Internet of Things

Academic Year: (2021 / 2022) **Review date: 09-06-2021**

Department assigned to the subject: Telematic Engineering Department

Coordinating teacher: IGLESIAS MARTINEZ, JOSE LUIS

Type: Electives ECTS Credits : 3.0

Year : Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Communications networks and services

OBJECTIVES

This course introduces the basic principles of the Internet of Things (IoT) and the main standardised IoT architectures, then it focuses on IoT-specific communication networks and services, illustrating their application to different use cases.
The aim of the course is to analyse both the architectural principles and the different alternative technologies that can be used for the deployment of an IoT system. In order to achieve this objective, the student must acquire a series of knowledge and skills.

In terms of knowledge, at the end of the course the student will be able to:
- Understand the concept of IoT and its basic principles.
- Know the main standardised IoT architectures.
- Know the main IoT connectivity technologies applicable to different use cases.
- Understand the modifications necessary to adapt the IP protocol to the IoT environment.
- Learn about the main IoT application protocols.
- Learn about different IoT use cases.

In terms of specific skills, at the end of the course the student will be able to:
- Know and understand the main reference architectural models for IoT.
- Know and identify different connectivity technologies, both short- and long-range, applicable to the IoT field.
- Ability to design network, transport and application level solutions for IoT.
- Be able to design a sensor/actuator network and its connection to the Internet according to the requirements of different use cases.

DESCRIPTION OF CONTENTS: PROGRAMME

1.- Introduction to IoT and basic concepts
2.- Standardized IoT architectures: OneM2M, IoTWF
3.- Sensors and actuators: smart objects
4.- Connectivity in IoT: NB-IoT, LTE-M, LoRaWAN, IEEE 802.15.4
5.- IP for IoT: 6LowPan and RPL
6.- Application protocols: COAP, MQTT
7.- Use Cases

LEARNING ACTIVITIES AND METHODOLOGY

The teaching methodology based on active learning will include:

1.- Lectures. The course has a basic reference book (see bibliography). The course will also propose complementary bibliography to allow students to complete and detail particular chapters.

2.- Practical classes applied to IoT networks and applications.

3.- Resolution of case studies in group work, which will enable them to consolidate the skills acquired.

4.- Group discussion of case studies that will allow to develop the skill of analysing and communicating the relevant information so as to solve problems.

ASSESSMENT SYSTEM

Evaluation:

100% of continous assessment

The evaluation will consist of three blocks:
1) 35 % evaluation of practical sessions (Laboratory knowledge tests and memories).
2) 25 % evaluation of case studies.
3) 40 % 2 knowledge tests (one 15% and the other 25%).

The extraordinary evaluation will be by means of an exam (100% of the mark).

% end-of-term-examination:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

BASIC BIBLIOGRAPHY

- Rob Barton; David Hanes; Gonzalo Salgueiro IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, Cisco Press, 2017

ADDITIONAL BIBLIOGRAPHY

- Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle. From machine-to-machine to the Internet of things: introduction to a new age of intelligence., Kidlington Oxford: Academic Press., 2014
- Jean-Philippe Vasseur;Adam Dunkels. Interconnecting Smart Objects with IP: The Next Internet., Morgan Kaufmann Publishers Inc., 2010
- Perry Lea. Internet of things for architects: architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security., Packt Publishing., 2018