

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	Level	2-2
Type	Semestral	Semester	1	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

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