

Computer Organization

Code: 102774
ECTS Credits: 6

2025/2026

Degree	Type	Year
Computer Engineering	OB	2

Contact

Name: Tomás Manuel Margalef Burrull

Email: tomas.margalef@uab.cat

Teachers

Xavier Cano De Castro

Nehir Sonmez Tekin

Rafael Cortes Fite

Otger Ballester Basols

Anna Barbara Sikora

Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

Although there are no formally established prerequisites, a good knowledge of the basic functioning of a computer and a certain knowledge of its functional units is indispensable. (Fundamentals of computers)

Objectives and Contextualisation

The objective of this subject is to know the operation of a computer, from the point of view of the instruction set, and to learn the operation of the subsystems of Input/Output and memory.

The theoretical concepts on the instruction are reinforced with the lab sessions where the students learn to program in assembly language.

All the components described in this subject must allow the student to understand the operation of a conventional computer and to a certain extent be able to make a simple design.

Competences

- Capacity to design, develop, evaluate and ensure the accessibility, ergonomics, usability and security of computer systems, services and applications, as well as of the information that they manage.
- Capacity to design, develop, select and evaluate computer applications and systems, ensuring reliability, security and quality, in accordance with ethical principles, and applicable standards and legislation.
- Conceive and develop centralised or distributed computer systems or architectures by integrating hardware, software and networks.
- Have the capacity to design and evaluate person-computer interfaces that guarantee the accessibility and usability of computer systems, services and applications.
- Have the right personal attitude.
- Know and apply the basic and main techniques of parallel, concurrent, distributed and real time programming.
- Know the characteristics, functionalities and structure of operating systems and design and implement applications based on their services.
- Know, understand and evaluate the structure and architecture of computers, as well as the basic components that they are composed of.

Learning Outcomes

1. Analyse and understand the translation that a computer makes of the original source code to generate the executable binary code.
2. Design and evaluate person-computer hardware interfaces that guarantee the accessibility and usability of computer systems, services and applications.
3. Design, develop, select and evaluate computer systems, ensuring their reliability, security and quality.
4. Design man-machine interfaces using user centred designs.
5. Generate proposals that are innovative and competitive.
6. Identify the accessibility, ergonomics and security requirements of computer systems.
7. Identify the architecture of a conventional computer, analysing in detail the different functional blocks that it is composed of.
8. Know, administer and maintain computer systems in terms of hardware.
9. Know and apply design diagrams in computer systems by integrating computer hardware, software and networks.
10. Know and apply the fundamental principles and basic techniques of parallel and real time programming.
11. Understand the assembly language to debug errors in source code and to detect performance problems.

Content

1. Computer Structure

2. The Processor

Instruction Set. Instruction Types. Increment Modes. Instruction Format.

3. Memory Hierarchy

Cache memory

4. The Memory System

Organization of the Memory System. Static and Dynamic Memory. Virtual

5. Input/Output and Buses

Input/Output Module. Programmed Input/Output. Interrupts. Direct Memo

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Exercises	7	0.28	9, 10, 3, 6, 7
Lab	9	0.36	1, 8, 9, 2, 11, 5
Theoretical lessons	22	0.88	3, 7
Type: Autonomous			
Study	100	4	10, 3, 7

1.- Lectures: The knowledge of the subject will be presented in the form of lectures. In these lectures the basic concepts exposed in the subject syllabus will be shown to the student and clear indications of how to complete and deepen these contents will be provided. The master classes, in spite of being mainly an explanation by the teacher, will be participatory for the student giving him/her the opportunity to ask those points that he/she does not understand where they will be constantly asked questions and problems to check the proper understanding of the exposed subject .

2.- Seminars: The objective of the seminars is double. On the one hand, the scientific and technical knowledge exposed in the lectures will be worked on to complete their understanding and deepen them. For this, diverse activities will be developed, from the typical resolution of problems to the discussion of practical cases. Learning methodologies and cooperative problem solving will be implemented. On the other hand, the seminars will be the natural forum in which to discuss altogether the development of practical work, contributing the knowledge that the student lacks to carry it out, or indicating where he/she can acquire this knowledge. The mission of the seminars is to bridge the gap between the master classes and the practical work, which will promote the capacity for analysis and synthesis, critical reasoning, and which will train the student to solve problems.

3.- Practicum: At the beginning of the course the student will receive a dossier with the practical work that must be developed during the course. This practical work is based on the design and programming of assembly programs that allow to understand the operation of a computer and learn the mechanisms of the Input / Output subsystem. The practices will be developed in groups of three students. The practicum includes 6 sessions in the laboratory, each lasting 2 hours, where the implementation and debugging of the programs will take place. Before each session the student will have to carry out work of preparation of the session and will have to show the professor to be able to begin his/her work in the laboratory. The student will deliver a report of the practicum in order to finish it and, for reasons of teaching ability, will only be corrected in the case of students whose grade is doubtful.

