

Course guide 340372 - ESC1-I2O01 - Computer Structure I

Last modified: 10/10/2024

Unit in charge: Teaching unit:	Vilanova i la Geltrú School of Engineering 701 - DAC - Department of Computer Architecture.
Degree:	BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2018). (Compulsory subject).
Academic year: 2024	ECTS Credits: 7.5 Languages: Catalan, Spanish
LECTURER	
Coordinating lecturer:	Asensio García, Adrián Farreras Esclusa, Montserrat

Others:Asensio García, AdriánFarreras Esclusa, MontserratTort Martinez, Adria

PRIOR SKILLS

Knowledge on SISA architecture concepts, as well as basic knowledge on SISA assembler programming.

REQUIREMENTS

Introducció als Computadors (Introduction to Computers) subject already taken

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. CEFB4. Basic knowledge of use and computer programming, as well as of operating systems, data base and generally informatic programs with engineering applications.

- 2. CEFB5. Knowledge of informatic systems, its structure, function and interconnection, as well as fundamentals of its programming.
- 3. CEFC9. Ability to know, understand and assess computer structure and architecture, as well as basic components forming them.

4. CEFC7. Knowledge, design and efficient use of data types and structures the most appropriate to resolve problems.

Transversal:

5. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

6. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.



TEACHING METHODOLOGY

The course includes theory, problems and laboratory sessions. The first two are given in the classroom while the practical sessions are held in the computer classrooms of the center.

The theory sessions will be conducted using the resources available in the classroom (whiteboards, multimedia equipment, etc.) and are based on oral presentation of the contents of the subject under study (lecture method) by the lecturer. In some cases, sessions based on students participation through short-term activities in the classroom will be made, such as direct individual questions, student presentations on selected topics or resolution of problems linked to the theoretical concepts previously presented in the theory sessions.

The problems sessions are split into those in which the lecturer solves problems aiming at solidifying the newly acquired concepts in the theory lectures and those sessions in which students team up to solve problems, which then will be presented as a method for the entire group. The exercises will be given to students from the existing collection of previous tests or new problems proposed by the lecturer.

Finally, the lab sessions will be held in the computer classrooms of the center. Students must bring the practice to make ready (i.e., read and understand the statement of the practice from a guide that is previously uploaded in the digital campus). Students make then a small test (about 15 minutes) on the practice followed by the work on the computer. The practices will be individual handled.

LEARNING OBJECTIVES OF THE SUBJECT

The basic objective of the course is to understand the basic operation of a computer at programmer-level machine language, and the basic data structures that can be stored in a computer.

CEFB4: Basic knowledge of the use and programming of computers, operating systems, database and software with applications to engineering

CEFB5: Knowledge of the structure, operation and interconnection of computer systems as well as the basics of programming.

CEFC7: Understanding, design and use of efficient data types and data structures best suited to solve a problem.

CEFC9: Ability to know, understand and assess computer structure and architecture, as well as basic components forming them.

STUDY LOAD

Туре	Hours	Percentage
Self study	112,5	60.00
Hours small group	30,0	16.00
Hours large group	45,0	24.00

Total learning time: 187.5 h



CONTENTS

1. Computer technology

Description:

- 1.1. Introduction
- 1.2. Under the program: Hierarchical computer description at different abstraction levels
- 1.3. Performance monitoring
- 1.4. Multiprocessors
- 1.5. The pitfalls

Specific objectives:

Getting basic knowledge about functional blocks within a computer. Understanding about different elements building the programmin environment for a processor.

Related activities:

Activity 1: Computer design problems Activity 2: Lab session 0: Introducing the programming environment

Full-or-part-time: 9h

Theory classes: 1h Practical classes: 2h Self study : 6h

2. SISA-I

Description:

2.1. SISA-I overall architecture2.2. SISA-I instructions2.3. SISP-I-1 processor

Specific objectives:

Knowledge about the SISA-I architecture. Catch up concepts previously obtained about SISA-I assembler programming

Related activities:

Activity 1: Assember SISA-I problems Activity 2: Lab session 1

Full-or-part-time: 22h

Theory classes: 2h Practical classes: 6h Laboratory classes: 2h Self study : 12h



(ENG) 3. Entrada/Sortida

Description:

- 3.1. SISA-F main characteristics
- 3.2. SISA-F Assembler
- 3.3. Undsigned and signed binary representation
- 3.4. Integers in SISA-F. Floating point representation

Specific objectives:

Getting knowledge in unsigned and signed binary representation, using floating point representation. Descriptio of SISA-F instructions as well as discussion on the differences at the architectural level between SISA-I and SISA-F

Related activities:

Activity 1: SISA-F programming problems Activity 2: Lab session 2

Full-or-part-time: 20h

Theory classes: 2h Practical classes: 4h Laboratory classes: 2h Self study : 12h

4. Assembler SISA-F: Complex data structures

Description:

4.1. Memory access at byte level

- 4.2. Bits processing and loops programming
- 4.3. Pointers and complex data structures

Specific objectives:

Getting knowledge in simple and complex data structures, loop programming and iterative programming resources. Particular attention is devoted to managing pointers, vectors, matrixes and structs.

Related activities:

Activity 1: Problems about unsigned and signed numbers representation Activity 2: Problems about if, while (salts, beq, bne, jump), case, switch Activity 3: Lab session 3

Full-or-part-time: 42h Theory classes: 4h

Practical classes: 8h Laboratory classes: 4h Guided activities: 2h Self study : 24h



5. Subroutines

Description:

- 5.1. Introducció
- 5.2. Storing the processor state
- 5.3. Delivering values
- 5.4. Passing variables
- 5.5. Local variable
- 5.6. Summing up

Specific objectives: Knowledge on subroutines managing, programming and execution

Related activities:

Activity 1: Problems about subroutines Activity 2: Lab session 4

Full-or-part-time: 29h

Theory classes: 3h Practical classes: 4h Laboratory classes: 2h Guided activities: 2h Self study : 18h

GRADING SYSTEM

Final mark = Intermediate examination*0.2 * problems*0.2 + laboratory*0.2 + Final examination*0.4

Revaluation:

Students having Final mark lower than 5 and greater than or equal to 2 can attend to the Revaluation examination. It is revaluated the content corresponding to "Final examination". Revaluation mark = max(Final examination, Revaluation examination) Final mark = Intermediate examination*0.2 * problems*0.2 + laboratory*0.2 + Revaluation mark*0.4 In this case, the maximum Final mark that could be obtained is 7.0

BIBLIOGRAPHY

Basic:

- Patterson, David A. ; Hennessy, John L. Computer organization and design : the hardware/software interface. 6th ed. Oxford, GB: Morgan Kaufmann, 2021. ISBN 9780128201091.

- Patterson, David A. ; Hennessy, John L. Computer organization and design RISC-V edition : the hardware software interface. 2nd ed. Cambridge, MA: Morgan Kaufmann, 2021. ISBN 9780128203316.