

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

Code	34852
Name	Programming
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1407 - Degree in Multimedia Engineering	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
1407 - Degree in Multimedia Engineering	3 - Informática	Basic Training

Coordination

Name	Department
GARCIA CALDERARO, JOSE FRANCISCO	240 - Computer Science

SUMMARY

The course "Programming" is a subject of the first year of the Degree of Multimedia 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 is 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.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

It is highly desirable that students have taken the course "Informatics" to know how to:

- Analyze simple problems and design algorithms to be solved using the computer.
- Data types, variables, constants, control structures and basic data structures within the procedural programming languages context.
- Use the procedural programming paradigm to solve problems using a computer. To be able to codify simple algorithms in a structured programming language.

OUTCOMES

1405 - Grado en Ingeniería Multimedia

- G6 - Know the basic subject areas and technologies that serve as a basis to learn and develop new methods and technologies and those that provide versatility to adapt to new situations.
- B3 - Be able to understand and master the basics of discrete mathematics, logic, algorithmic and computational complexity, and their application to solve engineering problems.
- B4 - Have basic skills in the use and programming of computers, operating systems, databases and computer software for use in engineering.
- B5- Know the structure, organisation, operation and interconnection of computer systems, the fundamentals of their programming and their application to solve engineering problems.
- I1- Know and be able to apply basic computer algorithmic procedures to design solutions to problems, by analysing the suitability and complexity of the proposed algorithms.
- I3 - Be able to analyse, design, build and maintain applications in a robust, secure and efficient manner by choosing the most suitable paradigm and programming languages.
- I8 - Know and apply the tools needed for the storage of, processing of and access to information systems, including web-based systems.
- MM21 - Communicate effectively, both in writing and verbally, knowledge, procedures, results and ideas related to ICT and specifically to multimedia, and know their socioeconomic impact.
- MM22 - Have knowledge and ability to understand essential facts, concepts, principles and theories related to multimedia and to the spectrum of reference disciplines.
- MM25 - Be able to define, evaluate and select hardware and software platforms for the development and implementation of multimedia systems, services and applications, according to the knowledge acquired as described in the specific competences.



- MM28 - Be able to solve problems with initiative, decision-making and creativity and to communicate and transmit the knowledge, abilities and skills of a multimedia engineer.

LEARNING OUTCOMES

At the end of the course, students will be able to:

- 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, including 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
- Sorting methods

2. Abstract data types

- Data types
- Data structures
- Abstract data types

3. Object-oriented programming

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



4. Stacks

- Definition of the abstract data type Stack.
- Static representation.
- Dynamic representation. Pointer data type.
- STL and stacks.
- Applications.

5. Queues

- Definition of the abstract type Queue
- Static and dynamic representation
- STL and Queues
- Applications

6. Lists

- Definition of list with point of interest
- Static and dynamic representation
- Improvements in the representation of linked lists
- Iterators
- STL and lists
- 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
TOTAL	150,00	



TEACHING METHODOLOGY

During the theoretical activities we will provide a global and inclusive vision of the subject, analyzing in detail the key and more complex issues. We will encourage the students to discuss them in the classroom. This work is complemented with practical activities:

- Problems and exercises which are solved in the classroom
- Discussion sessions of problem previously solved at home.
- Activities in the laboratory.
- Individual questionnaires of exercises in the classroom with the presence of teachers.

In addition to the classroom activities, students must perform individual tasks (outside the classroom) about: monographs, literature search and problem-solving and preparation of exams. These tasks also include working in small groups of students (2-4).

The platform of e-learning (virtual classroom) of the University of Valencia will be used to support the interaction and communication with students. The course materials will be also available.

EVALUATION

The following aspects will be taken into consideration for the evaluation of the course:

SE1 - Objective test, consisting of one or several exams consisting of both theoretical-practical questions and problems.

SE2 - Evaluation of practical activities based on the elaboration of papers/memorials and/or oral presentations.

SE3 - Continuous assessment of each student, based on the participation and degree of involvement of the student in the teaching-learning process, taking into account regular attendance at the scheduled face-to-face activities and the resolution of questions and problems proposed periodically.

The following considerations will be taken into account in each of these tests:

1) SE1: Various individual tests will be carried out throughout the course, consisting of both theoretical-practical questions and problems. There will be two types of tests with the following weight:

- SE1a (70%): Subject exam at the end of the course.
- SE1b (30%): Intermediate tests taken during the teaching period.



2) SE2: Evaluation of the practical activities carried out both in the laboratories and in written exercises. These tests will be carried out in groups of 2 people and include the following activities:

- SE2a (70%): Evaluation of laboratory practices from the documentation and practices uploaded to the repository (and with the deadlines) required in each of them.
- SE2b (30%): Performance of practical exercises in writing in intermediate controls carried out during the teaching period.

3) SE3: Continuous assessment of each student to measure their degree of participation and involvement in face-to-face activities. The following aspects will be considered: Resolution of exercises proposed during the teaching period; Public resolution of questions and problems discussed in class; Active participation in the proposed activities.

The final mark for the course will be calculated as the weighted average of sections SE1 (60%) and SE2 (40%). The SE3 criterion will be considered as an extra mark on top of the previous mark, but only if it is higher or equal to 4.5. In addition, the increase will be limited to a maximum of 10% of the grade obtained from SE1 and SE2.

Particular considerations on the evaluation:

- 1) Sections requiring a minimum grade: A minimum grade of 3.5 (out of 10) is required in each of the following evaluation sections in order to pass the subject: SE1a and SE2a.
- 2) Those students who have taken all the periodical controls of the subject (SE1b, SE2b) and whose weighted average mark in these controls (SE1b (70%), SE2b (30%)) is higher or equal to 5 will be exempted from taking the SE1a test (final exam). Additionally, it will be necessary to have obtained a mark higher or equal to 3.5 in all the controls (both individual and pairs). In these cases, the weighted average mark of the intermediate periodical tests will be assigned as the mark for section SE1a.
- 3) 2nd Call: The grade of sections SE1 or SE2 will be kept for those students who have NOT passed the course and have obtained an overall grade in any of the sections equal to or higher than 5:
 - SE1. Written exam of the subject.
 - SE2. Individual practical exam carried out in the laboratory in conditions equivalent to those of a laboratory practice, but with a limitation of time and access to support materials.

In any case, the evaluation of the course will be done in accordance with the University of Valencia's Evaluation and Qualification Regulations for Bachelor's and Master's Degrees approved by the Governing Council on 30 May 2017 (ACGUV 108/2017).

REFERENCES



Basic

- Referencia b1: TADs Estructuras de datos y resolución de problemas con C++ (2ª Ed.)
L.R. Nyhoff. Prentice Hall, 2005
- Referencia b2: Resolución de problemas con C++ (5ª Ed.)
W. Savitch. Prentice Hall, 2007
- Referencia b3: Cómo programar en C++ (6ª Ed.)
H.M. Deitel, P.J. Deitel, P.J. . Prentice Hall, 2009
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Additional

- - C++ plus data structures
N. Dale, C. Weems, T. Richards. Burlington, MA: Jones & Bartlett Learning, 2016
<http://proquest.safaribooksonline.com/?uiCode=valencia&xmlId=9781284089196>
- - C++ How to Program, Ninth Edition
H.M. Deitel, P.J. Deitel, P.J. Prentice Hall, 2013
<http://proquest.safaribooksonline.com/book/programming/cplusplus/9780133378795/firstchapter>