This approach of the work is oriented to promote an active learning and to develop the capacity competencies of organization and planning, oral and written communication, teamwork and critical reasoning. The quality of the project carried out, its presentation and its operation will be especially valued.

During theory classes and problem seminars, photos and recordings cannot be made without the consent of the teacher.

The platform for virtual communication used throughout the course will be the Virtual Campus - Moodle of the UAB.

TRANSVERSAL COMPETENCES

The transversal competences will be worked on and evaluated in several moments throughout the course. Specifically:

T06.03 Generate innovative and competitive proposals in the professional activity: In the laboratory sessions the students will carry out practical work and analyze the proposed solutions to solve the problems raised.

In case the lectures can not be done in presential way, they will be carried out in a "telepresential" way. It means, through synchronous sessions of theory, exercises and practices.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exercise Seminar 1	5%	1	0.04	3, 7
Exercise Seminar 2	5%	1	0.04	9, 10
Exercise Seminar 3	5%	1	0.04	1, 6
Exercise Seminar 4	5%	1	0.04	4, 3, 11, 6
Lab	30%	3	0.12	1, 8, 9, 2, 4, 11, 5
Lab Validation	Multiplying factor from 0.5 to 1.25	1	0.04	1, 11
1st partial exam	25%	2	0.08	3
2nd partial exam	25%	2	0.08	3, 7

Evaluation process and activities:

The objective of the evaluation process is to verify that the students have achieved the knowledge and skills defined in the objectives of the subject, as well as the competencies.

The evaluation will be carried out based on the degree of involvement in the seminars, the scientific-technical knowledge of the subject achieved by the students and the practical work developed by the students in groups of 3 people in the laboratory sessions.

To make this evaluation, the following instruments are available:

- The evaluation of the work in the Seminar sessions, which will include the delivery of a work in each session.
- Two midterms carried out throughout the course, individually, to adequately assess the degree of knowledge achieved by the students.
- The assessment of the students' work in the laboratory, as well as that of the documentation submitted of their practical work and the corresponding individual validation test.

Final grade = Midterm grade * (0.5) + Seminar grade * (0.2) + Practical grade * (0.3)

Midterm Grades = 1st Midterm * (0.5) + 2nd Midterm * (0.5)

Minimum average grade of Midterms: 5 points

Minimum grade of each midterm to be able to make calculate the final mark: 3 points

Rescheduling of Midterm Exams: In the cases contemplated in the regulations, to request the rescheduling of a Partial Exam, the established procedure must be followed. As a general rule, if a midterm exam must be rescheduled, it will be rescheduled on the date of the reassessment test.

Seminar Grades = > The 4 best grades obtained in the 5 seminars are considered. Each seminar considered has a weight of 0.25 in the final seminar grade

The seminars will be held in teams of 3 people (always the same teams). In the exceptional case of not being able to attend a seminar due to force majeure, there will be the possibility of connecting with the team online via Teams and participating in the activities of the seminar so that attendance can be taken into account.

Seminars cannot be rescheduled or rescheduled.

Practice Grade = Lab * Validation

Minimum grade of practices: 5 points

Minimum laboratory grade to calculate the Practice Grade: 5 points

Students who do not pass the part of the Midterms (either because they have obtained less than 3 points in a midterm or because they do not reach an average of 5 points in this part) will be able to take the re-evaluation exam of ALL the topics of the subject.

Attendance at laboratory sessions is mandatory and cannot be recovered. In the exceptional case of not being able to attend a laboratory session due to force majeure, there will be possibility of connecting with the team online via Teams and participating in the practice session so that attendance can be taken into account. Failure to attend two practical sessions will result in a failure in the laboratory qualification.

The practical work carried out in the laboratory sessions DOES NOT have REEVALUATION.

The practice will be structured in three levels: Basic, Intermediate and Advanced:

- The basic level gives the option of a score between 0 and 6 points, if it is delivered in the first 3 sessions. If it is delivered in the fourth or fifth session, it can reach a 5.5 and if it is delivered in the last session, a 5.
- The intermediate level allows you to add one point to the grade of the basic level, if it is delivered in the two sessions following the delivery of the basic level, and half a point if it is delivered from the third session after having delivered the basic level.
- The advanced level gives the option to add one point to the score achieved after submitting the intermediate level if it is delivered in the two sessions following the delivery of the intermediate level and half a point from the third session.

You cannot submit the work for a level if you have not previously presented the previous level to the teacher and he or she has given you the go-ahead. Only one level can be submitted in a session. In order to pass the practices, it is necessary to achieve a minimum score of 5 points in the laboratory sessions.

The grade obtained in the laboratory is individual, and will depend on the attendance and work developed during the practical sessions, and on the answers by each member of the team to the questions that the teacher responsible for the shift may ask.

