Universitat de les Illes Balears

Academic year	2017-18
Subject	21703 - Digital Systems
Group	Group 95, 1S, GEIN, GIN2, GMAT
Syllabus	B
Language	English

Syllabus

Subject

Name 21703 - Digital Systems
Credits 2.4 in-class (60 hours) 3.6 distance (90 hours) 6 total (150 hours).
Group Group 95, 1S, GEIN, GIN2, GMAT (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 Digital Systems course is in the syllabus of the Degree in Computer Engineering and the Degree in Mathematics. In the case of the Computer Engineering degree it is a subject of the compulsory training module which is taught during the first semester of the first year. In the studies of the Degree of Mathematics is an optional subject. The subject, which has a total of four chapters, aims for the student to get to know the usual ways of representing information for its processing through a digital system and the analysis and synthesis of digital systems (combinational and sequential).

Requirements

Skills

Specific

* CCM09 - Ability to know, understand and evaluate the structure and architecture of computers, as well as its basic components.

Generic

* CTR01 - Capacity for analysis and synthesis, organization, planning and decision making.
* CTR07 - Ability to communicate the concepts of computer science in an oral and written way in different areas of action.

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Basic

* You may consult the basic competencies students will have to achieve by the end of the degree at the following address: http://www.uib.eu/study/grau/Basic-Competences-In-Bachelors-Degree-Studies/

Content

Theme content

1. From zero to one
    - 1.1.- Introduction
    - 1.2. - The art of managing complexity
    - 1.3. - The digital abstraction
    - 1.4. - Number systems
    - 1.5. - Logic gates
    - 1.6. - Beneath the digital abstraction
    - 1.7. - CMOS transistors
    - 1.8. - Power consumption
2. Combinational logic: design and analysis
    - 2.1.- Introduction
    - 2.2.- Boolean equations
    - 2.3.- Boolean algebra
    - 2.4.- From logic to gates
    - 2.5.- Functionally completesets oflogical connectives
    - 2.6.- Multilevel combinational logic
    - 2.7.- X's and Z's
    - 2.8.- Karnaugh maps
    - 2.9.- Combinational building blocks
    - 2.10.- Analysis of combinational systems
    - 2.11.- Timing
3. Sequential logic: design and analysis
    - 3.1.- Introduction
    - 3.2.- Finite state machines
    - 3.3.- Latches and flip-flops
    - 3.4.- Synchronous logic design
    - 3.5.- Sequential building blocks
    - 3.6.- Analysis of sequential systems

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4. Introduction to programmable logic
    4.1.- Types of programmable logic devices
    4.2.- Hardware description languages

Teaching methodology

In-class work activities

Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Blackboard lectures	Large group (G)	The subject will be explained by using a combination of the more traditional master class, where an interactive relationship will be established between teacher and student using examples, solving simple exercises and proposing statements of more complex problems, and the methodology of "flipped classrooms", where the students will have to prepare the theoretical contents at home, and then work them in a practical way in the classroom.	30
Practical classes	Computing Laboratory sessions	Medium group (M)	The practical sessions will consist of a series of supervised sessions. The students will have to design different digital circuits and simulate their behaviour using a simulator in the computer room.	16
Practical classes	Solving exercices lectures	Large group (G)	The exercises sessions are combined with the more theoretical ones, and give students the opportunity to really confront the problems that arise in the course. The method used consists in proposing various exercises that students must solve. Those will be collectively later corrected or will be corrected by the teacher individually.	14

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	Preparation of final exam and classes	Self study and work for the preparation of the final exam and for classes where practical work is done in the classroom. The final examwill be a combination of short and medium answer questions. If the grade of the FINAL EXAM of February is less than 5 and an average global grade of the subject greater than or equal to 5 has not been obtained, this exam will have to be repeated in the extraordinary call. Delivering a blank exam or with totally inconsistent or meaningless answers will be considered as not presented.	20

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Modality	Name	Description	Hours
Individual self-study	Preparation of partial exam and classes	Study and autonomous work for the preparation of the partial exam and for classes where practical work is done in the classroom. The partial exam will be a combination of short and medium answer questions.	20
Individual self-study	Study and Follow-up Exercises	Self-study and work for the follow-up of the subject and to solve the exercises recommended in class.	30
Group self-study	Final practical work	The student will have to carry out a final practical work (in groups of 2 people maximum), consisting of the synthesis of two digital circuits: a combinational one and asequential one. If the qualification of this practical work is less than 5 and an average global grade of the subject greater than or equal to 5 has not been obtained, this work must be repeated in the extraordinary call. The delivery of a blank report, or a project that does not work, with a functionality different from the one requested, or that is incoherent, will be considered as not presented. The same consideration will be given if the reportdoes not include a consistent description and adjusted to the statement of the requested work.	20

