INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Software Development and Technologies	Field of study	Informatics
Master in	Informatics	School	School of Technology and Management
Academic Year	2024/2025	Year of study	2
Level	2-2	ECTS credits	6.0
Type	Semestral	Semester	1
Code	5060-710-2102-00-24		

Workload (hours)	Contact hours	T	TP	PL	TC	S	E	OT	O
162		-	60	-	-	-	-	-	-

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): José Luís Padrão Exposto

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Plan software development integration projects
2. Cooperate, organize, and devise strategies for solving technological problems
3. Use containerization technologies and development environments
4. Develop applications with a focus on microservices architecture

Prerequisites

Before the course unit the learner is expected to be able to:
1. Experience with requirements gathering and modeling
2. Experience with development frameworks
3. Understanding of object-oriented programming (OOP)
4. Experience with version control
5. Basic concepts of networking and operating systems

Course contents

Software development and tools.
Version control and collaboration.
Container technologies.
Microservices architecture.
Development technologies: Django, Django REST Framework, React.
Case study.

Course contents (extended version)

1. Software development and tools.
   - Overview of software development fundamental concepts.
   - Development environments: local, staging and production.
   - Software Development Tools.
2. Version control, collaboration and CI/CD.
   - Git and distributed version control.
   - Common Git operations.
   - Git workflow.
   - Branching and remote repositories.
   - Collaboration with GitLab.
   - Continuous integration, delivery and deplaoyment (CI/CD). GitLab pipelines and runners.
3. Container technologies
   - What are containers?
   - Docker architecture overview. Basic concepts.
   - Essential docker commands.
   - Dockerfile - creating custom images.
   - Docker networking and volumes.
   - Docker Compose.
   - Docker registries.
4. Microservices architecture
   - Software architectures. Elements of software architecture. Common architectural patterns.
   - Microservices characteristics, communication and best practices.
5. Development technologies: Django, Django REST Framework, React.
   - Python. Creation and management of virtual environments (venv).
   - Installation and package management with pip and requirements.txt.
   - Introduction to Django: models, views, templates. Django ORM.
   - RESTful APIs with Django REST Framework: serializers, viewsets, and routers.
   - Authentication, authorization, and permissions.
   - Synchronization of microservices.
   - Overview of React: components, state, and props.
   - Backend-frontend integration: communication between different components.
   - API testing and validation tools.
6. Case study: Medical managemt system

Recommended reading

1. Designing Microservices with Django. Akos Hochrein. Apress. 2019
2. Architecting Modern Web Applications with ASP.NET Core and Azure. Steve "ardalis" Smith. Microsoft Press. https://docs.microsoft.com/en-us/dotnet/architecture/modern-web-apps-azure/. 2020
3. Django documentation, https://docs.djangoproject.com/, 2024
4. Django REST framework, https://www.django-rest-framework.org/. 2024
5. React Learn, https://react.dev/learn, 2024

Teaching and learning methods

Project-based learning with group software development. Theoretical exposition of concepts focused on key moments to engage project evolution. Evaluation conducted by the instructor, self-assessment, and peer assessment.

Assessment methods

1. Final period - (Regular, Student Worker) (Final)
   - Experimental Work - 30%
   - Projects - 70%
2. Supplementary and special periods - (Regular, Student Worker) (Supplementary, Special)
   - Final Written Exam - 100%

Language of instruction

English

Electronic validation

José Luís Padrão Exposto	Tiago Miguel Ferreira Guimaraes Pedrosa	José Eduardo Moreira Fernandes	José Carlos Rufino Amaro
10-11-2024	11-11-2024	11-11-2024	11-11-2024