UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: COMPUTER ARCHITECTURE
Type: CORE COURSE
Degree: 407 - DEGREE PROGRAMME IN COMPUTER SCIENCE ENGINEERING
Center: 108 - SCHOOL OF COMPUTER SCIENCE OF C. REAL
Year: 3
Main language: English
Use of additional languages:
Web site:

Code: 42323
ECTS credits: 6
Academic year: 2020-21
Group(s): 20 21 22
Duration: First semester
Second language:
English Friendly: N
Bilingual: Y

Lecturer: **SERAFIN BENITO SANTOS** - Group(s): **21 22**

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Fermín Caballero/3.08	TECNOLOGÍAS Y SISTEMAS DE INFORMACIÓN	3712	serafin.benito@uclm.es	Available in https://esi.uclm.es/categories/profesorado-y-tutorias

Lecturer: **JESÚS BLANCO RODRÍGUEZ DE GUZMAN** - Group(s): **21**

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2. Pre-Requisites

Before taking this subject, your are supposed to have a good knowledge of the internals of a basic computer, as well as understanding how pipelining works, its advantages and drawbacks. It is also advisable that you are able to understand assembly code. more concretely we will assume that you are familiarized with the DLX/MIPS architecture.

Even without this prior knowledge you can still take the subject, but you should take into account the additional effort that it will imply. More concretely, you should review and study the program of Computer Structure (1st course) and Computer Organization (2nd Course). The Hennessy & Patterson book (included in the references) is also a good source of information to get this previous learning outcomes.

3. Justification in the curriculum, relation to other subjects and to the profession

This subject is part of the "Computing Engineering" block in the graduate degree. Here you will learn about the architectural concepts present in most current computers (from a laptop to a server in a data center). It provides the foundings for the following subjects: "Advanced Computer Architecture", "Operating Systems II", "Microprocessor based systems design" and "Information Systems Integration".

From the career point of view, the knowledge adquired should be useful to evaluate and select the most appropriate computing system for the concrete needs of a client. Furthermore, this type of know-how will also be useful for any company working on the development or integration of any type of computer system.

4. Degree competences achieved in this course

Course competences

Code	Description
CO01	Ability to design, develop, select, and assess, applications and digital systems, guaranteeing their reliability, security, and quality, according to ethical principles and the current and common laws.
CO08	Ability to analyse, design, build and maintain applications in a strong, safe, and efficient manner by selecting the most appropriate paradigms and programming languages.
CO09	Ability to know, understand, and assess the structure and architecture of computers, and their basic components.
INS01	Analysis, synthesis, and assessment skills.
INS04	Problem solving skills by the application of engineering techniques.
INS05	Argumentative skills to logically justify and explain decisions and opinions.
PER02	Ability to work in multidisciplinary teams.
PER04	Interpersonal relationship skills.
PER05	Acknowledgement of human diversity, equal rights, and cultural variety.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Knowledge and identification of paralelisms at instruction level trhoughout segmentation and problems linked to it.

Understanding of the principles of computer architecture.

Knowledge of the structure of a CPU, identification of its functioning units, and explanation of their role in the execution of instructions.
Knowledge of assessment techniques for computer performance.
Identification of main types of architectures.

Additional outcomes

- Understanding the concept of the programming model.
- Impact on performance of interactions between the programming model, programs coding and computer architecture.
- Understand the design of different types of ILP processors taking into account the relationships between technology, architecture, software, compilers, cost, power consumption, performance and market demands

6. Units / Contents

Unit 1: Introduction to Computer Architecture and Programming Models
Unit 2: Introduction to ILP Processors
Unit 3: Static Scheduling in ILP Processors
Unit 4: Superscalar and VLIW Processors
Unit 5: Dynamic Scheduling in ILP Processors

ADDITIONAL COMMENTS, REMARKS

Practical activities:

- Parallelizing with OpenMP. Measuring performance and understanding its relation with architecture, parallelism, coding and programming model

