

2nd semester 2022 - 2023

Teacher(s)	José Luis Guimarães Oliveira (teacher responsible) Carlos Manuel Azevedo Costa José Manuel Matos Moreira
Duration	Semiannual
ECTS credits	6.0
Scientific area	Computer Science / Science and Technology of Programming (I/Ctp)
Area of specialisation	n.a.
Attendance regime	yes
Contact hours	Theoretical/Practical Sessions = 2 hours Practical/Lab Sessions = 2 hours
Workload	162 hours
Department / School	Departamento de Electrónica, Telecomunicações e Informática
Language(s) of instruction	Portuguese English
Mode(s) of instruction	Presential

Study programme	Cycle	Year	Mandatory
8240 - Computer and Telematics Engineering (integrated Masters - 1st and 2nd Cycle)	1st Cycle	3rd	Optional
8240 - Computer and Telematics Engineering (integrated Masters - 1st and 2nd Cycle)	1st Cycle	0	Optional
8295 - Licenciatura in Informatics Engineering (1st Cycle)	1st Cycle	2nd	Mandatory
8316 - Licenciatura in Computer and Informatics Engineering (1st Cycle)	1st Cycle	3rd	Optional

Learning objectives

At the end of the course, the student must be able to:

1. Understand the scopes of abstractions: design principles, software standards, and software architecture styles
2. Communicate effectively with other members of a team in a software project.
3. Review supported code in tools and best practice rules
4. Propose and defend a solution for a software solution for a system (or part)

according to good practices, principles and standards addressed in the course unit

5. Identify expeditious solutions / platforms that may be alternatives to the deployment of a software project.

Course contents

Software design principles

- Principles and guidelines (e.g. GRASP)
- Their impact in a system's design process, namely in terms of flexibility, maintenance ease and components reuse

Code review and improvement

- Code metrics
- Code review, "Bad smells" and reengineering
- Frequent anti-patterns

Software design patterns

- Highlighting the main design patterns (e.g. GoF)
- Identification and study of the design patterns characteristics in real scenarios

Software architecture styles

- Structural and of interaction/concurrency architecture styles
- Identification and study of the design patterns characteristics in real scenarios
- Introduction to concurrency patterns: Distributed systems as a set of components that cooperate

Articulation of activities

Previous experience in Java Programming (or OO) is a main requirement.

Teaching and learning methods

The practical component will be organized according to a set of small assignments, mainly during classes, in which it is intended to perform experiments that consolidate the introduced theoretical concepts.

Active learning

The objective of both the theoretical and practice classes is to articulate strategies to promote active and student-centered learning.

Calculating the final mark

- TP (40.00%)
 - Discrete evaluation
 - Theoretical evaluation ATP1 2023-04-12 (20.00%)
 - Theoretical evaluation ATP2 2023-05-31 (20.00%)
 - Final evaluation
 - Theoretical evaluation (ATP final) (40.00%)
- P (60.00%)
 - Discrete evaluation
 - Practical evaluation (AP) 2023-05-31 (45.00%)
 - Continuous evaluation (AC) (15.00%)

- Final evaluation
 - Avaliação Prática (AP)/Practical evaluation (AP) (60.00%)

Prerequisites

basic skill on object-oriented programming

Main bibliography

- Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides (1994), *Design Patterns: Elements of Reusable Object-Oriented Software*, Addison-Wesley Professional.
- Craig Larman (2004), *Applying UML and patterns : an introduction to object - oriented analysis and design and iterative development*, Prentice Hall PTR.
- Steve McConnell (2004), *Code Complete: A Practical Handbook of Software Construction, Second Edition*, Microsoft Press.
- Martin Fowler, et al (2000). *Refactoring: Improving the Design of Existing Code*, Addison-Wesley.

Coherence course contents / objectives

The consistency of the syllabus with the objectives of the course comes from the demand for accurate answers to problems and also from the fact that they broaden the conception of students on the subjects under discussion.

Coherence methods / objectives

The contents of this course are dynamically discussed following a waterfall structure where thematic modules are enriched and complemented by hand-on practical sessions aimed at the consolidation knowledge.

Each practical script exposes the student to a set of problems that leads to increasing the demand for accurate answers to their conception of the syllabus. The monographic work promotes interpretation and analysis of technological solutions as also research articles that address the various themes proposed.

This document must be validated and authenticated by the Secretariat of the Organic Unit.