MEDTEC SHOOL

Course: Computer Science

Year (1ˢᵗ-2ⁿᵈ-3ʳᵈ-4ᵗʰ-5ᵗʰ-6ᵗʰ): ___2nd___

Period (1ˢᵗ-2ⁿᵈ semester – annual): ___1st____

Credits: ___5___

Objectives

The Computer Science course introduces problem solving through computer programming, with the following objectives: i) to develop a consistent methodology for solving problems, ii) to present the fundamental aspects of the Python programming language, and iii) illustrate the problem solving process with Python through a variety of interesting examples, either framed in the engineering or medical environment.

At the end of the course, students will acquire:

Knowledge and understanding
Students will acquire knowledge on and understanding of basic elements of computer programming and algorithms and will be able to demonstrate:
- *knowledge of how information is stored and handled in a computing system*
- *knowledge of the Python programming language syntax and semantics*
- *knowledge of the main statements typical of imperative programming languages to manipulate data*

Ability to apply knowledge and understanding
Students will use the acquired knowledge to achieve the following goals:
- *select and design data structures to effectively store information*
- *given a simple problem framed in the engineering or medical environment, design algorithm for its efficient resolution*
- *implement the algorithm in Python*

Making judgements
Students will acquire knowledge on how to interpret data aiming at formulating a subjective judgement:
- *evaluate the correctness of the proposed algorithm*
- *evaluate the appropriateness of the proposed algorithm/program for solving the given problem*

Prerequisites

Basic ability to use a personal computer

Contents

The course is organized in lectures and practical sessions, and will cover the following topics:
- *basic computer architecture*
- *information representation (integers, floating points, characters)*
- *fundamental aspects: structure of a Python program, built-in basic types and arithmetic/logical operators, statements, input/output, basic control structures/statements*
- *complex data types (lists, dictionaries, sets) and built-in methods*
- *functions, parameters and scopes*
- *files*
- *data manipulation and visualization*

Teaching Methods

The course is organized in frontal lectures introducing the key concepts and problem solving strategies using Python and practical sessions where exercises and small projects will be proposed and solved by writing Python programs. Lectures and practical sessions will provide the problem solving and programming abilities and skills that will be verified during the exam sessions.

Verification of learning

The exam can be taken in each one of the scheduled sessions in January-February, July and September.

Course assessment consists of two parts:
+ quizzes and exercises - QE - worth 50% of the final grade - pass mark 18/30
+ a programming project - PP - worth 50% of the final grade - pass mark 18/30
The final grade is the weighted average of positive (> 17/30) QE and PP grades.
The QE part consists of open and closed questions and exercises, to be solved with the computer, in an open book setup, having access to all available material.
The PP part refers to a project that will be presented at the end of the semester, and it is to be developed independently and autonomously by each student. A specification is given with the functionalities to be developed and each student will turn in the code and a short document reporting the presented solution. Students can discuss requirements but are not allowed to discuss and share (parts of) the solution. Students can use any available resource except for help from other peers/people, and generative AI development tools.

QE assessment is performed either
i) through continuous assessment (CA), during the course semester, by means of scheduled-in-advance, in class, short individual activities;
ii) on the day of the exam, during a 60-75 minutes session (open book / using the computer).
Students from previous years (enrolled in a previous academic year) who are not attending class will take the QE part on the day of the exam.

PP assessment is performed after a positive QE assessment, based on the submitted project (code & documentation) and an oral discussion (open to anyone). The project is to be submitted on the day of the exam and the oral discussion will be scheduled a few days later.

Texts

M. Lutz, "Python Pocket Reference", O'Reilly
J. Hunt, "A Beginners Guide to Python 3 Programming", Springer