- Superscalar speculative dynamic scheduling with WinSuperDLX simulator

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Study and Exam Preparation [OFF-SITE]	Self-study	CO08 CO09	1.8	45	N	-	Self-study (EST)
Writing of reports or projects [OFF-SITE]	Self-study	CO01 CO08 CO09 INS01 INS04 PER02 PER05	0.9	22.5	Y	N	Preparation of essays on topics proposed by lecturer (RES)
Other off-site activity [OFF-SITE]	Practical or hands-on activities	CO01 CO08 CO09 INS01 INS04 PER02 PER04	0.9	22.5	N	-	Lab practical preparation (PLAB)
Class Attendance (theory) [ON-SITE]	Lectures	CO08 CO09	0.9	22.5	N	-	Teaching of the subject matter by lecturer (MAG).
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	CO01 CO08 CO09 INS01 INS04	0.54	13.5	Y	Y	Realization of practicals in laboratory (LAB).
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CO09 INS04 PER04	0.48	12	Y	N	Worked example problems and cases resolution by the lecturer and the students (PRO).
Individual tutoring sessions [ON-SITE]		CO08 CO09	0.18	4.5	N	-	Individual or small group tutoring (TUT).
Other on-site activities [ON-SITE]	Assessment tests	CO08 CO09 INS01 INS04 INS05	0.15	3.75	Y	Y	Partial test 1 of the first half of the syllabus of the subject (EVA)
Other on-site activities [ON-SITE]	Assessment tests	CO08 CO09 INS01 INS04 INS05	0.15	3.75	Y	Y	Partial test 2 of the second half of the syllabus of the subject (EVA)
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Test	0.00%	25.00%	Partial Test 1. Compulsory activity that can be retaken. To be carried out within the planned dates of the final exam call.
Test	0.00%	25.00%	Partial Test 2. Compulsory activity that can be retaken. To be carried out within the planned dates of the final exam call.
Test	25.00%	0.00%	Partial Test 1. Compulsory activity that can be retaken (rescheduling). To be carried out at the end of the first half of the teaching period.
Test	25.00%	0.00%	Partial Test 2. Compulsory activity that can be retaken. To be carried out within the planned dates of the final exam call. The Partial Test 1 retake will be performed at this date.
Laboratory sessions	25.00%	25.00%	Compulsory activity that can be retaken. It will be assesed by tests or projects.
Projects	15.00%	15.00%	Non-compulsory activity that can be retaken. Elaboration of projects.
Other methods of assessment	10.00%	10.00%	Non-compulsory activity that can be retaken. Participation in forums and online training activities will be valued

Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

In compulsory activities, a minimum mark of 40% is required in order to pass that activity and have the possibility to therefore pass the entire subject. The evaluation of the activities will be global and therefore must be quantified by means of a single mark. If the activity consists of several sections, each section may be evaluated separately provided students are informed in writing of this evaluation criterion at the beginning of the academic year. In the case of the activities that may be retaken (i.e., rescheduling), an alternative activity or test will be offered in the resit/retake exam call (convocatoria extraordinaria).

The partial tests will be common for all the theory/laboratory groups of the subject and will be evaluated by the lecturers of the subject in a serial way, i.e., each part of the final exam will be evaluated by the same lecturer for all the students.

A student is considered to pass the subject if she/he obtains a minimum of 50 points out of 100, taking into account the points obtained in all the evaluable activities, and also has passed all the compulsory activities.

For students who do not pass the subject in the final exam call (convocatoria ordinaria), the marks of activities already passed will be conserved for the resit/retake exam call (convocatoria extraordinaria). In the case of the passed recoverable activities, the student will have the opportunity to receive an alternative evaluation of those activities in the resit/retake exam call and, in that case, the final grade of the activity will correspond to the latter grade obtained.

The qualification of the passed activities in any call, except for the partial tests, will be conserved for the next academic year at the request of the student, provided that it is equal or superior to 5 and the training activities and the evaluation criteria of the subject are not modified in the next academic year.

The failure of a student to attend the partial 1 and partial 2 tests will automatically result in her/him receiving a "Failure to attend" (no presentado). If the student has not passed any compulsory evaluation activity, the maximum final grade will be 40%.

Non-continuous evaluation:

Students who are unable to attend training activities on a regular basis may apply at the beginning of the semester for the non-continuous assessment mode. Similarly, if a student who is undergoing continuous assessment incurs any circumstance that prevents her/him from regularly attending the classroom-based training activities, she/he may renounce the accumulated mark in continuous assessment and apply for the non-continuous assessment mode. In this case, a notification by the student must be given before the date scheduled for the tests in the ordinary call, in accordance with a deadline that will be informed at the beginning of the semester.
Students who take the non-continuous assessment mode will be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences), through the assessment systems indicated in the column "Non-continuous assessment".
In the "non-continuous assessment" mode, it is not compulsory to keep the mark obtained by the student in the activities or tests (progress test or partial test) taken in the continuous assessment mode.

Specifications for the resit/retake exam:

Evaluation tests will be conducted for all recoverable activities.
The call is consumed only if the student carries out any evaluation activity.

Specifications for the second resit / retake exam:

Same characteristics as the resit/retake exam call.
The call is consumed even if the student does not carry out any evaluation activity.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	**hours**
Study and Exam Preparation [AUTÓNOMA][Self-study]	45
Writing of reports or projects [AUTÓNOMA][Self-study]	22.5
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	22.5
Class Attendance (theory) [PRESENCIAL][Lectures]	22.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	13.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	12
Individual tutoring sessions [PRESENCIAL][]	4.5

General comments about the planning: The subject is taught in 3 x 1,5 hour sessions per week: two sessions of theory and problems in the classroom and one of practice in the laboratory.

Global activity

Activities	**hours**
Individual tutoring sessions [PRESENCIAL][]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	45
Writing of reports or projects [AUTÓNOMA][Self-study]	22.5
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	22.5
Class Attendance (theory) [PRESENCIAL][Lectures]	22.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	13.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	12
Total horas:	142.5

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
- Hennessy, John L. and D. A. Patterson	Computer Architecture: A Quantitative Approach. Sixth Ed.	Morgan Kaufmann		978-0-12-811905-1	2017	También sirven las ediciones 4.ª y 5.ª del libro.
- Ortega Lopera, Julio	Arquitectura de computadores	Thomson		84-9732-274-6	2006	

-	OpenMP Official Website / Sitio oficial de OpenMP http://www.openmp.org