INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Software Engineering Laboratory					Field of study	Computer Science								
Bachelor in	Management Informatics					School	School of Technology and Management								
Academic Year	2022/2023	Year of study	3			Level	1-3			ECTS credits	6.0				
Type	Semestral	Semester	1			Code	9186-709-3103-00-22								
Workload (hours)	162	Contact hours	T	30	TP 30	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): Paulo Jorge Teixeira Matos

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. select and apply the development model that best suit each project
2. design software using concepts and principles of component-oriented design to potentiate the reuse and maintenance
3. select and apply software architecture patterns in accordance with the needs of each application
4. make use of design patterns in software building
5. design, develop and make use of frameworks
6. apply concepts and management practices to software development processes

Prerequisites

Before the course unit the learner is expected to be able to:
Program in an object oriented or functional programming language, preferably Java or Javascript.

Course contents

Management of software projects. Environments and tools to support the software development process. Software architectures. Software design. Design patterns and best practices in software development. Software verification and validation. Software maintenance.

Course contents (extended version)

1. Introduction
   - Software development process
2. Introductory concepts of project management software
   - Team management
   - Tasks planning and management
   - Tools to manage projects
3. Environments and tools to support software development process
   - Software development environments
   - Tools for analysis of requirements and modeling
   - Tools for configuration and software management
4. Software architectures
   - Pipe + filter
   - Object-oriented
   - Layers
   - Blackboard
   - State-machine
   - Client-server
   - Peer-to-peer
   - Event-oriented
   - Pull and Push based
   - Distributed
5. Software design
   - Principles and fundamental concepts of software design
   - Object-oriented design
   - Design patterns
   - Design by components
   - Reuse of software and frameworks
   - Software prototyping
6. Software verification and validation
   - Strategies for validation and verification
   - Fundamental principles of software testing
   - Techniques of black-box and white-box test
   - Verification tools
   - Software maintenance

Recommended reading

1. "Design Pattern – Elements of resuable object-oriented software", Erich Gamma, Richard Helm, Ralph Johnson e John Vlissides; Addison-Wesley, 1994.
2. "UML – Metodologias e Ferramentas CASE – Volume I", Alberto Silva e Carlos Videira; Centro Atlantico. pt, 2005.
3. "Software Construction", MITOPENCOURSEWARE, 2016, https: //ocw. mit. edu/courses/electrical-engineering-and-computer-science/6-005-software-construction-spring-2016/index. htm
4. "Designing Software Architectures: A Practical Approach", Cervantes, H. and Kazman, R. , Addison-Wesley, 1 Edition, 2016.
5. "Complete Guide to Test Automation: Techniques, Practices, and Patterns for Building and Maintaining Effective Software Projects", 1st Edition, Arnon Axelrod, APress, 2018

Teaching and learning methods

Laboratory lessons, where active methodologies are used, leading the students to analyze, encode, verify and validate solutions to real problems. Expository methodologies are also used to complement the knowledge of students that is required to solve the problems. Non-presential periods are used to study, plan and conclude the work performed in classes.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary)
   - Projects - 60%
   - Final Written Exam - 40% (This component has a minimum classification of 7. 0 (seven) values, on the scale 0-20.)
2. Alternative 2 - (Student Worker) (Special)
   - Final Written Exam - 100%
3. Alternative 3 - (Regular) (Special)
   - Projects - 40%
   - Final Written Exam - 60% (This component has a minimum classification of 7. 0 (seven) values, on the scale 0-20.)

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

Paulo Jorge Teixeira Matos	José Luís Padrão Exposto	José Carlos Rufino Amaro	Paulo Alexandre Vara Alves
16-10-2022	24-10-2022	24-10-2022	24-10-2022