There is a written test of individual validation of the practices in the schedule established by the coordination for the second midterms in January. A score of 0 points on the validation test will give a factor of 0.5, a score of 5 points will give a factor of 1, and a score of 10 will give a factor of 1.25. That is, there is a scale factor between 0 and 5 ($0.5 + 0.1 \cdot \text{grade}$) and a scale factor between 5 and 10 ($1 + 0.05 \cdot (\text{grade} - 5)$).

Scheduling and operation of evaluation activities:

The dates of the continuous assessment tests and submission of assignments will be published on the virtual campus and may be subject to possible scheduling changes for reasons of adaptation to possible incidents; the Virtual Campus (CV) will always be updated about these changes, since the CV is the usual mechanism for communicating information by the teaching staff. Students who wish to communicate with the teaching staff electronically must do so using their institutional email and directing it to the institutional email of the teaching staff in order to avoid communication problems.

Both with regard to the midterms and the reassessment, no person will be allowed to enter after 5 minutes from the start of the test. Electronic devices (mobile phones, smart watches, tablets, etc.) may not be used in the evaluation tests.

Procedure for reviewing grades:

For each evaluation activity, once the grades have been published, a deadline will be set to request review. People who have requested a review will be called to carry out the review. In this context, complaints may be made about the grade of the activity, which will be evaluated by the teaching staff responsible for the subject. People who do not request a review will not be able to review this activity later.

Special Qualifications:

- Students are considered to have taken the subject when they have completed a delivery of seminar exercises and have attended a midterm exam. In case of not presenting this minimum, the grade awarded will be "Not evaluable".
- To pass the subject, it will be necessary to have obtained a minimum score of 5 in the practical section and average of the midterms.
- A complete evaluation of the theory part (midterms) will be planned at the end of the semester for those students that have passed the practicum, but not the midterms. Provided that the grade of this global reassessment of the controls is greater than 5 points, the final grade will be calculated by calculating the corresponding average with the practicum grade and the seminars.
- In case of not passing the subject due to not reaching the minimum score in any of the sections, even if the final grade is equal to or greater than 5 when calculating the average, the final for the subject will be a 4.5. In the event that the average does not reach 5, the grade that will appear in the records will be the average grade obtained numerically.
- To qualify for the honors grade, it is a necessary condition to have obtained a final grade of the subject of more than 9 points. On the other hand, only a maximum number of honors can be assigned equal to 5% of the number of students enrolled.

Evaluation of repeating students:

Repeating students are evaluated in the same way as newly enrolled students, without any difference, nor keeping any grade count from the previous year.

Consequences of irregularities committed by students:

Without prejudice to other disciplinary measures that may be deemed appropriate, and in accordance with current academic regulations, irregularities committed by a person that may lead to a variation in the grade will be graded with a zero (0). For example, plagiarism, copying, letting copy, unauthorized use of AI (e.g. Copilot, ChatGPT or equivalents) ..., an evaluation activity will involve suspending this evaluation activity with a zero (0). Evaluation activities qualified in this way and by this procedure will not be recoverable. If it is necessary to pass any of these evaluation activities to pass the subject, this subject will be suspended directly, without the opportunity to recover it in the same academic year.

For this subject, the use of Artificial Intelligence (AI) technologies is allowed exclusively in support tasks, such as bibliographic or information search, text correction or translations ... In the case of laboratory practices, the

student must clearly identify which parts have been generated with this technology, specify the tools used and include a critical reflection on how they have influenced the process and the final result of the activity. Non-transparency of the use of AI in this assessable activity will be considered a lack of academic honesty and may lead to a partial or total penalty in the grade of the activity, or greater penalties in cases of seriousness of the act. AI tools cannot be used in problem seminars.

Single Assessment:

This subject DOES NOT PROVIDE FOR A SINGLE ASSESSMENT.

Bibliography

- "Organización y Arquitectura de Computadores. Principios de estructura y funcionamiento" William Stallings. Ed. Pearson. Prentice-Hall.
- "Estructura y diseño de computadores" David Patterson/John L. Hennessy. Ed. Reverté.
- "Computer Systems Design and Architecture" Vicent P. Heuring / Harry F. Jordan. Ed. Addison-Wesley
- "Problemas resueltos de estructura de Computadores" Félix García Carballeira, Jesús Carretero Pérez, José Daniel García Sánchez, David Expósito Singh. Editorial Paraninfo

Software

Visual Studio 2022 Community

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	411	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	431	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	451	Catalan	first semester	afternoon
(PLAB) Practical laboratories	411	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	412	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	413	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	414	Catalan	first semester	afternoon
(PLAB) Practical laboratories	415	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	416	Catalan	first semester	afternoon
(PLAB) Practical laboratories	417	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	418	Catalan	first semester	morning-mixed

(TE) Theory	41	Catalan	first semester	morning-mixed
(TE) Theory	43	Catalan/Spanish	first semester	morning-mixed
(TE) Theory	45	Spanish	first semester	afternoon