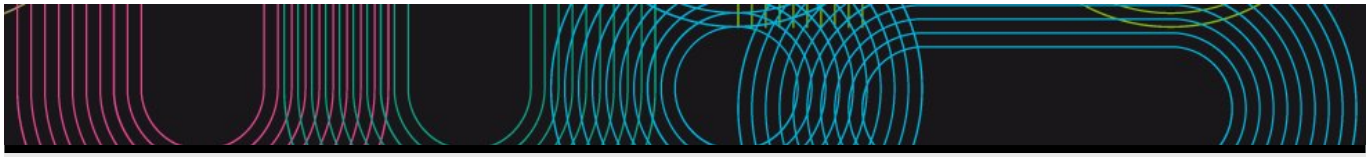

| IDENTIFYING DATA | | | | |
|---|---|---|---|---|
| **Informatics: Computer Architecture** | | | | |
| Subject | Informatics: Computer Architecture | | | |
| Code | V05G300V01103 | | | |
| Study programme | (*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Basic education | 1st | 1st |
| Teaching language | Spanish | | | |
| Department | | | | |
| Coordinator | Llamas Nistal, Martín | | | |
| Lecturers | Álvarez Sabucedo, Luis Modesto<br>Anido Rifón, Luis Eulogio<br>Costa Montenegro, Enrique<br>Fernández Iglesias, Manuel José<br>Gil Solla, Alberto<br>Llamas Nistal, Martín<br>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.<br><br>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).<br><br>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 | |
| A3 | CG3: The knowledge of basic subjects and technologies that capacitates the student to learn new methods and technologies, as well as to give him great versatility to confront and update to new situations |
| A4 | 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. |
| A11 | CE2/FB2: The basic knowledge about using and programming computers, operative systems, databases and Engineering applied software. |

| Learning aims | |
|---|---|
| Expected results from this subject | Training and Learning Results |
| (*)FB2: Basic knowledge on the use and programming of computers, operating systems, data bases and software applied to engineering. | A11 |
| (*)CG3: Knowledge on basic subjects and technologies, enabling learning new methods and technologies, as well as endowed with the versatility to adapt to new situations. | A3 |

| | |
|---|---|
| (*)CG4: Problem-solving capacity with initiative, decision making, creativity, and to communicate and transfer knowledge, skills and abilities, understanding the ethical and professional responsibility of the activity of Telecommunications Technical Engineering | A4 |

## 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 | (*)4. IInstructions 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. Introduction to CPU management. Introduction to memory management. Introduction to file management. Introduction to I/O management. |
| (*)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). |
| Introductory activities | Presentation of the course contents, methodology, office hours, evaluation, usage of the labs, and any other issue related to the subject. |
| 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. |
| 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. |

## Personalized attention

| Methodologies | Description |
|---|---|
| Master Session | |
| Laboratory practises | |
| Troubleshooting and / or exercises | |

## Assessment

| | Description | Qualification |
|---|---|---|
| Self-assessment tests | Exam questions will be available for students, in order to perform autoevaluation. | 0 |
| Practical tests, real task execution and / or simulated. | Three practical exams (ongoing evaluation) will be performed in laboratory. Competencies A3, A4 and A11. | 50 |
| Short answer tests | Three exams (ongoing evaluation) will be performed to evaluate the theory.Competencies A3, A4 and A11. | 50 |

**Other comments on the Evaluation**

This subject is organized in two parts: Theory and Practice.
The final grade for the course (FG) is the harmonic average (HA) of both parts, TG (Theory Grade) and PG (Practice Grade). Namely
FG = HA(TG,PG) = 2*TG*PG/(TG+PG)
If the two terms (TG and PG in this case) are zero, the harmonic average is zero (0).
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).
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 December examinations, its grade will be kept for the July 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, 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), 66% for the second (CE2) and 100% for the third (T2).
The note of the first subpart is T1 = 0.35 * CE1 + 0.65 * CE2
If the student has followed CE but has failed the subject, the T1 and T2 grades will be kept for July examinations.

*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).

* RECOVERY IN JULY
The Theory Final 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 December. 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 around the last week .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.

* RECOVERY IN JULY
In July, the student will have a Final 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.
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,


ADITIONAL BIBLIOGRABHY:


[Cos98] C. Costilla Rodríguez. 1996. Introducción a las Bases de Datos Modernas. Dpto. Publicaciones ETSIT Madrid. ISBN 84-605-6469-X

[Dat99] C.J. Date. An introduction to database systems (Vols. 1 y 2) . Séptima edición. Addion-Wesley. ISBN-10: 0201385902, ISBN-13: 978-0201385908

[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


## Recommendations