/she will keep the grades.
The CE tasks grades are only valid for the current academic course, being discarded in case the student fails the course.

THEORY
The Theory part is divided into two subparts: T1 and T2. T1 covers approximately 66% of the syllabus (up to theme 5 included), while T2 the 100% of the syllabus.
The Theory grade is the harmonic average of the grades of these two subparts, ie:
TG = HA(T1,T2) = 2*T1*T2/(T1+T2)

*CONTINUOUS EVALUATION (CE):
In CE in Theory, the T1 subpart consists of two exercises (CE1 and CE2) and T2 subpart of one exercise. They will be done approximately in the 5th week, 10th week and the final exam (ie, the third exercise is part of the Review Final) .

The syllabus is about 33% of the total for the first exercise CE1 (up to theme 3, floating point excluded), 66% for the second CE2 (up to theme 5 included) and 100% for the third (T2).
The note of the first subpart is T1 = HA(CE1,CE2)

If the student has followed CE but has failed the subject, the T1 and T2 grades will be kept for remedial examinations.
* BLENDED FLIPPED CLASSROOM (BFC)In a week, one hour class will be done by watching videos outside the classroom, and the other class time in the classroom to answer questions, problems and evaluation.
Enrollment in groups BFC will be held during the first week of class, and it will begin in the second week. Students who choose BFC must sign a document stating their commitment to follow the rules of the BFC.
*SEMESTER FINAL EXAM
Any student, whether or not has followed the CE, can take the Final Exam. If the student followed the CE, he/she may discard the results obtained there, and take the Final Exam . In this case, the valid grade will be the FE, canceling the grades that had been obtained previously in the CE.
This Final Exam will have two exercises (T1 and T2) to be done in 90 minutes. Students who have not passed CE will have to present to the entire Final Exam (T1 and T2).

* REMEDIAL EXAMS
The Theory Remedial Exam has the same structure as in the Semester Final Exam and will last 90 minutes. If CE was not followed, the student will have to do both T1 and T2, regardless of the grades in each exercise in Final Semester Exam. If EC was followed, the student can do T1 and/or T2, canceling the grades that he/she had previously obtained.

PRACTICE
*CONTINUOUS EVALUATION:
The CE of Practice consists of 3 exercises P1, P2 and P3 . P1 will be about Simplez, P2 about Basic Algoritmez (over 60% of the syllabus) and P3 about Full Algoritmez (100% of the syllabus). The exercises will be done in the laboratory and will last approximately 1 hour. P1 will be around the 4th week, P2 around the 8th P2 and P3 at he final exam. P1 and P2 will be held in afternoon shifts.The Practice CE grade is the weighted average of these three exercises: PG = 0.20*P1 + 0.35*P2 + 0.45*P3

*SEMESTER FINAL EXAM
Any student, whether or not has followed the CE, can take the Final Exam. If the student followed the CE, he/she may discard the results obtained there, and take the Final Exam . In this case, the valid grade will be the FE, canceling the grades that had been obtained previously in the CE.
This Final Exam will have one exercise about Algoritmez to be done in the laboratory in 1 hour (approximately).
In this case, the Practice Grade is the grade of the Final Exam.

* REMEDIAL EXAM
The student will have a Remedial Exam similar to the Semester Final Exam.

GENERAL ISSUES
ACTS- For the CE to be considered in Acts, the student will have do exercise P1 in Practice or EC1 in Theory. Any student following the CE who does not do any of these exercises (P1 or EC1):
His/her grade will not be registered in the acts and, for all purposes, will be treated as those presented for the first time, without having studied before.
He/she could not take the other CE exercises, as they will not be considered.
EXAMS: To perform any theory exam (CE1, CE2, T1 and T2) or practice (P1, P2, P3 and Final Exam), including remedial exams, all students must register through the corresponding software tool, for which it will be notified with a minimum term of 5 calendar days.
Note: Prior to an exercise or an exam, the date and procedure for the score review will be published sufficiently in advance.

Sources of information
Gregorio Fernández Fernández, **Curso de Ordenadores. Conceptos básicos de arquitectura y sistemas operativos.**, 5ª,
Silberschatz, H.F. Horth y S. Sudarshan, **Fundamentos de Bases de Datos.**, 2ª,
A. S. Tanenbaum, **Organización de Computadoras. Un enfoque estructurado.**, 4ª,
J.L. Hennessy y D.A. Patterson, **Arquitectura de los Computadores. Un enfoque cuantitativo**,
Martín Llamas Nistal, Fernando A. Mikic Fonte y Manuel J. Fernández Iglesias, **Arquitectura de Ordenadores: Problemas y Cuestiones de Teoría**, 1ª,
Alberto Gil Solla, **Ejercicios resueltos sobre Fundamentos de los Ordenadores**, 1ª,
Alberto Gil Solla, **Problemas resueltos de programación en ensamblador**, 1ª,
Fernando A. Mikic Fonte y Martín Llamas Nistal, **Arquitectura de Ordenadores: Problemas de Programación en Ensamblador**, 1ª,

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[Dat01] C.J. Date. 2001. Introducción a los Sistemas de Bases de Datos. Pearson Educación. ISBN : 968-444-419-2

[EN02] R.A. Elmasri and S.B. Navathe. 2002. Fundamentos de Sistemas de Bases de Datos. Pearson Educación. ISBN 978-84-782-9085-7

[FMH01] I.M. Flynn y A. McIver McHoes. 2001. Sistemas Operativos (tercera edición) . Thomson Learning. ISBN: 534376665

[GUW02] H. García-Molina, J.D. Ullman y J. Widom. 2002. Database Systems. The Complete Book . Prentice-Hall. ISBN 0137135262

[HVZ87] V.C. Hamacher, Z.G. Vranesic, S.G. Zaky, 1987. Organización de Computadoras (2ª ed.) McGraw-Hill.

[PH95] D. A. Patterson y J.L. Hennessy (Traducido por J.M. Sánchez), 1995. Organización y diseño de Computadores. La interfaz hardware/software. McGraw-Hill. 1-55860-281-X.

[SBG02] A. Silberschatz, P. Baer Galvin, G. Gagne. 2002. Sistemas Operativos (sexta edición). Limusa-Wiley. ISBN: 9681858220

SIMULATORS:

ESAL: http://www.gist.uvigo.es/esal

SIMULNET: http://www-gist.det.uvigo.es/~lanido/fo1/fo1.html

Recommendations