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|--------------------------|--------------------------|---------------|----------------|--------------------------------------------------------|-----|
| Course Unit              | Programming Languages II |               | Field of study | Computing Science                                      |     |
| Bachelor in              | Game Design              |               | School         | School of Public Management, Communication and Tourism |     |
| Academic Year            | 2021/2022                | Year of study | 1              | Level                                                  | 1-1 |
| Type                     | Semestral                | Semester      | 2              | ECTS credits                                           | 6.0 |
| Workload (hours)         |                          |               | 162            | Contact hours                                          |     |
|                          |                          |               | T              | -                                                      | TP  |
|                          |                          |               | 15             | PL                                                     | 45  |
|                          |                          |               | TC             | -                                                      | S   |
|                          |                          |               | -              | E                                                      | -   |
|                          |                          |               | OT             | -                                                      | O   |
|                          |                          |               | -              | -                                                      | -   |
| Code 8309-414-1204-00-21 |                          |               |                |                                                        |     |

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Telmo Miguel de Oliveira Adao

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Identify the guiding principles of object oriented programming
2. Implement solutions based on problems descriptions and Class Diagrams.
3. Define classes, objects, attributes and method, identifying and defining the needed constructors to the correct instance initialization
4. Implement aggregation.
5. Identify and implement inheritance between classes and establish class hierarchies. Understand and implement interfaces.
6. Understand the concept of polymorphism and implement it.
7. Understand the concept of abstract.

### Prerequisites

Before the course unit the learner is expected to be able to:

1. Elaborate logical reasoning for the resolution of problems
2. Create programs using the procedural paradigm

### Course contents

Object-Oriented Programming definition; Introduction to the C # language; Principles of Object Oriented Programming; Definition of classes in C #; Object Oriented Modeling Concepts; Implementation of class aggregation, associations; Multiple inheritance

### Course contents (extended version)

1. Object Oriented Programming definition
  - Motivation
  - Basic concepts
2. Introduction to the C # language
  - C # the language of . NET architecture
  - Declarations, constants, data types
  - Expressions and operators
  - Flow control structures
  - Subprogramming
  - Exceptions
  - Arrays
  - LinkedList and ArrayList Collections
  - Strings
  - Files (input/output)
3. Principles of Object Oriented Programming
  - Abstraction (class / object)
  - Encapsulation
  - Inheritance
  - Polymorphism
4. classes in C #
  - Attributes
  - Constructors
  - Properties
  - Methods
5. Object Oriented Modeling Concepts
  - Class diagrams in UML
  - Associations between classes: simple, aggregation and inheritance
  - Overriding and adding features, Abstract Classes, Interfaces
6. Implementation of aggregation
7. Implementation of associations
  - 1-N associations
  - N-N associations
  - Associative classes

### Recommended reading

1. GRIFFITHS, I. (2019). Programming C# 8. 0: Build Windows, Web, and Desktop Applications, O'Reilly. [978-1492056812]
2. MARQUES, P. (2016). CURSO PRÁTICO DE C#. Editora FCA. [978-972-722-818-8]
3. Rumbaugh, J. (1991). Object-Oriented Modeling and Design. (3ª Edição). Prentice Hall. [ISBN 0-201-49834-0]
4. LOUREIRO, H. (2017). C# 7. 0 COM VISUAL STUDIO - CURSO COMPLETO. FCA. [ISBN: 978-972-722-868-3]
5. MOURAO, A (2020). Programação Orientada aos Objectos - Textos de Apoio. ESACT-IPB

### Teaching and learning methods

Lecture classes of theoretical concepts followed by practical discussion of model examples. Concepts exploration through the practical solving of small and average complexity problems, aiming to provide a more concrete understanding of the applicability of the acquired concepts.

### Assessment methods

- Distributed Evaluation / incoming students - (Regular, Student Worker) (Final, Supplementary, Special)

**Assessment methods**

- Intermediate Written Test - 35% (minimal grade of 7 points out of 20.)
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- Development Topics - 5% (Interdisciplinary Week work)
- Projects - 25% (Result of the transversal final project.)

**Language of instruction**

Portuguese, with additional English support for foreign students.

**Electronic validation**

|                               |                                  |                                      |                              |
|-------------------------------|----------------------------------|--------------------------------------|------------------------------|
| Telmo Miguel de Oliveira Adao | Barbara Costa Vilas Boas Barroso | Elisabete da Anunciacao Paulo Morais | Luisa Margarida Barata Lopes |
| 21-04-2022                    | 21-04-2022                       | 27-04-2022                           | 04-05-2022                   |