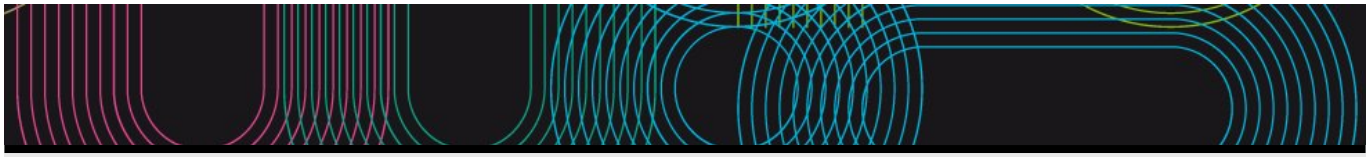

IDENTIFYING DATA				
Informatics: Computer Architecture				
Subject	Informatics: Computer Architecture			
Code	V05G306V01109			
Study programme	Bachelor Degree in Telecommunication Technologies Engineering (BTTE)			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	English			
Department				
Coordinator	Llamas Nistal, Martín Fernández Iglesias, Manuel José			
Lecturers	Fernández Iglesias, Manuel José Llamas Nistal, Martín Mouriño García, Marcos Antonio			
E-mail	manolo@uvigo.es martin@uvigo.es			
Web	http://moovi.uvigo.es			
General description	Students of the degree in Engineering in Telecommunication Technologies interact with computers both as specialized users and as designers and developers of complex systems, where computers play a central role in their design and even as systems components. Hence, the motivation for a course in computer architectures is to provide students with a fundamental understanding of computer operations. For this, computers are studied at the conventional machine level, which abstracts away implementation details that will be discussed in electronics/microelectronics courses and serves as the foundation for the symbolic machine level, at which computers are programmed using high-level languages. Besides, this course provides an introduction to the operating machine level by discussing basic operating systems concept, and shows an example application of the symbolic machine level through the introduction of the Database Management Systems. This is an English Friendly course: 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.			

Training and Learning Results	
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.

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. Central Processing Unit, Arithmetic and Logic Unit, memory, registers, buses.
3. Symbolic Representation and Processing .	Representation of basic data elements: integer, character, floating point. Conventions for data storage. Processing operations. Introduction to symbolic processing. Assembler language.
4. Instructions and addressing	Instructions and addressing modes. Software considerations. Registers at the conventional machine level. Register transfer language (RT level). Instruction formats. Addressing modes. Stacks and subprograms. RISC and CISC computers.
5. RISC Computer	Instruction sets & formats. Addressing modes. Assembler. Example programs.
6. CISC Computer	Instruction sets & formats. Addressing modes. Assembler. Example programs.
7. Device Management.	Device types. Management of variety. Models. Secondary memories. Interrupts. Service Rutines. DMA: justification.
8. Parallelism and parallel Architectures	Pipelining. Parallelism and memory access. Associative Memory. Parallel architectures. Vector processors. Multiprocessors.
9. Operating systems	The operating machine. Introduction to operating systems. Definition of an operating system.
10. Databases	Introduction to the database systems. Database types.

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practical	22	27.5	49.5
Introductory activities	5	5	10
Problem solving	10	17.5	27.5
Lecturing	12	24	36
Self-assessment	0	3	3
Laboratory practice	2	4	6
Laboratory practice	2	4	6
Problem and/or exercise solving	1	4	5
Problem and/or exercise solving	2	5	7

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

Methodologies

	Description
Laboratory practical	The course includes programming assignments that will performed using an ARM simulator. Using this methodology, competences CG3, CG4, CT2, CT3 and CE2 are developed.
Introductory activities	Presentation of course contents, methodology, tutoring hours, evaluation, lab work, and any other issue related to the subject. Through this methodology, competences
Problem solving	Programming, information representation, and other problems and exercises will be solved at lecture time. Some will be solved by students in advance at home, and they will participate actively in the solution of additional problems. Through this methodology, competencies CG, CT2 and CE2 are developed.

Lecturing	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 assistance

Methodologies	Description
Lecturing	Students will have the chance to attend tutorial sessions at the teacher´s office. Teachers will define an schedule for this purpose at the beginning of the course. This schedule will be published on the course website.
Laboratory practical	Students will have the chance to attend tutorial sessions at the teacher´s office. Teachers will define an schedule for this purpose at the beginning of the course. This schedule will be published on the course website.
Problem solving	Students will have the chance to attend tutorial sessions at the teacher´s office. Teachers will define an schedule for this purpose at the beginning of the course. This schedule will be published on the course website.

