Informatics and Programming

Calendar: 1st semester

Contact Hours: 37h50 TP + 7.5h OT

Scientific Area: Matemática e Informática

Learning outcomes of the curricular unit
The student should be able to form a solid base in the programming abstract concepts, allowing the students to adapt to new programming languages; Preform an introduction to Visual Basic Language, using the previously learned abstract concepts to a specific programming language. Master the concepts behind a spreadsheet and its correct use; Master the VBA (Visual Basic for Applications) programming language.

Syllabus
Chapter 1 - 4 weeks
Formatting cells, cells references, graphics, predefined functions. VBA: construction of functions and macros.
Chapter 2 - 4 weeks
Programming Techniques: Top-Down Approach, constants, variables, expressions and functions.
Chapter 3 - 1.5 weeks
Pseudo code: Structure of an algorithm, declaring variables, assigning values, comments, input and output commands, basic structures (sequential, conditional and repeating).
Chapter 4 - 1.5 weeks
Flowchart vs pseudo code: Symbology, structure, declaring variables, assigning values, inputs and outputs, the basic structures. Composite variables, modules.
Chapter 5 - 3 weeks
Visual Basic - analogy between pseudo code and flowchart. Object oriented programming and event driven programming, code and VB fundamentals - variables, arrays, constants, assignment, control flow instructions, repetition. Available working objects. Correction of coding errors: syntax and semantic errors.
Chapter 6 - 1 week
Revisions

Demonstration of the syllabus coherence with the curricular unit's objectives
For the student to form a solid foundation in the abstract concepts of programming, will be taught the main programming techniques. The concept of "spaghetti code" will also be explained. The basic structures of programming will be explained, as well as ways of representing algorithms – pseudo code and flowchart.
The Visual Basic programming language will be used to introduce the student with the different stages of program building. The main components of this language will be introduced.
In order to the student to master the concepts of using a spreadsheet and the concepts of programming VBA - Visual Basic for Applications, it will be introduced the elements needed to build a spreadsheet. The concepts of building formulas will be taught, supported by exercises, and the main pre-defined functions in Excel will be addressed.

Teaching methodologies (including evaluation):
Theoretical/practical classes will be taught using an expositive technique, by using a projector and PowerPoint slides. The aim is to gain the students attention, developing their ability to think and to solve new problems.
A computer will be used in order to solve the practical exercises.
The evaluation will consist of:
• A written exam with a weight of 50% in the final grade;
• Two papers on the worksheet, with the weight of 10% each;
• A final project for Visual Basic, with a weight of 30%

Demonstration of the coherence between the teaching methodologies and the
learning outcomes.
For the student to achieve the key learning objectives identified for this curricular unit, i.e., form a solid foundation in programming concepts, able to build computer programs going through its different phases, and also to grasp the concepts of construction and use of a spreadsheet, it is considered that the most appropriate methodology would be the use of theoretical-practical classes, with informatics resources as a support tool. This is because it is the domain of theoretical concepts that can later be tested and practiced, either through written exercises, or with the use of computer tools, such as PC's and programming languages.

Thus, it is possible to learn the theoretical concepts always interconnected with a practical explanation of each concept. For this purpose we use the video projector to display the slides with the matter, which allow the teacher to carry out practical exercises to illustrate its application.

The Pc's laboratory are used by students (individually or in groups of two) so they can follow the explanation of the teaching and conduct practical exercises on the subject.