

62949 - Internet of Things

Syllabus Information

Academic Year: 2022/23

Subject: 62949 - Internet of Things

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 562 - Master's in Product Development Engineering

ECTS: 4.5

Year: 1

Semester: Second semester

Subject Type: Optional

Module:

1. General information

1.1. Aims of the course

The subject and its expected results respond to the following approaches and objectives:

- Complete the training of graduates, especially in Engineering of Industrial Design and Product Development, with the knowledge not covered in their previous Grade.
- Provide students with both conceptual and practical resources to apply in their professional or research work.
- Strengthen the ability to create new IoT products and services with a strong technological component.
- Encourage judgment and creativity of the students.

These approaches and objectives are aligned with some of the Sustainable Development Goals (SDG) of the 2030 Agenda (<https://www.un.org/sustainabledevelopment/en/>) and certain specific goals, in such a way that the acquisition of the learning outcomes of the subject provide training and competence to contribute to their achievement:

- **Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all**
 - **Target 8.2** *Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors.* Throughout the subject, the CE9 competence is worked through the use, knowledge and application of various technological and digital tools of the latest generation to empower students in Information and Communication Technologies (ICTs) and their application in design of products and services.
- **Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation**
 - **Target 9.4** *By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.* In the course projects (continuous assessment) the CE8 and C10 competences work out complete proposals for the design, development and implementation of IoT solutions: some of these IoT solutions are focused (depending on the academic year and their projects) in the field of smart infrastructures, urban mobility, industrial sustainability, etc.

1.2. Context and importance of this course in the degree

This subject is optional (4.5 ECTS) within the second semester of the Master. It offers innovative knowledge trying to fill a gap of professionals for the new Industry 4.0 and Internet of Things (IoT) paradigm. It offers tools based on Information and

Communication Technologies (ICT) to learn to design, develop and implement novel IoT products and services.
Subject linked to the subject with code 62244

1.3. Recommendations to take this course

There are no previous recommendations

2. Learning goals

2.1. Competences

The student will be more competent to...

- ? Understand the knowledge that can give an opportunity to be original in the development of new applications/services.
- ? Integrate knowledge and devices into the network.
- ? Design and prototype devices with a high technological component.
- ? Solve problems of design, research, development and innovation in relevant areas of economic, industrial, professional and academic activity.

2.2. Learning goals

The student, to pass this course, must demonstrate the following results...

- ? Knows the fundamentals of the connectivity of things through networks, as well as the functionality and possibilities of communication between different types of sensors and actuators.
- ? Knows and understands the possible application in different production areas of integrated product/service, device/s and user/s connectivity systems.
- ? Is able to understand and participate in the design process of an integrated connectivity system and is able to prototype developments of products and/or services related to Internet of Things (IoT)

2.3. Importance of learning goals

- ? Possibility of acquiring new R+D+i knowledge with high technological and human repercussions.
- ? Possibility of applying the knowledge acquired and their ability to solve problems in new environments within very broad technological and social contexts.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The subject will be evaluated through the following tests:

- Final evaluation test with a value of 30% of the final grade.
- Directed work and continuous evaluation with a value of 70% of the final grade.

Following the regulations of the University of Zaragoza in this regard, a global assessment test will also be scheduled for those students who decide to opt for this second system.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It is based on a practical approach and learning by experience. A wide range of teaching and learning tasks are implemented, such as lectures, theory and practice sessions, problem-solving, assignments, workshops and seminars, autonomous work and study, and tutorials.

4.2. Learning tasks

The course (60 hours of teaching sessions) includes the following learning tasks:

- Lectures and theory sessions. Their goal is to provide the necessary bases to understand the relevance of some theoretical aspects that cannot be learned in other activities.
- Practice sessions. Their goal is to apply the concepts and techniques introduced in lectures and theory sessions to design, develop, integrate and implement professional IoT solutions.
- Autonomous work and study.

4.3. Syllabus

The course will address the following topics:

Theory

- Internet and the evolution of the web
- Types of network computing
- Internet of things
- Design of intelligent devices
- Electronic communications between devices
- Interconnectivity and interoperability

Practice

- Analysis and design of IoT architectures
- Software / hardware integration
- Technical validation and user evaluation
- Value proposition: Minimum Viable Product (MVP)
- IoT professional solutions

4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the course and EINA websites (<https://eina.unizar.es/>).

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=62949&Identificador=C70509>

Otros recursos:

- ¿Qué es Internet de las Cosas? <https://www.domodesk.com/221-a-fondo-que-es-iot-el-internet-de-las-cosas.html>
- 5 claves para entender IoT <https://www.renacen.com/blog/claves-internet-de-las-cosas/>
- Estrategia Nacional de Inteligencia Artificial https://portal.mineco.gob.es/es-es/comunicacion/Paginas/201202_np_enia.aspx
- The IoT Business Index 2020: a step change in adoption <https://eiuperspectives.economist.com/technology-innovation/iot-business-index-2020-step-change-adoption>
- Toward the artificial intelligence of things (white paper) <https://blogs.sas.com/content/sascom/2018/06/01/toward-the-artificial-intelligence-of-things/>
- The Internet of Senses: Ericsson ConsumerLab: Ten Hot Consumer Trends 2030 <https://www.ericsson.com/en/press-releases/2019/12/ericsson-consumerlab-ten-hot-consumer-trends-2030--the-interr>
- The IoT Business Index 2020: a step change in adoption <https://eiuperspectives.economist.com/technology-innovation/iot-business-index-2020-step-change-adoption>