Assessment

	Description	Qualification	Training and Learning Results		
Self-assessment	Exam questions will be available for students, in order to perform self assessment.	0	B3 B4	C2	
Laboratory practice	EP1 continuous evaluation exam consisting of practical exercises at the laboratory on the part P1 of the lab syllabus.	16	B3 B4	C2	D2 D3
Laboratory practice	EP2 continuous evaluation exam consisting of practical exercises at the laboratory on the part P2 of the lab syllabus.	24	B3 B4	C2	D2 D3
Problem and/or exercise solving	ET1 continuous evaluation classroom exam consisting on questions and/or exercises, covering the part T1 of the classroom syllabus.	24	B3 B4	C2	D2 D3
Problem and/or exercise solving	ET2 continuous evaluation classroom exam consisting on questions and/or exercises, covering the part T2 of the classroom syllabus.	36	B3 B4	C2	D2 D3

Other comments on the Evaluation

ASSESSMENT

This subject is organized in two parts: Theory and Lab.

The final grade for the course (FG) is computed as the weighted average (WA) of the theory grade (TG) and Lab Grade (PG): FG = WA = 0.6 x TG + 0.4 x LG

However, if any of TG or LG is less than 3.5 and WA is greater than 4.0, then the final grade will be 4.0 or the weighted average WA of both grades, whatever is the lowest value.

To pass the course, FG must be greater than or equal than 5.0

Both parts can be evaluated by Continuous Assessment (CA) or by a Global assessment (GA), in the latter case by means of a final exam (FE).

The FE will have two parts, Theory and Lab, and will take place at the officially approved date and time.

CA will be based on the tests defined in this guide. In the case an student misses a CA test it cannot be retaken or rescheduled.

CA test grades are only valid for the current academic year, being discarded in case the student fails the course.

CLASSROOM SESSIONS / THEORY

The Theory part is divided into two sub-parts: T1 and T2. T1 corresponds to approximately half of the syllabus, while T2 covers all the syllabus.

CLASSROOM. REGULAR CALL (CONVOCATORIA ORDINARIA) ASSESSMENT

CLASSROOM. REGULAR CALL. CONTINUOUS ASSESSMENT (CA).

In the case of CA, it consists of two exams: ET1 and ET2 that correspond to the two parts in which classroom content is

divided. ET1 & ET2 exam dates will be approved at a Degree's Academic Committee (CAG) meeting and will be available at the beginning of the academic term.

Additionally, during the classroom lectures, short exercises may be proposed to be completed using your cell phone. Altogether, they can add up to one additional point to the theory grade of each part.

Thus, the grade for each part will be the one obtained in the exam (0-10 points) plus the one obtained by solving the short exercises (0-1 points).

The theory CA grade for the Regular call is TG=0.4xT1 + 0.6xT2 (i.e., the weights of T1 & T2 in the final grade are respectively 40% & 60%).

CLASSROOM. REGULAR CALL. GLOBAL ASSESSMENT

All students that have not attended CA will have to attend the Final classroom exam (FCE). The FCE consists of two exercises for T1 and T2.

The global assessment's theory grade is computed as: TG=0.4xT1 + 0.6xT2

CLASSROOM. SUPPLEMENTARY CALL (CONVOCATORIA EXTRAORDINARIA) ASSESSMENT

The Supplementary call exam has the same structure as the Regular call one.

Not attending the Supplementary Call implies accepting the grade obtained at the Regular call.

If you failed the theory part (both in CA and GA), you can:

- sit both parts (ET1 and ET2), which would supersede the theory grade obtained in CA or GA.

- sit only one of the two parts (ET1 or ET2), which would supersede the grade obtained for that part in CA or GA.

- not to take any part and keep the theory grade obtained in CE or GA.

In case of CA, the grade obtained by solving the short exercises during the classroom lectures will be kept and added to the final grade.

The theory grade will be the one computed as 0.4xT1 + 0.6xT2, with the new grades from ET1 and/or ET2, if applicable. Sitting any part (ET1 and/or ET2) implies renouncing to the previously obtained grade.

