INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Object-Oriented Programming			Field of study	Computer Science										
Bachelor in	Multimedia			School	School of Public Management, Communication and Tourism										
Academic Year	2023/2024	Year of study	1	Level	1-1	ECTS credits	6.0								
Type	Semestral	Semester	2	Code	9213-656-1204-00-23										
Workload (hours)	162	Contact hours	T -	TP 60	PL -	TC -	S -	E -	OT -	O -					

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): Carlos Filipe Campos Rompante da Cunha

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. Principles of Object Oriented Programming. Concepts of object-oriented modeling. Introduction to the C# language. Class definition in C#. Implementation of associations. Class and functions templates. Implementation of inheritance and class hierarchies. Dynamic memory management inside a class. Interfaces and multiple inheritances. Input and output.

Course contents (extended version)

1. Object Oriented Programming definition
   - Motivation
   - Basic concepts
2. Principles of Object Oriented Programming
   - Encapsulation
   - Inheritance
   - Polymorphism
3. Concepts of object oriented modeling
   - Class diagrams using UML
   - Associations between classes: simple, aggregation and inheritance
   - Overriding and adding new features. Abstract classes. Multiple inheritance.
4. Introduction to the C# language
   - Declarations
   - Constants
   - Data types
   - Expressions and operators
   - Flow control
   - Methods
5. Class definition in C#
   - Attributes
   - Constructors. Construtors categories.
   - Methods
6. Basic features of C#
   - Object arrays. Self reference
7. Implementation of aggregation
8. Function and class templates
9. C# Standard libraries
   - String class
   - ArrayList class
10. Implementation of associations
    - 1-N associations
    - N-N associations
    - Associative classes
11. Multiple inheritance
    - Multiple ocorrence of the base class
    - Interfaces
12. Input and output data.

Recommended reading

1. Albahari, J. (2022). C# 10 in a Nutshell. O'Reilly Media, Inc.
2. Trigo, A. & Henriques, J. (2023). Aprenda a Programar com C# (3ª Edição). Edições Sílabo.
3. Sundaramoorthy, S. (2022). UML Diagramming: A Case Study Approach. Auerbach Publications.
4. GRIFFITHS , I. (2019). Programming C# 8. 0: Build Windows, Web, and Desktop Applications, O'Reilly.

Teaching and learning methods

Lecture classes of theoretical concepts followed by practical discussion of model examples. Concept application through small problem solving. Practical experience is developed with the resolution of a larger problem. Execution of a final project assignment.

Assessment methods

- Final Assessement - (Regular, Student Worker) (Final, Supplementary, Special)
  - Experimental Work - 10% ((Optional) Four challenges to be solved outside of the classroom.)
  - Practical Work - 40% ((Mandatory) Minimum 7 points.)
  - Final Written Exam - 50% ((Mandatory) Minimum 7 points. 60% if grade is higher than Trab. Experimental.)

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

Carlos Filipe Campos Rompante da Cunha	Ana Lucia Jesus Pinto	Anabela Neves Alves de Pinho	Luisa Margarida Barata Lopes
27-02-2024	03-05-2024	03-05-2024	08-05-2024