Universitat de les Illes Balears

Academic year	2017-18
Subject	11541 - High-performance Computing
Group	Group 1, 1S
Syllabus	C
Language	English

Syllabus

Subject

Name 11541 - High-performance Computing
Credits 0.72 in-class (18 hours) 2.28 distance (57 hours) 3 total (75 hours).
Group Group 1, 1S (Campus Extens)
Period First semester
Language English

Lecturers

Lecturers	Office hours for students					
	Starting time	Finishing time	Day	Start date	End date	Office
Catalina Lladó Matas cllado@uib.es	13:30	14:30	Monday	11/09/2017	26/02/2018	237, AT

Context

The course High Performance Computing is a mandatory subject of the module Computing Technologies.The course takes place during the first term. The course examines current concepts of computer architecture such as computer performance and pipelining, as well as the memory hierarchy and its relationship to performance improvement.

Requirements

Recommended

It is recommended to have basic and intermediate knowledge of Computer Architecture.

Skills

Specific

* CE10 - Ability to understand and to apply advanced knowledge of high performance computing and numerical or computational methods to solve engineering problems.
* CE1 - Capacity for integration of technologies, applications, systems and services specific to computer engineering in more general and multidisciplinary broader contexts.

Generic

* CG8 - Ability to implement the acquired knowledge and solve problems in new or unfamiliar environments within broader and multidisciplinary contexts , being able to integrate this knowledge.

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Syllabus

Basic

* You may consult the basic competencies students will have to achieve by the end of the Master's degree at the following address: http://estudis.uib.cat/master/comp_basiques/

Content

Theme content

T1. Fundamentals of Quantitative Design and Analysis

Computer architecture review, memory hierarchy, multi -threaded,dependability,energy and measuring performance

T2. Pipelining and parallelism

Using pipelining techniques andparallelism to increase productivity. Necessary resources

T3. Pipelining and instruction interpretation.

Pipelined datapath and control, data hazards: forwarding vs stalling,control hazards and exceptions

Teaching methodology

The subject is explained using lectures, establishing an interactive relationship between teacher and studentsusing examples, solving simple exercises, problems and proposing more complex problems where studentscan develop the knowledge and skills acquired. The exercises sessions are combined with the more theoreticalones, and give students the opportunity to really confront the problems that arise in the course. The methodused consists in proposing various exercises that students must solve. Those will be collectively later correctedor will be corrected by the teacher individually.In order to encourage autonomy and personal work of the student, the course is part of the Extended Campus,which includes the use of electronic tools to achieve a flexible and distance education. Thus, and using theMoodle platform, students will have a means of online communication and ag distance with the teacher

In-class work activities

Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Blackboard lectures	Large group (G)	The subject is explained using lectures, establishing aninteractive relationship between teacher and students usingexamples, solving simple exercises, problems and proposingmore complex problems where students can develop theknowledge and skills acquired.	11
Seminars and workshops	Seminars	Medium group (M)	The seminars are supervised monographic sessions with shared participation of teachers , students, and possibly other experts from universities and the business world	2
Practical classes	Computing Laboratory sessions	Medium group (M)	The sessions and the Computing lab are done using asimulation environment of a pipelined computer	4

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Modality	Name	Typ. Grp.	Description	Hours
ECTS tutorials	Tutoring	Small group (P)	Personal relationship and help from the teacher- tutor to aid and directs one or more students.	1

At the beginning of the semester a schedule of the subject will be made available to students through the UIBdigital platform. The schedule shall at least include the dates when the continuing assessment tests will be conducted and the hand-in dates for the assignments. In addition, the lecturer shall inform students as to whether the subject work plan will be carried out through the schedule or through another way included in the Campus Extens platform.

Distance education work activities

Modality	Name	Description	Hours
Individual self-study	Final exam preparation	Self-study to prepare for the final exam	34
Group self-study	Final project and seminar	The students must carry out a final project using the pipelined architecture used in the classes. On the other hand, they have also to prepare a short presentation for the seminar	23

Specific risks and protective measures

The learning activities of this course do not entail specific health or safety risks for the students and therefore no special protective measures are needed.

Student learning assessment

Blackboard lectures

Modality	Theory classes
Technique	Observation techniques **(non-retrievable)**
Description	The subject is explained using lectures, establishing aninteractive relationship between teacher and students usingexamples, solving simple exercises, problems and proposingmore complex problems where students can develop theknowledge and skills acquired.
Assessment criteria	

Final grade percentage: 5%

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Seminars

Modality	Seminars and workshops
Technique	Papers and projects **(non-retrievable)**
Description	The seminars are supervised monographic sessions with shared participation of teachers , students, and possibly other experts from universities and the business world
Assessment criteria	
Final grade percentage: 15%	

Final exam preparation

Modality	Individual self-study
Technique	Short-answer tests **(retrievable)**
Description	Self-study to prepare for the final exam
Assessment criteria	
Final grade percentage: 50%	

Final project and seminar

Modality	Group self-study
Technique	Student internship dissertation **(retrievable)**
Description	The students must carry out a final project using the pipelined architecture used in the classes. On the other hand, they have also to prepare a short presentation for the seminar
Assessment criteria	
Final grade percentage: 30%	

Resources, bibliography and additional documentation

Basic bibliography

J.L Hennessy & D.A. Patterson. Computer Architecture: A Quantitative Approach. Morgan Kaufman
D.A. Patterson & J.L Hennessy. Computer Organization and Design: The Hardware/Software Interface.Morgan Kaufman

Complementary bibliography

W. Stallings. Computer Organization and Architecture. Pearson

Other resources

Articles, publications, notes and presentations that will be published during the course through the e-learning platform (Moodle)