

300263 - IOT-IP - Internet of Things and Ubiquitous IP

Coordinating unit:	300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit:	744 - ENTEL - Department of Network Engineering
Academic year:	2019
Degree:	MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Teaching unit Optional) MASTER'S DEGREE IN APPLIED TELECOMMUNICATIONS AND ENGINEERING MANAGEMENT (MASTEAM) (Syllabus 2015). (Teaching unit Optional)
ECTS credits:	3
Teaching languages:	English

Teaching staff

Coordinator:	CARLOS GOMEZ MONTENEGRO
Others:	Primer quadrimestre: CARLOS GOMEZ MONTENEGRO - M1A21 M. ELENA LOPEZ AGUILERA - M1A21 ENRICA VALERIA ZOLA - M1A21

Prior skills

- Fundamental mechanisms of the Internet: IPv4, IPv6, routing, transport (e.g. TCP), applications (e.g. SIP).
- Fundamentals of RF communication and protocols: physical and MAC layers.
- Ethernet and IEEE 802.11 networks: MAC layer switching/routing, WiFi functions (scan, exploration, association, handover, etc.).
- Cellular mobile communication networks: elements (base stations, data bases, switching elements, gateways, etc.) and functions (mobility management: location, handover, paging; attachment, power control, silence detection, etc.).
- Fundamentals of wireless multihop networks. Ad-hoc network routing protocols.
- Sensor networks.
- Probability and stochastic processes.

Requirements

None.

Degree competences to which the subject contributes

Basic:

CB6. (ENG) CB6 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.

CB9. (ENG) CB9 - 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.

Transversal:

02 SCS N1. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 1. Analyzing the world's situation critically and systemically, while taking an interdisciplinary approach to sustainability and adhering to the principles of sustainable human development. Recognizing the social and environmental implications of a particular professional activity.

05 TEQ N2. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.

06 URI N1. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.

03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that

300263 - IOT-IP - Internet of Things and Ubiquitous IP

fits in with the future needs of the graduates of each course.

Teaching methodology

The teaching methodology combines the following components:

- Traditional lectures incorporating students' participation through short activities in the class, such as short questions, problem solving, debates and presentations done by the students.
- Autonomous work, whereby students will complete the information provided by the teachers and will carry out activities with the goal of consolidating knowledge in the scope of the subject, with the teachers' support.
- Collaborative work, whereby teams of students will be mutually responsible for the learning process within a team.

Learning objectives of the subject

At the end of the course the student should be able to:

- Evaluate the Internet limitations, as well as the proposed solutions and the scenarios in which these will be used.
- Design a complete solution in terms of connectivity (technologies, protocol architecture, topology, etc.) for an Internet of Things application in a specific scenario.
- Choose and configure adequately the communication protocols for the Internet of Things.
- Choose and configure adequately optimization techniques for wireless communications at various protocol stack layers.
- Use the solutions for supporting the mobility of devices in the Internet.
- Analyze and select the best mobility support solution for a given scenario.
- Configure adequately the network parameters and mechanisms to mitigate the impact of the mobility of the devices connected to a network.

Study load

Total learning time: 75h	Hours large group:	22h	29.33%
	Hours medium group:	0h	0.00%
	Hours small group:	2h	2.67%
	Guided activities:	3h	4.00%
	Self study:	48h	64.00%

300263 - IOT-IP - Internet of Things and Ubiquitous IP

Content

Internet evolution	Learning time: 6h Theory classes: 2h Self study : 4h
--------------------	--

Description:

This unit provides a vision on the Internet evolution since its origins, focusing on the motivation, principles and near future use cases of IPv6 (the long term solution for Internet connectivity). The limitations of the native Internet architecture are shown, and possible solutions are offered.

Internet of Things: technologies and applications	Learning time: 31h Theory classes: 9h Laboratory classes: 2h Self study : 20h
---	--

Description:

This unit focuses on constrained node networks, the new IP-based protocol suite for their connection to the Internet, and smart applications enabled by these technologies in a wide range of environments such as cities, homes, buildings, agriculture, health, vehicles, etc.

Wireless experience improvement	Learning time: 13h Theory classes: 5h Self study : 8h
---------------------------------	---

Description:

This unit provides tools for management, self-configuration and analysis for wireless network improvement, as well as end-to-end solutions and optimizations for wireless Internet access.

Mobility support	Learning time: 25h Theory classes: 9h Self study : 16h
------------------	--

Description:

This unit provides tools for analysis, protocols and architectures for supporting the mobility of things, people and vehicles for network/Internet connectivity, enabling new applications. This unit includes the impact of mobility on the network parameters and their configuration.

Qualification system

- Final (written) exam: 50%.
- Assignments carried out groupwise: 50%.

300263 - IOT-IP - Internet of Things and Ubiquitous IP

Regulations for carrying out activities

Attendance is mandatory in laboratory activities and in classes involving oral presentation of tasks performed by students.

Bibliography

Basic:

Shelby, Zach; Bormann, Carsten. 6LoWPAN : the wireless embedded internet. Chichester, West Sussex, U.K. ; Hoboken, NJ: John Wiley & Sons, 2009. ISBN 9780470747995.

Gómez, C; Paradells Aspas, Josep; Caballero Herrero, José Eugenio. Sensors everywhere : wireless network technologies and solutions. [S.l.]: Fundación Vodafone España, cop. 2010. ISBN 9788493474058.

Santi, Paolo. Mobility models for next generation wireless networks : ad hoc, vehicular and mesh networks. Chichester: John Wiley & Sons, 2012. ISBN 9781119992011.