ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

593000504 - Information Models

DEGREE PROGRAMME

59AH - Master Universitario En Internet Of Things (iot)

ACADEMIC YEAR & SEMESTER

2024/25 - Semester 1

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Learning guide

1. Description

1.1. Subject details

Name of the subject	593000504 - Information Models
No of credits	3 ECTS
Type	Compulsory
Academic year ot the programme	First year
Semester of tuition	Semester 1
Tuition period	September-January
Tuition languages	English
Degree programme	59AH - Master Universitario en Internet Of Things (Iot)
Centre	59 - Escuela Tecnica Superior De Ingenieria Y Sistemas De Telecomunicacion
Academic year	2024-25

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Ana Marta Gabaldon Perez	A4404	a.gabaldon@upm.es	Sin horario.
Maria Luisa Martin Ruiz (Subject coordinator)	A4406	marialuisa.martinr@upm.es	Sin horario.

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

2.2. Research assistants

Name and surname	Email	Faculty member in charge
Diez Muñoz, Fernando	fernando.diez.munoz@upm.es	Martin Ruiz, Maria Luisa

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

The subject - recommended (passed), are not defined.

3.2. Other recommended learning outcomes

- Basic concepts of XML, JSON and creation of abstract Schemas

4. Skills and learning outcomes *

4.1. Skills to be learned

CB08 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios

CB09 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades

CE.08 - Diseñar y desarrollar soluciones tecnológicas para implementar servicios IoT capaces de interactuar con diferentes fuentes de información y dispositivos distribuidos incluyendo el diseño de estructuras de intercambio de información eficientes

CE.10 - Analizar y diseñar modelos de información basados en ontologías normalizadas para aplicaciones IoT así como las técnicas empleadas para manejar estos modelos de información

CG02 - Los alumnos serán capaces de aplicar métodos y tecnologías avanzadas que les permitan abordar necesidades y problemas en aplicaciones IoT

CG03 - Los alumnos demostrarán tener las destrezas necesarias para integrar y aplicar los conocimientos adquiridos de forma que puedan desarrollar soluciones innovadoras y servicios IoT en general

CT.01 - Capacidad de uso de la lengua inglesa para el trabajo en contextos internacionales

4.2. Learning outcomes

RA9 - To understand the information models that allow evaluate, develop and validate the security and privacy of IoT services.

RA8 - To manage heterogeneous information from multiple sources based on interoperability and congestion control techniques.

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

5. Brief description of the subject and syllabus

5.1. Brief description of the subject

Information Model is the first course related to a basic part of IoT: information. Information has been treated from multiples points of view and applied to different environments. In this course it is solved the problem of collecting information in real time, processing, analyzing and inferring new knowledge to creating smarts responses.
In this course it is studied mechanisms of organization, conceptualization and classification of information in IoT environments, based on its semantic description, for processing and extracting knowledge. Semantic information must not only be applied to information, but also to the set of systems that make up the IoT and the environment in which it is deployed.

5.2. Syllabus

1. Techniques to manage heterogeneous information to design solutions to integrate information from multiple sources

    1.1. Introduction to the Semantic Web

    1.2. Semantic Web Standards

        1.2.1. Resource Description Framework (RDF)

        1.2.2. Resource Description Framework Schema (RDFS)

2. Knowledge engineering and knowledge base design for Semantic Web applications

    2.1. Ontology generation methodologies

    2.2. Ontology Web Language (OWL)

    2.3. Ontology Development Environments (ODEs)

    2.4. SPARQL

6. Schedule

6.1. Subject schedule*

Week	Type 1 activities	Type 2 activities	Distant / On-line	Assessment activities
1	**Introduction to Information Models** Duration: 01:00 Lecture **Interoperability; Ontology: 1. What is an Ontology? 2. Ont. Utility 3. Ont. Type & Elements** Duration: 03:00 Lecture			
2	**Methodologies: 101 Methodology; Other Methodologies** Duration: 03:00 Lecture **Final Project Introduction;** Duration: 01:00 Lecture			
3	**RDF: 3.1. Why do we need RDF?; 3.2. Namespaces;** Duration: 03:00 Lecture **What is a graph?; Knowledge graph;** Duration: 01:00 Lecture			
4	**RDFS.** Duration: 01:00 Lecture **1.1. Class, Subclass, Instances; 1.2. Properties & Relations; 1.3. Inference;** Duration: 03:00 Laboratory assignments			
5	**OWL.** Duration: 01:00 Lecture **1.1. Why OWL?; 1.2. Properties; 1.3. Complex Classes; 1.4. Ontology Mapping;** Duration: 03:00 Cooperative activities			

6	**TEAM WORK: Ontology development.** Duration: 04:00 Cooperative activities			
7	**TEAM WORK: Ontology development.** Duration: 04:00 Cooperative activities			
8	**TEAM WORK: Ontology development.** Duration: 04:00 Cooperative activities			
9	**Presentation of Works** Duration: 03:00 Additional activities			**Presentation of works** Group work Progressive assessment and Global Examination Presential Duration: 03:00
10				
11				
12				
13				
14				
15				
16				
17				

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
9	Presentation of works	Group work	Face-to-face	03:00	100%	5 / 10	CE.08 CE.10 CB08 CB09 CT.01 CG03 CG02

7.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
9	Presentation of works	Group work	Face-to-face	03:00	100%	5 / 10	CE.08 CE.10 CB08 CB09 CT.01 CG03 CG02

7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Presentation of works	Problem-solving test	Face-to-face	01:00	100%	5 / 10	CE.08 CE.10 CB08 CB09 CT.01 CG03 CG02

7.2. Assessment criteria

Along this course the students will develop a project to apply the content, in groups of two people.

The assessment of this course is continous. Last week the students will do a presentation of their project. Previously, a memory with the results obtained must be uploaded to Moodle Platform. The final project is a non-recoverable activity.

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Modulo de Laboratorio	Equipment	
Plataforma SOFIA2	Others	IoT Platform.
http://json-schema.org/	Web resource	JSONSchema main page
https://w3.org/TR/	Web resource	W3C standards and drafts
https://w3.org/XML/Schema	Web resource	XMLSchema W3C Main page
https://w3.org/2001/sw/wiki/RDF	Web resource	RDF W3C Main Page
https://w3.org/2001/sw/wiki/SPARQL	Web resource	SPARQL W3C Main Page
https://w3.org/2001/sw/wiki/RDFS	Web resource	RDFS W3C Main page
https://w3.org/2001/sw/wiki/OWL	Web resource	Web Ontology Languaje W3C Main page
https://protege.stanford.edu	Web resource	Protege tool main page