Course guide
270536 - IT - Internet of Things

Unit in charge: Barcelona School of Informatics
Teaching unit: 701 - DAC - Department of Computer Architecture.
Degree: MASTER'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2012). (Optional subject).
Academic year: 2022 ECTS Credits: 3.0 Languages: Spanish

LECTURER
Coordinating lecturer: JORGE GARCÍA VIDAL
Others: Segon quadrimestre: JORGE GARCÍA VIDAL - 10

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems.

Generic:
CG8. Capability to apply the acquired knowledge and to solve problems in new or unfamiliar environments inside broad and multidisciplinary contexts, being able to integrate this knowledge.

Transversal:
CTR2. SUSTAINABILITY AND SOCIAL COMMITMENT: Capability to know and understand the complexity of the typical economic and social phenomena of the welfare society. Capacity for being able to analyze and assess the social and environmental impact.

TEACHING METHODOLOGY

Theory classes.

LEARNING OBJECTIVES OF THE SUBJECT

1. To understand the Internet of Things from a technological point of view, identifying its limitations and opportunities.

STUDY LOAD

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<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Self study</td>
<td>48,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>27,0</td>
<td>36.00</td>
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Total learning time: 75 h
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<td>Low Power communication technologies</td>
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<td>Description: 802.15, BlueTooth, RFID, NFC, LoraWAN</td>
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<td>Standards and communication protocols</td>
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<td>Description: 6loWPAN, RPL, CoAP, Routing en WSN</td>
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<td>Data Analysis. Security and Privacy.</td>
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<td>Description: Middleware, cloud systems. Algorithms. Privacy i security</td>
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<td>Sensors and devices</td>
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<tr>
<td>Description: Sensors, Low power devices. Operating systems</td>
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<td>Applications</td>
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<td>Description: Application examples in industry, health, environment, home, etc</td>
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# T1: Introduction

**Description:**
Course overview. Main concepts related with IoT

**Specific objectives:**
1

**Related competencies:**
- CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
- CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems.
- CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
- CTR2. SUSTAINABILITY AND SOCIAL COMMITMENT: Capability to know and understand the complexity of the typical economic and social phenomena of the welfare society. Capacity for being able to analyze and assess the social and environmental impact.

**Full-or-part-time:** 3h
Theory classes: 3h

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# T2: Low power communication technologies

**Description:**
Low power communication systems. Standards: 802.15.4, Bluetooth, RFID, NFC, LoRaWAN.

**Specific objectives:**
1

**Related competencies:**
- CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
- CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems.
- CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
- CTR2. SUSTAINABILITY AND SOCIAL COMMITMENT: Capability to know and understand the complexity of the typical economic and social phenomena of the welfare society. Capacity for being able to analyze and assess the social and environmental impact.

**Full-or-part-time:** 9h
Theory classes: 3h
Self study: 6h
**T3: Standards and communication protocols**

**Description:**
Main standards and communication protocols: 6LoWPAN, RPL, CoAP. MQTT, Routing in WSN.

**Specific objectives:**

1

**Related competencies:**
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.  
CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems.  
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.  
CTR2. SUSTAINABILITY AND SOCIAL COMMITMENT: Capability to know and understand the complexity of the typical economic and social phenomena of the welfare society. Capacity for being able to analyze and assess the social and environmental impact.

**Full-or-part-time:** 9h  
Theory classes: 3h  
Self study: 6h

**T4: Sensors and devices**

**Description:**
Sensors. Low power devices

**Specific objectives:**

1, 2

**Related competencies:**
CG8. Capability to apply the acquired knowledge and to solve problems in new or unfamiliar environments inside broad and multidisciplinary contexts, being able to integrate this knowledge.  
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.  
CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems.  
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.  
CTR2. SUSTAINABILITY AND SOCIAL COMMITMENT: Capability to know and understand the complexity of the typical economic and social phenomena of the welfare society. Capacity for being able to analyze and assess the social and environmental impact.

**Full-or-part-time:** 9h  
Theory classes: 3h  
Self study: 6h
**T5: Data analysis and management. Security and privacy.**

**Description:**

**Specific objectives:**
1, 2

**Related competencies:**
- CG8. Capability to apply the acquired knowledge and to solve problems in new or unfamiliar environments inside broad and multidisciplinary contexts, being able to integrate this knowledge.
- CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
- CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems.
- CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
- CTR2. SUSTAINABILITY AND SOCIAL COMMITMENT: Capability to know and understand the complexity of the typical economic and social phenomena of the welfare society. Capacity for being able to analyze and assess the social and environmental impact.

**Full-or-part-time: 18h**
Theory classes: 6h
Self study: 12h

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**T6: Applications**

**Description:**
Applications to industry, health, environment, precision agriculture, etc

**Specific objectives:**
2

**Related competencies:**
- CG8. Capability to apply the acquired knowledge and to solve problems in new or unfamiliar environments inside broad and multidisciplinary contexts, being able to integrate this knowledge.
- CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems.
- CTR2. SUSTAINABILITY AND SOCIAL COMMITMENT: Capability to know and understand the complexity of the typical economic and social phenomena of the welfare society. Capacity for being able to analyze and assess the social and environmental impact.

**Full-or-part-time: 18h**
Theory classes: 6h
Self study: 12h
Description:
Students will develop a research project in a system related with IoT

Specific objectives:
1, 2

Related competencies:
CG8. Capability to apply the acquired knowledge and to solve problems in new or unfamiliar environments inside broad and multidisciplinary contexts, being able to integrate this knowledge.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems .
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTR2. SUSTAINABILITY AND SOCIAL COMMITMENT : Capability to know and understand the complexity of the typical economic and social phenomena of the welfare society. Capacity for being able to analyze and assess the social and environmental impact.

Full-or-part-time: 18h
Theory classes: 3h
Self study: 15h

GRADING SYSTEM

Ef: Final exam
P: Project

Nota= 0,75*Ef+0,25*P

BIBLIOGRAPHY

Basic: