Course guide
270504 - SEU - Embedded and Ubiquous Systems

Unit in charge: Barcelona School of Informatics
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: MASTER'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2012). (Compulsory subject).

Academic year: 2022  ECTS Credits: 6.0  Languages: Catalan

LECTURER

Coordinating lecturer: DANIEL GARCIA SOLÀ

Others: Primer quadrimestre:
DANIEL GARCIA SOLÀ - 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.
CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems.

Generical:
CG1. Capability to plan, calculate and design products, processes and facilities in all areas of Computer Science.
CG2. Capacity for management of products and installations of computer systems, complying with current legislation and ensuring the quality of service.
CG6. Capacity for general management, technical management and research projects management, development and innovation in companies and technology centers in the area of Computer Science.
CG7. Capacity for implementation, direction and management of computer manufacturing processes, with guarantee of safety for people and assets, the final quality of the products and their homologation.
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.
CTR5. APPROPRIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Basic:
CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

TEACHING METHODOLOGY

Teaching methodology is described in Activities

LEARNING OBJECTIVES OF THE SUBJECT
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Self study</td>
<td>96,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>24,0</td>
<td>16.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>24,0</td>
<td>16.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

(ENG) Introducció

Description:
(ENG) Que és un sistema encastat? Esquema general d’un sistema encastat i distribuït. Conceptes bàsics.

Fiabilitat i Seguretat.

Abast. Aplicacions.

Specific objectives:
(ENG)

Related activities:
(ENG)

(ENG) Plataformes hardware per a sistemes encastats

Description:
(ENG) Alternatives. Arquitectures, exemples d’aplicació.

Busos i interfícies.

Dispositius d’E/S. Sensors i actuadors.

Instrumentació i adquisició de dades.

Specific objectives:
(ENG)

Related activities:
(ENG)
**(ENG) Disseny i desenvolupament de sistemes encastats**

**Description:**
(ENG) Requeriments funcionals d'un sistema.

Disseny conscient de l'arquitectura.

Co-disseny hardware-software.

Eines d'emulació i desenvolupament.

**Specific objectives:**
(ENG)

**Related activities:**
(ENG)

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**(ENG) Sistemes operatius per sistemes encastats**

**Description:**
(ENG) Requeriments: compacitat, eficiència i fiabilitat.


Sistemes operatius en temps real.

**Specific objectives:**
(ENG)

**Related activities:**
(ENG)

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**(ENG) Sistemes ubics i mòbils**

**Description:**
(ENG) Interconnexió de dispositius. Topologies.

Xarxes per sistemes encastats.

Intel·ligència ambiental (ambient intelligence).

Exemples d'aplicació: automoció, domòtica, seguretat, robòtica, agricultura, ...

**Specific objectives:**
(ENG)

**Related activities:**
(ENG)
**Description:**

(ENG) Avaluació dels sistemes encastats

(ENG) Fiabilitat i tolerància a fallades.

Seguretat: estàndards de seguretat (SIL).

Eficiència.

**Specific objectives:**

(ENG)

**Related activities:**

(ENG)

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**ACTIVITIES**

**Description:**

(ENG) Desenvolupament del tema 1 de l'assignatura

**Specific objectives:**

(ENG) 1

**Material:**

(ENG)

**Delivery:**

(ENG)

**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.

CG7. Capacity for implementation, direction and management of computer manufacturing processes, with guarantee of safety for people and assets, the final quality of the products and their homologation.

CG1. Capability to plan, calculate and design products, processes and facilities in all areas of Computer Science.

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CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems.

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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.

CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

**Full-or-part-time:** 8h

Theory classes: 3h
Laboratory classes: 2h
Self study: 3h
(ENG) Desenvolupament del tema 2 de l'assignatura

**Description:**

(ENG)

**Specific objectives:**

(ENG) 1

**Material:**

(ENG)

**Delivery:**

(ENG)

**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.

CG7. Capacity for implementation, direction and management of computer manufacturing processes, with guarantee of safety for people and assets, the final quality of the products and their homologation.

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CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

**Full-or-part-time:** 15h

Theory classes: 3h
Laboratory classes: 6h
Self study: 6h
### Description:

(ENG)

### Specific objectives:

1. (ENG)

### Material:

(ENG)

### Delivery:

(ENG)

### 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.
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### Full-or-part-time: 16h

- Theory classes: 4h
- Laboratory classes: 6h
- Self study: 6h
### (ENG) Desenvolupament del tema 4 de l'assignatura

**Description:**

(ENG)

**Specific objectives:**

(ENG) 1

**Material:**

(ENG)

**Delivery:**

(ENG)

**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.

CG7. Capacity for implementation, direction and management of computer manufacturing processes, with guarantee of safety for people and assets, the final quality of the products and their homologation.

CG1. Capability to plan, calculate and design products, processes and facilities in all areas of Computer Science.

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CG2. Capacity for management of products and installations of computer systems, complying with current legislation and ensuring the quality of service.

CTE8. Capability to design and develop systems, applications and services in embedded and ubiquitous systems.

CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.

CTR5. APPROPRIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

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.

CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

**Full-or-part-time:** 15h

Theory classes: 3h
Laboratory classes: 6h
Self study: 6h
**Description:**

**Specific objectives:**

1.

**Material:**

**Delivery:**

**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.
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- 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.
- CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

**Full-or-part-time:** 14h

Theory classes: 3h
Laboratory classes: 5h
Self study: 6h
(ENG) Desenvolupament del tema 6 de l'assignatura

**Description:**

(ENG)

**Specific objectives:**

(ENG) 1

**Material:**

(ENG)

**Delivery:**

(ENG)

**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.

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CTR5. APPROPRIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

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.

CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

**Full-or-part-time:** 9h
Theory classes: 3h
Self study: 6h
(ENG) Primer parcial

Description:

Specific objectives:

Material:

Delivery:

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.
CG7. Capacity for implementation, direction and management of computer manufacturing processes, with guarantee of safety for people and assets, the final quality of the products and their homologation.
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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.
CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

Full-or-part-time: 12h
Guided activities: 2h
Self study: 10h

(ENG) Segon parcial

Description:

Specific objectives:

Material:

Delivery:

Full-or-part-time: 12h
Guided activities: 2h
Self study: 10h
**Proposta Treball Dirigit (P1)**

**Description:**

**Specific objectives:**

**Material:**

**Delivery:**

**Full-or-part-time:** 6h 18m  
Guided activities: 0h 18m  
Self study: 6h

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**Pre-projecte Treball Dirigit (P2)**

**Description:**

**Specific objectives:**

**Material:**

**Delivery:**

**Full-or-part-time:** 10h 42m  
Guided activities: 1h 42m  
Self study: 9h

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**Defensa Projecte Treball Dirigit (P3)**

**Description:**

**Specific objectives:**

**Material:**

**Delivery:**

**Full-or-part-time:** 12h 42m  
Guided activities: 2h  
Self study: 10h 42m

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**GRADING SYSTEM**

Not yet translated
BIBLIOGRAPHY

Basic: