INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Programming Languages II			Field of study	Computer Science								
Bachelor in	Informatics and Communications			School	School of Public Management, Communication and Tourism								
Academic Year	2021/2022	Year of study	1	Level	1-1	ECTS credits	6.0						
Type	Semestral	Semester	2	Code	9188-320-1204-00-21								
Workload (hours)	162	Contact hours	T -	TP 15	PL 45	TC -	S -	E -	OT 20	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): João Pedro Carneiro Borges Gomes

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. Understand and implement the different relationships between classes.
5. Identify and implement inheritance between classes and establish class hierarchies.
6. Understand the concept of polymorphism and implement it.
7. Understand and implement the concepts of abstract classes and interfaces.

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

Introduction to the C# language. Principles of Object Oriented Programming. Classes and objects. Relations between classes. Polymorphism and abstraction.

Course contents (extended version)

1. Introduction to the C# language
   - Development environment
   - Values and variables
   - Fundamental data types
   - Expressions and declarations
   - Operators
   - Flow control
   - Static methods
   - Parameter passing
   - Exceptions and exception handling
2. Principles of Object Oriented Programming
   - Basic concepts
   - Encapsulation
   - Inheritance
   - Polymorphism
   - Abstraction
3. Classes and objects
   - Fields
   - Attributes
   - Constructors
   - Methods
   - Access modifiers
   - Properties
4. Collections
   - Arrays
   - Lists
5. Relations between classes
   - Class diagrams in UML
   - Dependency
   - Association
   - Generalization / Inheritance
   - Agregation
   - Composition
   - Associative classes
6. Polymorphism and abstraction
   - Overload
   - Virtual members
   - Abstract members
   - Override members
   - Interfaces

Recommended reading

1. Weisfeld, M. (2019). Object-Oriented Thought Process, 5th Ed. Addison-Wesley Professional. ISBN-13: 978-0135181966
2. Sarcar, V. (2017). Interactive C#: Fundamentals, Core Concepts and Patterns. Apress. ISBN-13: 978-1484233382
3. Loureiro, H. (2017). C# 7.0 Com Visual Studio - Curso Completo. FCA. ISBN-13: 978-972-722-868-3
4. 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. Concept application through small problem solving. Resolution, with support, of proposed problems. Execution of an integrated project that allows the global application of the various concepts acquired.

Assessment methods

1. Distributed Evaluation - (Regular, Student Worker) (Final)
   - Practical Work - 50% (Minimum grade of 7 out of 20 points.)
   - Intermediate Written Test - 50% (Tests during the academic semester. Minimum final grade of 7 out of 20 points.)
2. Distributed Evaluation - (Regular, Student Worker) (Supplementary, Special)
   - Practical Work - 50% (Minimum grade of 7 out of 20 points.)
   - Final Written Exam - 50% (Minimum grade of 7 out of 20 points.)
3. Exchange students - (Regular, Student Worker) (Final, Supplementary, Special)
   - Practical Work - 100%

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

João Pedro Carneiro Borges Gomes	Vítor José Domingues Mendonça	Elisabete da Anunciacao Paulo Morais	Luisa Margarida Barata Lopes
08-03-2022	10-03-2022	10-03-2022	21-03-2022