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 will be explained by using a combination of the more traditional master class, where an interactive relationship will be established between teacher and student using examples, solving simple exercises and proposing statements of more complex problems, and the methodology of "flipped classrooms", where the students will have to prepare the theoretical contents at home, and then work them in a practical way in the classroom.
Assessment criteria	Skills evaluated: CCM09, CTR07

Final grade percentage: 2% for the training plan A
Final grade percentage: 2% for the training plan B

Solving exercices lectures

Modality	Practical classes
Technique	Short-answer tests **(non-retrievable)**
Description	The exercises sessions are combined with the more theoretical ones, and give students the opportunity to really confront the problems that arise in the course. The method used consists in proposing various

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	exercises that students must solve. Those will be collectively later corrected or will be corrected by the teacher individually.
Assessment criteria	Skills evaluated:CCM09, CTR07

Final grade percentage: 8% for the training plan A
Final grade percentage: 8% for the training plan B

Preparation of final exam and classes

Modality	Individual self-study
Technique	Extended-response, discursive examinations **(retrievable)**
Description	Self study and work for the preparation of the final exam and for classes where practical work is done in the classroom. The final examwill be a combination of short and medium answer questions. If the grade of the FINAL EXAM of February is less than 5 and an average global grade of the subject greater than or equal to 5 has not been obtained, this exam will have to be repeated in the extraordinary call. Delivering a blank exam or with totally inconsistent or meaningless answers will be considered as not presented.
Assessment criteria	Skills evaluated:CCM09, CTR01, CTR07

Final grade percentage: 50% for the training plan A
Final grade percentage: 50% for the training plan B

Preparation of partial exam and classes

Modality	Individual self-study
Technique	Short-answer tests **(non-retrievable)**
Description	Study and autonomous work for the preparation of the partial exam and for classes where practical work is done in the classroom. The partial exam will be a combination of short and medium answer questions.
Assessment criteria	Skills evaluated:CCM09, CTR01, CTR07

Final grade percentage: 20% for the training plan A
Final grade percentage: 20% for the training plan B

Final practical work

Modality	Group self-study
Technique	Student internship dissertation **(retrievable)**
Description	The student will have to carry out a final practical work (in groups of 2 people maximum), consisting of the synthesis of two digital circuits: a combinational one and asequential one. If the qualification of this practical work is less than 5 and an average global grade of the subject greater than or equal to 5 has not been obtained, this work must be repeated in the extraordinary call. The delivery of a blank report, or a project that does not work, with a functionality different from the one requested, or that is incoherent, will be considered as not presented. The same consideration will be given if the reportdoes not include a consistent description and adjusted to the statement of the requested work.
Assessment criteria	Skills evaluated:CCM09, CTR01, CTR07

Final grade percentage: 20% for the training plan A
Final grade percentage: 20% for the training plan B

Resources, bibliography and additional documentation

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Basic bibliography

* Harris, D.V. and Harris, S.L. 'Digital Design and Computer Architecture'. Morgan Kaufman, 2nd edition. 2013
* Floyd, T. L. 'Digital Fundamentals'. Ed. Prentice-Hall.
* Miró J., Ortíz A., Proenza J. iSantamaría L. 'Problemes resolts de l'assignatura fonaments de computadors'UIB, 1995.

Complementary bibliography

* Angulo, José Mª y García Zubía, Javier 'Sistemas Digitales y Tecnología de Computadores' Paraninfo.
* Tocci R. J. Y Widmer N.S. 'Digital Systems: Principles and Applications' Ed. Prentice-Hall.
* García Sánchez J.E., Gil Tomás D., Martínez Iniesta M. 'Circuitos y sistemas digitales' Tebar Flores.
* Hayes, J. P. ' Introduction to digital logic design'. Ed. Addison Wesley.
* Mandado, E. 'Sistemas electrónicos digitales'. Ed. Marcombo.
* Taub, H. ' Digital Circuits and Microprocessors'. Ed. McGraw-Hill.
•Bibliography for cross-curricular competences: Oral and written communication:
* José Antonio Marina, María de la Valgoma. La Magia de Escribir. DEBOLSILLO, 2014. ISBN: 9788490626481.
* C. Michael Levy, Sarah Ransdell (eds). The Science of Writing: Theories, Methods, Individual Differences and Applications. Lawrence Erlbaum Associates, 1996. ISBN: 0-8058-2108-2 (c), 0-8058-2109-0 (p), 978-1-136-68678-8 (ebk).

Other resources

Aula Digital

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