

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

Code	36500
Name	Programming and Algorithmics Fundamentals
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1332 - Degree in Business Intelligence and Analytics	Faculty of Economics	1	First term

Subject-matter

Degree	Subject-matter	Character
1332 - Degree in Business Intelligence and Analytics	14 - Informatics	Basic Training

Coordination

Name	Department
MARTIN-SACRISTAN GANDIA, DAVID	240 - Computer Science

SUMMARY

The course "Programming concepts and Algorithms" is a core course of the first year of the Degree in Business Intelligence and Analytics. The course workload is 6 ECTS and it is given in the first four-month period of the first year.

The student will be introduced to the knowledge and management of the operating system, as well as sufficient knowledge of the design of algorithms through structured programming and modular programming, basic data structures and data management through files.

In the laboratory sessions, the student will implement the theoretical concepts learned in the course, will use some basic software tools and will program some simple software developments using a general purpose structured programming language.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

No prerequisites are established

OUTCOMES

1332 - Degree in Business Intelligence and Analytics

- Students must have acquired knowledge and understanding in a specific field of study, on the basis of general secondary education and at a level that includes mainly knowledge drawn from advanced textbooks, but also some cutting-edge knowledge in their field of study.
- Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.
- Acquire basic training that can be used to learn new methods and technologies and to adapt to new situations in academic and professional areas.
- Be able to solve problems and to communicate and spread knowledge, skills and abilities, taking account of the ethical, egalitarian and professional responsibility of the activity of business intelligence and analytics.
- Be able to access and manage information in different formats for subsequent analysis in order to obtain knowledge through data.
- Demonstrate skills for analysis and synthesis.
- Be able to use ICT, both in academia and in professional practice.
- Be able to define, solve and present complex problems systemically.
- Know the basic concepts of logic, algorithmics, computational complexity and their application to business intelligence.
- Know the different types of data.
- Reorganise and restructure variables and databases.

LEARNING OUTCOMES

Learning goals of the course:

- Basic knowledge about the internal structure of a computer, in both, the physical (CPU, memory,...) and the logical scope (operating system, programs,...).



- Knowledge and use of the basic computer tools at the operating system level.
- Perform basic operations on files.
- Analyze problems, design and develop algorithms to solve problems using a computer.
- Know the basic data types, variables, constants, control structures and data structures of the procedural programming languages to develop programs.
- Use the procedural programming paradigm to solve problems using a computer.
- Learn how to code simple algorithms using a structured programming language.

It is also pretended in this course to further develop the following skills:

- Logical reasoning.
- Analysis and synthesis.
- Oral and written communication skills.
- Personal work capacity.
- Teamwork and group leadership skills

DESCRIPTION OF CONTENTS

1. INTRODUCTION TO PROGRAMMING

- 1.1.- Informatics: Computers and programs
- 1.2.- Information management
- 1.3.- Computer programming
- 1.4.- Operating system

2. ALGORITHMS AND PARADIGMS OF PROGRAMMING

- 2.1.- Algorithm
- 2.2.- Programming languages and paradigms
- 2.3.- The representation of the data: Constants and variables
- 2.4.- Simple data types: Numerical, Character and Boolean.
- 2.5.- Operators and expressions.
- 2.6.- Problem solving: Algorithm design and programming



3. STRUCTURED PROGRAMMING

- 3.1.- Structured programming theorem.
- 3.2.- Design of structured programs
- 3.3.- Basic control structures: Sequential, Conditional and Iterative
- 3.4.- Algorithms representation techniques: Pseudocode and flow diagrams

4. MODULAR PROGRAMMING

- 4.1.- Definition of module
- 4.2.- Decomposition of problems: Modular programming.
- 4.3.- Definition of subprograms: Functions
- 4.4.- Parameters of a subprogram.
- 4.5.- Scope of identifiers.
- 4.6.- Recursivity

5. STRUCTURED DATA TYPES

- 5.1.- Introduction
- 5.2.- Vectors
- 5.3.- Character vectors: Strings
- 5.4.- Matrices
- 5.5.- Operations with vectors: Sorting and search
- 5.6.- Records
- 5.7.- Operations with records

6. PROCESSING OF TEXT FILES

- 6.1.- Basic concepts of archives.
- 6.2.- Types of access.
- 6.3.- Logical and physical files.
- 6.4.- Binary and text files.
- 6.5.- Processing of files

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Computer classroom practice	30,00	100
Development of group work	5,00	0
Development of individual work	5,00	0
Study and independent work	10,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	20,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	20,00	0
Resolution of case studies	10,00	0
TOTAL	150,00	

TEACHING METHODOLOGY**Theoretical activities.**

Description: The lectures will present the course contents providing a global vision, a detailed analysis of the key concepts and encouraging the student participation. The workload of this section for the students is 20% of the total of the course.

