

Course Unit	Semantic Web	Field of study	Information Systems
Master in	Informatics	School	School of Technology and Management
Academic Year	2023/2024	Year of study	2
Type	Semestral	Semester	1
Level	2-2	ECTS credits	6.0
Code	5060-710-2103-00-23		
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) Paulo Jorge Teixeira Matos

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. know the guiding principles of the semantic web;
2. identify and characterize opportunities to make use of semantic web technologies and principles;
3. select and apply the web semantic most appropriate technologies to each problem;
4. understand the principles and use of graph databases for knowledge representation;
5. understand what ontologies are, what they are for and know how to apply RDF, RDFS and OWL in their design;
6. understand and be able to apply the concepts and technologies associated with Linked Data;
7. using query languages for knowledge bases;
8. use semantic web work tools.

Prerequisites

Before the course unit the learner is expected to be able to:

1. understand the main concepts of an information system;
2. have basic knowledge of programming and systems design.

Course contents

Semantic web: general concepts, motivation, objectives, basic technologies and applications. Graph database: general concepts, design, tools, technologies, practical applications and case studies. Ontologies: general concepts, design, tools, technologies (RDF, RDFS, OWL, rules and inference engines), practical applications and case studies. Linked Data and good practices to move towards web 3. 0.

Course contents (extended version)

1. Introduction to Semantic Web
 - General concepts and motivation.
 - Motivation
 - Objectives and potential
 - Base technologies
 - Applications
2. Graph databases
 - General concepts
 - Conception and design
 - Tools and technologies.
 - Practical applications and case studies
3. Ontologies
 - General concepts
 - Conception and design
 - Tools and technologies (RDF, RDFS, OWL, rules and inference engines).
 - Practical applications and case studies
4. Extraction, Transformation and Load processes
 - General concepts
 - Good practices
 - Technologies (JSON-LD and RDFa)

Recommended reading

1. "Demystifying OWL for the enterprise", Michael Uschold, Morgan & Claypool Publishers, 2018
2. "Graph Algorithms - Practical Examples in Apache Spark & Neo4j", Mark Needham, Amy Hodler, O'Reilly, 2019
3. "Learning Cypher", Onofrio Panzarino, Packt Publishing, 2014
4. "Semantic Modeling for Data: Avoiding Pitfalls and Breaking Dilemmas 1st Edition", Panos Alexopoulos, O'Reilly, 2020
5. "Linked Data", David Wood, Marsha Zaidman, Luke Ruth, Manning Publications, 2014

Teaching and learning methods

This course is composed by theoretical-practical lectures, divided into two kinds of periods: - expository periods during which the theoretical contents are presented and explained based on practical examples; - implementation periods during which the students put in practice the knowledge acquired in the expository periods. Non-presence periods are aimed to study and implement practical works.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary)
 - Development Topics - 70% (Development of a theme using the technologies taught and elaboration of a scientific publication.)
 - Practical Work - 5% (Practical work carried out in class.)
 - Final Written Exam - 25% (The written test has a minimum grade of 7. 0 out of 20)
2. Alternative 2 - (Regular, Student Worker) (Special)
 - Practical Work - 60%
 - Final Written Exam - 40% (The written test has a minimum grade of 7. 0 out of 20)

Language of instruction

English

Electronic validation

Paulo Jorge Teixeira Matos	Tiago Miguel Ferreira Guimaraes Pedrosa	José Eduardo Moreira Fernandes	José Carlos Rufino Amaro
04-11-2023	06-11-2023	06-11-2023	06-11-2023