

**COURSE DATA****Data Subject**

Code	36405
Name	Semantic web technologies
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1400 - Degree in Computer Engineering	School of Engineering	4	First term
1403 - Degree in Telematics Engineering	School of Engineering	4	First term
1407 - Degree in Multimedia Engineering	School of Engineering	4	First term

Subject-matter

Degree	Subject-matter	Character
1400 - Degree in Computer Engineering	16 - Optional subject	Optional
1403 - Degree in Telematics Engineering	19 - Optional subjects	Optional
1407 - Degree in Multimedia Engineering	19 - Optatividad	Optional

Coordination

Name	Department
SAMPER ZAPATER, JOSE JAVIER	240 - Computer Science

SUMMARY

Semantic Web Technologies is part of the optional module. It aims to be the continuation of the contents that the student has acquired in previous courses, especially in courses related to programming and Web application development. Its main objective is to provide an in depth view of the various technologies related to the Web environment that have emerged in this area: Blogs, Wikis, Social Networks, Content Managers, etc. It is intended that the student is capable of handling them, including those related to Web 3.0, as well as design-oriented web applications in different areas or domains. At the same time, we want the student can understand the concept of semantic annotation and information extraction using technologies such as RDFa and GRDDL, tools that enable better management and knowledge recovering.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

It is recommended to have completed the courses (taught to the previous year) related to programming and Web application development: Specifically, DAW, Web Applications Development in Degrees in Computer and Telematics Engineering, and Web Programming in Multimedia Engineering

OUTCOMES

1400 - Degree in Computer Engineering

- TI6 - Ability to design systems, applications and services based on network technologies, including the Internet, the web, e-commerce, multimedia, interactive services and mobile computing.
- SI1 - Ability to integrate ICT solutions into business processes in order to meet the information needs of organisations, thus enabling them to achieve their goals effectively and efficiently and providing them with competitive advantage.
- SI3 - Ability to actively participate in the specification, design, implementation and maintenance of information and communication systems.

1405 - Grado en Ingenieria Multimedia

- MM3 - Be able to implement methodologies, technologies, processes and tools for the professional development of multimedia products in a real context of use by applying the appropriate solutions for each environment.

LEARNING OUTCOMES

This course allows for the following learning outcomes or capabilities:

- Knowing determine the applicability of content management tools in the development of a specific web project.
- Being able to choose the development platform for web content best suited to each type of project.
- Be able to develop in environments common CMS on the market.
- Being able to design Web-oriented applications in different areas or domains.
- Understand the concept of semantic annotation and information extraction using technologies and tools that enable better management and pursuit of knowledge.



To complement the above results, this course also allows to acquire the following skills:

- Model and solve problems being able to identify the essential elements of a situation and make approximations to reduce problems to a manageable level. This includes solutions that are not derived from the application of a standardized procedure, but providing original, creative and imaginative answers.
- Organize, plan and conduct their own learning, individually and in groups in a coordinated way.
- Working individually and in groups in a coordinated way.
- Work in groups: collaborating, leading, planning, interacting, getting consensus, negotiating, resolving conflicts and respecting the views of others.
- Argue, defend their views and be critical (and self-criticism) from rational and rigorous criteria.
- Preparation and presentation of texts in a clear, coherent, organized and understandable way.
- Oral and written comprehension.

DESCRIPTION OF CONTENTS

1. Web Evolution

From Web 1.0 to Web 4.0: The Evolution of the Web

2. Technology and Web 2.0 tools

RSS

Mash upBlogs

Wikis

Social Networks

Other Web 2.0 tools

3. Web 3.0 Technologies

XML reminder. Structured Web Documents

RDF. Description of web resources

Metadata Vocabularies

OWL

Microdata and Microformats

RDFa: Semantic Annotations in XHTML documents.

JSON-DL

GRDDL: Getting RDF from XML, XHTML documents.



4. SWRL and SQWRL Rule Languages

Introduction to SWRL (Semantic Web Rule Language)

Types of atoms and expressions

SWRLTab

Introduction to SQWRL (Semantic Query-enhanced Web Rule Language) and SQWRLTab

Execution of Rules through the PELLET reasoner and RULE Engine.

5. Query Language SPARQL

Introduction to SPARQL

Modifiers

Filters and operators

Using Regex

Graph Patterns

Using From

Using Graph

Construct, Describe and Ask

Federated queries

Examples (DBpedia)

6. GeoSparql

Introduction to GeoSparql

GeoSparql Vocabulary

Geometric objects and representations

Relations and Functions. Specifics in environments.

Use cases.

7. Open Data Publication

Introduction to the Linked Open Data (LOD)

Regulation at European and Spanish level: Technical Interoperability Standard (NTI-RISP). European Open Data Directive.

Life cycle in open data modeling. Tools.

Guide for the publication of OpenData CKAN (Aporta.es)

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Development of group work	5,00	0
Development of individual work	5,00	0
Study and independent work	5,00	0
Preparation of evaluation activities	15,00	0
TOTAL	90,00	

TEACHING METHODOLOGY

During the on-site basis theoretical activities, the main topics of the course will be shown by providing a global and inclusive vision, analyzing in detail the key and more complex issues, encouraging at all times the students participation. These activities are complemented by practical activities in order to apply the basic concepts and to expand the knowledge and experience that is acquired during the performance of the proposed work. The on-site activities comprise the following:

- Problem-based lectures and questions in the classroom
- Sessions devoted to moderated discussions, and the resolution of problems and exercises that the students have previously worked
- Laboratory-based practical exercises
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In addition to on-site activities, students must perform personal tasks (outside the classroom), including: monographs, guided literature research, questions and problems as well as the preparation of classes and exams (study). These tasks will be primarily conducted on an individual basis, thus enabling to enhance self-employment. Additionally, works requiring the participation of small groups of students (2-4) will be proposed to promote the students capacity for integration into working groups.

The University of Valencia e-learning platform (*Aula Virtual*) will be used to support the communication with students. Through this platform the students will have access to course materials used in class as well as the problems and exercises to solve.



EVALUATION

Students can choose between two different assessments:

- Continuous assessment system
- Overall system.

Continuous assessment system

The evaluation of the course is conducted by the aggregation of the following elements:

- Continuous assessment (N_Continua), based on the students participation and their degree of involvement in the teaching-learning process, taking into account the regular attendance to onsite activities and the resolution of questions and problems, and the development of the works proposed to be delivered.
- Individual objective test (N_Examenes), consisting of several exams, or knowledge tests, which consist of both theoretical/practical questions and problems.
- Assessment of practical activities (N_Practicas), from the achievement of objectives in the laboratory and problems sessions, and the preparation of reports. Oral presentations (individually and/ or in groups) can be also part of this evaluation elements in order to evaluate the students capacity for creating documents and transferring knowledge.

$N_Examenes \text{ Score} = 50\% \text{ Score Control} + 50\% \text{ Score Official Examination}$

Control with note ≥ 5 eliminate matter, but only your note is saved to the 1st call. In 2nd call exam it will be unique and correspond to the whole subject. The 1st call exam consists of two parts. Those who have the approved control only submitted to the 2nd part and all the rest. The realization of the first part in the 1st Call void the note of the first part obtained in control.

$\text{Final Score} = 20\% \times N_Continua + 45\% \dagger \times N_Examenes + 35\% \dagger \times N_Practicas$

Continuous assessment is distributed among the following items:

- Attendance 5%
- Participation 5%
- Activities throughout the course: 10%

\dagger It will be necessary to, at least, obtain obtain a minimum grade 4 in the different exams and N_Practicas to have the possibility to pass the course

Attendance to laboratory sessions is mandatory. A minimum of 80% of classes must be attended and adequately justify the impossibility of attending the remaining sessions.

Those students who do not pass Laboratory in 1st call must submit and present (not necessarily identical to those required during the course) for the second call and defend them before their practice teacher. This delivery and presentation must be carried out according previously with the professor and the totality of the works must be presented before the day of the final exam of the 2nd call.

Applying flexibility in the criteria, if a student approves the part of THEORY or the part of LABORATORY in 1st call, the approved part (Theory or Laboratory) will be saved, and only must be submitted to the suspended part (Theory or Laboratory) in 2nd Call.

The part of THEORY (1st call) , may be approved only in the case where the average of the parts is ≥ 5 and the minimum grade of 4 is reached in each one of them.

Single Evaluation System

This method will apply to any student who, for a reason reasoned and admitted by the teacher, can not attend classes regularly. In this sense, the grade will be obtained from 70% of the grade obtained in a single global exam of the subject and 30% of the practical activity..

The completion of this global examination will coincide with the final Theory examinations of students who have pursued the continuous assessment system. The global examination will include the contents of both theory sessions and problems.



In the first call, the same works (and deadlines for delivering) that attendance students, will be carried out and the works will be delivered through the corresponding tasks through the virtual classroom. In addition, after the delivery of each work, the student and teacher will schedule an appointment to defend in person the work delivered.

In the second call, the procedure will be the same that for the attendance students.

According to the regulations of the University of Valencia, the performance of fraudulent actions in a test or part of it will result in the qualification of a zero in the same, irrespective of the disciplinary procedure that can be opened and of the sanction that is according to the current legislation.

The evaluation will be conducted in accordance with the University of Valencia Qualifications Legislation. At the time of writing this teaching guide, the current legislation is the one approved by the Governing Council of the UVEG in January 27, 2004, adjusted as provided for that purpose by the Royal Decrees 1044/2003 and 1125 / 2003. It states basically that the qualifications will be numbered from 0 to 10 with a decimal element and they must be accompanied with the qualitative rating in accordance with the following scale:

From 0 to 4.9: "Failed"

From 5 to 6.9 "Approved"

From 7 to 8.9, "Notable"

9 to 10: "Outstanding" or " Outstanding with honors"

REFERENCES

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Publisher: Emereo Publishing (September 18, 2008)
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- Hjelm, Johan, Creating the Semantic Web with RDF, Professional Developers Guide. ISBN 0-471-40259-1, Wiley (2001)
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- Uso de Tecnologías Semánticas En Diferentes Dominios de Aplicación. Entorno Educativo y Sistemas de Información Vial.
Autores: Samper Zapater Jose Javier y Mendes Neto Fco Milton
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- Researcher Profiling based on Semantic Analysis in Social Networks. Autor: Laurens De Vocht. Thesis voorgedragen tot het behalen van de graad van Master in de ingenieurswetenschappen: computerwetenschappen. © Copyright K.U.Leuven

Additional

- Joomla! 2.5 - Guía para Principiantes de Hagen Graf, Christine Graf y Isidro Baquero (21 abril 2012)
- Web 2.0: Blog, Habbo, Wordpress, Crowdsourcing, Windows Live, Computaci N En Nube, Nimbuzz, Stabri Monogo, Gears, Taringa!, Websockets.
Editor: Books LLC, Wiki Series (26 de mayo de 2011)
Idioma: Español
ISBN-10: 1231465506
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- Tutorial. XML Design. (Gentle Transition from XML to RDF). Roger L. Costello, David B. Jacobs @2003 the MITRE Corporation. Sponsored by DARPA
- Joomla! Programación (Títulos Especiales (anaya))
Mark Dexter, Louis Landry. Editor: ANAYA MULTIMEDIA, 2012.
- Daconta, Michael C.; Obrst, Leo, J. and Smith, Kevin, T The semantic Web. A guide to the future of XML, Web services, and knowledge management.Ed. Wiley, ISBN: 0-471-43257-1. (2003)
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- Recurso Web en W3C: http://www.w3.org/TR/#tr_GRDDL



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- Recurso Web en W3C: http://www.w3.org/TR/#tr_RDF