Practical activities.

Description: The practical activities complement the theoretical classes and allow the students to put into practice the contents and improve the understanding of the course concepts. They include the following types of classroom activities:

- Solving problems in class.
- Regular discussion of exercises and problems that the students have previously tried to work out.
- Laboratory sessions.
- Support tutorial sessions (individualized or in group).
- Individual evaluation of questionnaires to be done in class with the help of professors.

The workload of this section for the students is 20% of the total of the course.

Personal work.



Description: It is the work that the student must carry out individually out of the classroom timetable. It tries to promote the autonomous work habit. Activities in this group are: monographs, guided literature search, exercises and problems as well as preparation of classes and exams. The workload of this section for the students is 45% of the total of the course.

Teamwork in small groups.

Description: It will be carried out by small groups of students (2-4). It consists of work to be done out of the class timetable in form of exercises and problems. This work tries to improve the teamwork and leadership skills. The workload of this section for the student is 15% of the total charge of the course.

During the course the e-learning (pizarra virtual) platform of the University of Valencia will be used to support the teaching activities. This platform allows the access to the course materials used in the classes as well as additional documents, solved problems and exercises

EVALUATION

The breakdown of the course assessment is the following:

(C) Continuous assessment. It is based on participation and the degree of involvement in the teaching-learning process. In this section it will be taken into account the attendance to classroom activities and the resolution of exercises and problems. The weight of this part will be 20% of the final mark.

(E) Individual examination. Consisting of several exams, they will include both theoretical and practical questions and problems. There will be some midterm exams distributed during the period of classes and a final exam out of this period that is fixed in the official exam calendar. This part of the assessment will represent the 50% of the final mark and the weight of each individual exam is as follows:

$$E = 50\%(\text{average of midterm exams}) + 50\%(\text{final exam})$$

The weight of all of the midterm exams will be the same.

(P) Laboratory activities assessment. The marks of this part will take into account the achievement of objectives in the laboratory sessions. These activities will be carried out individually and/or in-group and its weight is 30% of the final mark.

The final mark of the course will be calculated as follows:

$$\text{Final Mark (M)} = 0.2 \cdot C + 0.5 \cdot E + 0.3 \cdot P$$

A minimum mark of 4 out of 10 for each part is required to obtain a final average mark (M), which must be equal or higher than 5 out of 10 to pass the course. The student will fail the course if some mark is below 4 or the average is lower than 5.

Alternate assessment: aimed at students study part-time or who can not attend class



$$\text{Final Mark} = 0,1 * C + 0,7 * I + 0,2 * P$$

The second exams session for this course will be based on a single final exam.

REFERENCES

Basic

- Apuntes de la asignatura.
- [G. Beekman (2005)]. Introducción a la informática (Prentice-Hall).
- [Kent D. Lee (2014)] Python Programming Fundamentals (Spinger)
- [A. Marzal, I. Gracia, P. García (1993)] Introducción a la programación con Python.
- [N. R. Ceder (2010)] The quick Python book (Manning Publications Co.)

Additional

- [A. Downey, J. Elkner, C. Meyers (2002)] Aprenda a Pensar Como un Programador con Python (Green Tea Press). Traducido por M.A. Vilella, A. Arnal, I. Juanes, L. Amurrio, E. Andia, C. Ballardini

ADDENDUM COVID-19

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

For the academic year 2020-2021 it is foreseen that the teaching of this subject will be face-to-face, both in theory and in practice, following, therefore, what is established in this Teaching Guide. However, if the health situation changes, information will be provided on the modifications that will be made at the appropriate time to adapt the teaching to the new scenario.