CLASSROOM. END-OF-STUDIES CALL

It will consist of an exam similar to the Final exam of the Regular call.

LAB ASSESSMENT

The lab part is carried out on an ARM/Thumb assembler. It is divided into two parts: P1 deals with about half of the syllabus and P2 the whole syllabus.

LAB. REGULAR CALL

LAB. REGULAR CALL. CONTINUOUS ASSESSMENT (CA)

The Lab's CA consists of 2 exercises EP1, EP2 that correspond to the two parts in which lab activities are divided. The EP1 exam's date will be approved in a Degree's Academic Committee (CAG), will take place in the afternoon and all the details will be available at the beginning of the academic term. EP2 will take place on the day of the Regular call's GA. There will be a separate exam for those who opt for CA and for those who decide to sit the GA only.

Additionally, during the lab sessions, short exercises may be proposed to be completed using your cell phone. Altogether, they can add up to one additional point to the lab grade.

Thus, the grade for each part will be the one obtained in the exam (0-10 points) plus the one obtained by solving the short exercises (0-1 points).

The lab CA grade for the Regular call is TG=0.4xT1 + 0.6xT2

LAB. REGULAR CALL. GLOBAL ASSESSMENT

All students opting for GA will have to attend a final lab exam (FLE).

The FLE will consist of an exercise on the complete ARM/Thumb syllabus to be performed in the lab.

The lab grade in this case is the grade obtained in the FLE.

LAB. SUPPLEMENTARY CALL EXAM

The Supplementary call's exam will be similar to the GA's FLE of the Regular call. All students who did not pass the lab part, independently of them of opting for CA or not, may attend this exam. Not attending the Supplementary call's assessment implies accepting the grade obtained at the Regular call. Nevertheless, CA students will keep the average grade obtained (0-1) from the short lab exercises.

LAB. END-OF-STUDIES CALL

It will consist of an exam similar to the FLE of the Regular call.

GENERAL REMARKS

All exercises and exams in this course are graded from 0 to 10. **As a consequence of short exercises, the student's grade may be higher than 10. In that case, the final grade would be 10, considering the total grade higher than 10 for the awarding of honours.**

Not participating in the Supplementary call assessment process implies accepting the grade obtained at the Regular call assessment.

TUTORING

Tutoring sessions will be suspended t**wo school days prior** to any official exam.

CONTINUOUS ASSESSMENT ELIGIBILITY

Students may opt for CA independently for the classroom/theory part and lab/practical part. To be eligible for CA, students must take the first exam in that part (theory/ET1 and/or lab/EP1).

Once being enrolled in CA for theory or lab, students cannot opt for GA for the corresponding part. As pointed out above, students may opt to be assessed differently (CA or GA) for theory and lab.

OFFICIAL TRANSCRIPTS

If a student is graded at least once after taking any of the exams in CA or GA, its final grade will be computed according to this guide.

EXAMS

To take any classroom exam (ET1, ET2, FE) or lab exam (EP1, EP2, FLE), all students must register using the designated software tool. The registration process will be open and notified with a minimum of 5 calendar days prior to the corresponding exam.

GRADING INFO

The date and procedure for grade review will be published in advance.

COMMUNICATION WITH STUDENTS

Communication between students and lecturers will be done by means of the standard procedures established by the University. **It is assumed that all students read their email (the one registered in Moovi) at least once a day.**

ETHICAL CODE

Plagiarism is regarded as serious dishonest behavior. If any form of plagiarism is detected in any of the tests or exams, the final grade will be FAIL (0), and the incident will be reported to the corresponding academic authorities for prosecution. All students are expected to have an ethical behavior in all exams, ensuring equal opportunities for all students. If an infraction is detected in an exam, the score obtained in that test will automatically be zero (0) and a report will be issued to the School Direction to take actions.

These are some examples of unethical behavior: use of electronic devices (mobile phones, tablets, computers, etc.), copy from another peer, use of unauthorized material in an exam, etc.

Sources of information

Basic Bibliography

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Sergio Barrachina Mir, Maribel Castillo Cata- lán, Germán Fabregat Llueca, Juan Carlos Fernández Fer, **Prácticas de inntroducción a la arquitectura de computadores con QtARMSim y Arduino**, Universitat Jaume I, 2014

Recommendations