COURSE DATA

Data Subject	
Code	34656
Name	Programming
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1400 - Degree in Computer Engineering	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
1400 - Degree in Computer Engineering	5 - Information technology	Basic Training

Coordination

Name	Department
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
TOTAL	**150,00**	

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 by:
SE1 - Objective test, consisting of one or several exams that consist of both theoretical-practical issues and problems.
SE2 - Evaluation of practical activities based on the preparation of papers/reports and/or oral presentations.
SE3 - Continuous evaluation of each student, based on the participation and degree of involvement of the student in the teaching-learning process, taking into account the regular attendance at the planned face-to-face activities and the resolution of issues and problems proposed periodically.

In each of these tests the following considerations will be taken into account:
1) SE1: Several individual tests will be carried out throughout the course, which will include theoretical-

practical questions as well as problems (evaluation of competencies CB02, CB04, CG01, CG06, CT03, CT05, CE02, CE06). There will be two types of tests with the following weight:
SE1a (80%): Exam of the subject at the end of teaching.
SE1b (20%): Intermediate exams made during the teaching period.

2) SE2: Evaluation of the practical activities carried out both in the laboratories, and in written exercises (evaluation of competences CB02, CB04, CG01, CG06, CT03, CT05, CE02, CE06). These tests will be carried out in groups of 2 people and contemplate the following activities:
SE2a (80%): Evaluation of laboratory practices based on documentation (and deadlines) required in each of them.
SE2b (20%): Completion of practical written exercises in intermediate exams made during the teaching period.

SE3: Continuous evaluation of each student to measure their degree of participation and involvement in classroom activities. The following aspects will be considered (evaluation of competencies CB02, CB04, CG01, CT03): Resolution of exercises proposed during the teaching period; Public resolution of issues and problems discussed in class; Active participation in the proposed activities.

The final grade for the course will be calculated as the arithmetic mean of sections SE1 and SE2. The SE3 criterion will be considered as an extra score over the previous grade, but only if it was greater than or equal to 4.5. In addition, the increase will be limited to a maximum of 10% of the grade obtained as an average of SE1 and SE2.

Particular considerations on the evaluation:
1) Non-recoverable sections: The criteria that evaluate the follow-up of the subject during the school term are not recoverable later. These are: SE1b, SE2b and SE3. The SE2a criterion will be recoverable, only in the second call, through an individual practical examination carried out in the laboratory under conditions equivalent to those of a laboratory practice, but with a limited time and access to support materials.

2) Sections that require a minimum grade: It is required to obtain a minimum grade of 3 (out of 10) in each of the following evaluation sections in order to pass the subject: SE1a and SE2a.

3) Students who have completed all the periodical exams of the subject (SE1b, SE2b) and whose weighted average score in these controls (SE1b (60%), SE2b (40)) will be exempted from the SE1a test (final exam). %)) is greater than or equal to 5. In addition, it will be necessary to have obtained a score greater than or equal to 3 in all controls (both individual and in pairs). In these cases, the weighted average grade of the periodic intermediate controls will be assigned as qualification in section SE1a.

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

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

The teaching methodology for this subject will follow the model approved by the Academic Committee of the GII / GIM degrees (https://links.uv.es/catinfmult/modeloDocent). If the facilities are closed because of COVID-19 pandemics, the scheduled lectures will be replaced by synchronous online sessions within the assigned time slots of the course, using the tools provided by the university.

If the facilities need to be closed due to the pandemics causing any of the evaluation exercises to be held at ETSE-UV, these exercises will be substituted by equivalent exercieses held online using the tools provided by the university. The weights for each activity will remain the same as specified in the teaching guide.