COURSE DATA

DATA SUBJECT

Code: 36411
Name: Programming fundamentals
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1406 - Degree in Data Science	Escola Tècnica Superior d'Enginyeria	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1406 - Degree in Data Science	Informatics	BASIC

COORDINATION

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SUMMARY

In this subject it is about learning the basic knowledge of what a computer is, what are its basic components, potential uses and limitations.

It will be a question of getting a sufficient knowledge of the design of algorithms through structured programming, as well as of the fundamental data structures, which progressively allows more complex problems to be tackled later, both from an analytical and numerical point of view.

With regard to the practical part, in this subject we will try that students consolidate the knowledge seen in the theoretical part both regarding the knowledge of the computer and the basic tools for its use and that they acquire abilities of development of programs in a structured programming language of general purpose and extended use in the field of Data Science.

Theory lessons will be taught in Spanish and practical and laboratory lessons as according to the information sheet available on the web page of the degree.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

None.

COMPETENCES / LEARNING OUTCOMES

1406 - Degree in Data Science

(CE02) To methodologically know and apply the programming techniques and the algorithms necessary for the efficient processing of information and the computer resolution of problems that use large volumes of data.

(CE11) Ability to design and implement data acquisition, its integration, transformation, selection, verification of its quality and veracity from different sources, taking into account its character, heterogeneity and variability.

(CG01) Knowledge of basic subjects and technologies that enable students to learn new methods and technologies, and to provide them with versatility to adapt to new situations.

(CG06) Ability to access and manage information in different formats for subsequent analysis in order to obtain knowledge from data.

(CT02) To be able to complete technical, scientific, social and human training in general, and to organise self-learning with a high degree of autonomy.

(CT05) Ability to evaluate the advantages and disadvantages of different methodological and / or technological alternatives in different fields of application.

Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.

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.

DESCRIPTION OF CONTENTS

Basic concepts.
Internal structure of the computer: control unit, arithmetic-logic unit, memory unit, input unit and output unit.
Languages and programming paradigms: procedural languages and declarative languages.

1. Introduction

Basic concepts.
Internal structure of the computer: control unit, arithmetic-logic unit, memory unit, input unit and output unit.Operating system

2. Programming in high-level languages

Algorithms.
Characteristics of high-level programming languages: Objects and references, simple data types, strings and lists, and data input and data output.
Phases in the realization of a program: Analysis of the problem, design of the algorithm and programming of the algorithm.

3. Structured programming

Theorem of structured programming.
Design of structured programs.
Control structures: sequential structure, conditional structure and iterative structure.

4. Files

Basic concepts of files: Type of access, Logical files and physical files and Binary and text files.
Processing of files.

5. Modular programming

Module definition: Modular programming, Definition of subprograms: Functions, Parameters of a subprogram and Scope of identifiers.
Recursivity.

6. Structured data types

More about strings and lists.
Collections.
Introduction to Classes.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	28,00
Laboratory	20,00
Classroom practices	12,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	30,00
Independent study and work	0,00
Preparation of lessons	50,00
Preparation for assessment activities	10,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

In the in classroom theoretical activities the topics of the subject will be developed, providing a global and integrating vision, analysing in greater detail the key aspects and of greater complexity, promoting, at all times, the participation of students (CB1). These activities are complemented by practical activities with the aim of applying the basic concepts and expanding them with the knowledge and experience that are acquired during the performance of the proposed works (CB2). They include the following types of classroom activities: types of problems and questions in the classroom; discussion and problem solving sessions and exercises previously worked by students; laboratory practices; individual evaluation questionnaires in the classroom with the presence of the teaching staff (CG01, CG06, CE02, CE11).

In addition to in classroom activities, students must perform personal tasks (outside the classroom) on: monographic works, directed bibliographic searches, questions and problems, as well as the preparation of classes and exams (study) (CT01, CT02). These tasks will be carried out mainly individually, in order to enhance self-learning, but will also include jobs that require the participation of small groups of students (4-6) to promote capacity for integration in work groups (CT03).

The e-learning platform (Virtual Classroom) of the University of Valencia will be used to support communication with the students. Through it you will have access to the didactic material used in class, as well as the problems and exercises to solve.

EVALUATION

The evaluation of the subject will be carried out by means of:

- Continuous evaluation, based on participation and degree of involvement in the teaching-learning process, taking into account the regular attendance at the planned activities and the resolution of proposed questions and problems. Occasionally, oral presentations can take place (individually and/or in groups) to assess the ability to produce documents and transmit

knowledge (N_Continuous). In classroom activities are non-recoverable (SE3).
- Individual objective test, consisting of several controls throughout the semester, and a final exam, which will include both theoretical-practical questions and problems (N_Exams) (SE1).

N_Exams = 60% Controls + 40% Final Exam

The value of all controls will be the same. You must obtain a minimum grade of 4 in the final exam to be able to take the average.

Controls are not recoverable.

- Evaluation of practical activities from the achievement of objectives in the laboratory sessions and problems, and the preparation of papers/reports, including the final project (N_Practices) (CB1, CB2, CG1, CG6, CT1, CT3, CT5, CE2, CE11). Attendance to laboratory lessons is compulsory to pass the subject in first call (SE2).

N_Practices = 30% Practices work + 70% Final project

At least a 4 has to be obtained in the final project to make the average.

The final score of the subject will be:

Final score = 20% N_Continuous + 50% N_Exams + 30% N_Practices

It will be necessary to obtain at least 3.5 out of 10 in each part to be able to make the average.

In second call it is possible to improve the final practice (if you have not attended practical lessons, the final practice will have to be defended before the teacher and will be 100% of the practice note), improve the note of the questions and problems proposed throughout the semester to be done at home and improve the final exam (the weight of controls will be reduced to 20% in N_Exams). The weight of each section will be the same as in the first call, as well as the conditions to pass the subject.

In any case, the evaluation system will be governed by what is established in the Evaluation and Qualification Regulations of the University of Valencia for Degrees and Masters, especially in relation to point two of article 15:

https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado=5639

Copies:

Any copy any part of any of the activities of the course will be a zero in the full activity (newsletter, practice,

control, ...). Detection of two copies in different activities will suspend the subject in both the first and second call. Will apply the same criteria to both the original and the copy.

All the above measures will be applied irrespective of the disciplinary procedure that the student may initiate and, if applicable, the sanction that proceeds in accordance with current legislation (Reglament d'Avaluació i Qualificació de la Universitat de València Per a Títols de Grau i Màster (Aprovat en Consell de Govern de 30 de maig de 2017. AUGUV 108/2017)).

REFERENCES

- [Kent D. Lee (2014)] Python Programming Fundamentals (Spinger). https://link.springer.com/book/10.1007/978-1-4471-6642-9

- [A. Marzal, I. Gracia, P. García (1993)] Introducción a la programación con Python 3. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwjr9fC1vXiAhUUXRUIHerpDWgQFjAAegQIAhAC&url=http%3A%2F%2Frepositori.uji.es%2Fxmlui%2Fbitstream%2F10234%2F102653%2F1%2Fs93.pdf&usg=AOvVaw3B4HO6V05Ay1QwcqsnmZXa

- [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. https://argentinaenpython.com/quiero-aprender-python/aprenda-a-pensar-como-un-programador-con-python.pdf