

**COURSE DATA****Data Subject**

<b>Code</b>	34656
<b>Name</b>	Programming
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2023 - 2024

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1400 - Degree in Computer Engineering	School of Engineering	1	Second term
1936 - PDG Matemàtiques-Informàtica	Faculty of Mathematics	1	Second term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1400 - Degree in Computer Engineering	5 - Information technology	Basic Training
1936 - PDG Matemàtiques-Informàtica	1 - Primer curso	Basic Training

**Coordination**

<b>Name</b>	<b>Department</b>
ALBERT BLANCO, JESUS V.	240 - Computer Science

**SUMMARY**

The course "Programming" is a subject of the first year of the Degree of Computer Engineering, which covers part of the basic matter Informatics.

This course explores the knowledge and skills in C + + programming seen on the subject "Informatics", which can be considered to be a continuation. The basic lines of the course are organized around Object Oriented Programming and Abstract Data Types and their various interrelationships. Also there will be studied by certain detail the analysis of the temporary cost of the algorithms, which allow students to decide the most appropriate algorithm for each particular problem.

The lecturers of this subject are members of the Teaching Innovation Consolidated Group in Collaborative, Cooperative and Competitive Teaching Methodologies, and they participate in the Teaching Innovation Network proposal with reference UV-SFPIE\_FO13-147196.



## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

Es muy conveniente que los alumnos hayan cursado la asignatura Informática.

Los conocimientos y habilidades previas que se requieren en esta asignatura son los siguientes:

- Analizar problemas sencillos, diseñar y preparar algoritmos para resolverlos mediante la utilización del ordenador.
- Tipos de datos, variables, constantes, estructuras de control y estructuras de datos básicas que tienen los lenguajes de programación procedurales para desarrollar programas.

## OUTCOMES

### 1400 - Degree in Computer Engineering

- G8 - Knowledge of basic subject areas and technologies that serve as a basis for learning and developing new methods and technologies, and of those which provide versatility to adapt to new situations.
- G9 - Ability to solve problems with initiative, decision making, autonomy and creativity. Ability to communicate and transmit the knowledge, skills and abilities of a computer engineer.
- B3 - Ability to understand and master the basics of discrete mathematics, logic, algorithms and computational complexity and their application for solving problems in engineering.
- B1 - Ability to solve the mathematical problems that may arise in engineering. Ability to apply knowledge of linear algebra, differential and integral calculus, numerical methods, numerical algorithms, statistics and optimisation.
- B4 - Have basic skills in the use and programming of computers, operating systems, databases and computer software for use in engineering.

## LEARNING OUTCOMES

The subject, according to the verification memory, provides the following learning results:

- Perform basic file operations
- Describe algorithmically solutions to problems
- Ability to use a programming language to describe the algorithm that solves a problem
- Describe basic, numeric, and non-numeric data types
- Designing simple computer programs with one or more loops
- Design simple computer structured programs using functions
- Designing simple computer programs using conditional structures
- To document properly the programs built
- Describe the internal representation of non-numeric data.



- Work as a team to make the necessary designs and configurations, spreading the workload to deal with complex problems.

In addition, the following skills will be acquired:

- Calculate the theoretical time cost of an algorithm. Express the cost using asymptotic notation.
- Use classes, inheritance, and operator overloading to implement programs.
- Decide the abstract data type most appropriate for a particular problem, distinguishing between vectors, stacks, queues and lists.
- Use the most appropriate implementation for a particular ADT, especially distinguishing between static and dynamic implementations.
- Propose solutions to programming problems using object-oriented programming with C ++.

## DESCRIPTION OF CONTENTS

### 1. Introduction to the study of algorithms and complexity

- Definition of complexity and its measure.
- Information Retrieval: Search.
- The problem of array sorting. Internal sorting methods

### 2. Abstract data types

- Data Types.
- Data Structures.
- Abstract data types.

### 3. Object oriented programming

- Classes.
- Overload.
- Inheritance.
- Introduction to templates. Standard Template Library (STL).

### 4. Stacks

- Fundamentals and definition of the ADT Stack.
- Static representation.
- Dynamic representation. Pointer data type.
- Representation in STL.
- Applications.



## 5. Queues

- Fundamentals and definition of the Queue ADT.
- Static and dynamic representation.
- Representation in STL.
- Applications.

## 6. Lists

- Definition of type List with point of interest.
- Static and dynamic representation.
- Improvements in the representation of linked lists.
- Iterators.
- Representation in STL.
- Applications.

## WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Development of group work	14,00	0
Development of individual work	15,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	26,00	0
Preparation of practical classes and problem	20,00	0
<b>TOTAL</b>	<b>150,00</b>	

## TEACHING METHODOLOGY

Theoretical classroom activities will develop themes of the subject by providing a global view and integrating, analysing the key aspects in greater detail and greater complexity, encouraging the participation of the student body at all times. These activities are complemented with practical activities in order to apply the basic concepts and extend them with the knowledge and experience which will be acquired during the implementation of the proposed work. They include the following kinds of classroom activities:

- Classes of problems and issues in classroom



- Session for discussion and resolution of problems and exercises previously worked for the students
- Laboratory practice
- Realization of individual questionnaires for evaluation in the classroom with the presence of the teacher.

In addition to classroom activities, students must perform personal tasks (out of the classroom) on: targeted bibliographic search, issues and problems, as well as the preparation of lessons and tests. These tasks will be carried out primarily on an individual basis, in order to promote self-employment, but in addition will include jobs that require the participation of small groups of students (2-4) for capacity-building for integration into working groups.

It will use the e-learning platform (Virtual Classroom) from the University of Valencia as a medium of communication with the students. Through it have access to the materials used in class, as well as problems and exercises to solve.

## EVALUATION

The subject will be evaluated applying the following three criteria:

1) Criterion 1 (C1): Individual objective tests. Various written tests will be carried out throughout the theoretical-practical course (evaluation of skills CB02, CB04, CG01, CG06, CT03, CT05, CE02, CE06). There will be two types of tests with the following weight:

C1a (70%): Exam of the subject at the end of teaching.

C1b (30%): Intermediate controls carried out during the teaching period.

2) Criterion 2 (C2): Evaluation of the practical activities carried out both in the laboratories and in practical written exercises (evaluation of competences CB02, CB04, CG01, CG06, CT03, CT05, CE02, CE06). These tests will be carried out in groups of (maximum) 2 people and include the following activities:

C2a (70%): Evaluation of laboratory practices.

C2b (30%): Completion of practical written exercises in intermediate controls carried out during the teaching period.

3) Criterion 3 (C3): Continuous evaluation of each student, based on the participation and degree of involvement of the student in the teaching-learning process. The following aspects will be considered (evaluation of competences CB02, CB04, CG01, CT03): Resolution of exercises proposed during the teaching period; Public resolution of issues and problems discussed in class; Participation in the proposed activities.

The final grade for the subject will be calculated as the weighted average of sections C1 (60%) and C2 (40%). Criterion C3 will be considered an extra score of up to 10% over the previous grade, but only if it is greater than or equal to 4.5.





Particular considerations about the evaluation:

1) Non-recoverable sections: The criteria that evaluate the follow-up of the subject during the school period are not recoverable later. These are: C1b, C2b and C3. Criterion C2a (laboratory practices) will be recoverable, only in the 2nd call, through an individual practical exam carried out in the laboratory under conditions equivalent to those of a laboratory practice, but with a limitation of time and access to support materials.

2) Sections that require a minimum grade: To pass the subject, it is required to obtain a minimum grade of 3 (out of 10) in sections C1a and C2a.

3) Those students who have completed all the periodical exams of the subject (C1b, C2b) and whose weighted average score in these controls (C1b (70%), C2b (30%)) is greater than or equal to 5 will be exempted from the C1a test (final exam). Additionally, it will be necessary to have obtained a grade greater than or equal to 3 in both C1b and C2b. In these cases, the grade for section C1a will be assigned the weighted average score of the periodic intermediate controls (C1b (70%), C2b (30%)).

In any case, the evaluation of the subject will be done in accordance with the Regulations for evaluation and qualification of the University of Valencia for bachelor's and master's degrees approved by the Governing Council on May 30, 2017 (ACGUV 108/2017).

## REFERENCES

### Basic

- TADs Estructuras de datos y resolución de problemas con C++ (2ª Ed.)  
L.R. Nyhoff. Prentice Hall, 2005
- Resolución de problemas con C++ (5ª Ed.)  
W. Savitch. Prentice Hall, 2007
- Cómo programar en C++ (6ª Ed.)  
H.M. Deitel, P.J. Deitel, P.J. . Prentice Hall, 2009

### Additional

- C++ plus data structures  
N. Dale, C. Weems, T. Richards. Burlington, MA: Jones & Bartlett Learning, 2016  
<https://ebookcentral.proquest.com/lib/univalencia/detail.action?docID=4714314>
- C++ Cómo programar, Novena Edición  
H.M. Deitel, P.J. Deitel, P.J. Prentice Hall, 2014  
[http://www.ingebook.com/ib/NPcd/IB\\_BooksVis?cod\\_primaria=1000187&codigo\\_libro=6053](http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=6053)