Course guides
270129 - IM - Wireless and Mobile Communications

Unit in charge: Barcelona School of Informatics
Teaching unit: 701 - DAC - Department of Computer Architecture.
Degree: BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2010). (Optional subject).
Academic year: 2021 ECTS Credits: 6.0 Languages: Spanish

LECTURER
Coordinating lecturer: JORGE GARCÍA VIDAL
Others:
Segon quadrimestre: JORGE GARCÍA VIDAL - 11

PRIOR SKILLS
Basic knowledge of TCP / IP networks and network protocols.
Basic knowledge of probability and linear algebra

REQUIREMENTS
- Prerequisite XC

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CTI1.1. To demonstrate understanding the environment of an organization and its needs in the field of the information and communication technologies.
CTI1.2. To select, design, deploy, integrate and manage communication networks and infrastructures in a organization.
CTI1.3. To select, deploy, integrate and manage information system which satisfy the organization needs with the identified cost and quality criteria.
CTI1.4. To select, design, deploy, integrate, evaluate, build, manage, exploit and maintain the hardware, software and network technologies, according to the adequate cost and quality parameters.
CTI2.1. To manage, plan and coordinate the management of the computers infrastructure: hardware, software, networks and communications.
CTI3.1. To conceive systems, applications and services based on network technologies, taking into account Internet, web, electronic commerce, multimedia, interactive services and ubiquitous computation.
CTI3.2. To implement and manage ubiquitous systems (mobile computing systems).
CTI3.4. To design communications software.

Generical:
G2. SUSTAINABILITY AND SOCIAL COMPROMISE: to know and understand the complexity of the economic and social phenomena typical of the welfare society. To be capable of analyse and evaluate the social and environmental impact.

TEACHING METHODOLOGY
* Classroom sessions
* Lab classes (python programming)
* Case-based sessions (mobile app design)
LEARNING OBJECTIVES OF THE SUBJECT

1. knowledge of specific problems in the radio transmission
2. know the technology of wireless networks
3. knowing the value chain of mobile Internet
4. know the basic processing techniques for smartphone sensors
5. understand the business models, development costs, marketing, competition, etc., associated with the development of a mobile application
6. work together to develop a design work
7. technologies know no children of short-range.
8. known auxiliary technologies: positioning, secure mobile payments, advertising insertion, etc.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes</td>
<td>45,0</td>
<td>30.00</td>
</tr>
<tr>
<td>Laboratory classes</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Self study</td>
<td>84,0</td>
<td>56.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

The value chain of mobile Internet

Description:

Radio Transmission

Description:

Cellular networks

Description:

WiFi Networks

Description:
IEEE 802.11. CSMA / CA. Different standards of physical (802.11b, 802.11g, 802.11a, 802.11n). Solutions security (WEP, WPA). New standards: 802.11ac, 802.11ah.
Low power wireless transmission technologies

Description:
Bluetooth. 802.15.4. RFID and NFC. Mesh Networks and adhoc networks. Sensor networks. 6LowPAN, CoAP.

Sensors and signal processing techniques

Description:

LBS and Complementary Technology

Description:
Positioning techniques, GPS, and Based Location Services (LBS). Secure Payment. Mobile Advertising.

ACTIVITIES

Topic 1

Description:

Specific objectives:
3

Related competencies:
G2. SUSTAINABILITY AND SOCIAL COMPROMISE: to know and understand the complexity of the economic and social phenomena typical of the welfare society. To be capable of analyse and evaluate the social and environmental impact.

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

item 2

Description:

Specific objectives:
1

Full-or-part-time: 24h
Theory classes: 6h
Self study: 18h
### item 3

**Description:**
IEEE 802.11. CSMA / CA. Different standards of physical (802.11b, 802.11g, 802.11a). Solutions security (WEP, WPA). New standards: 802.11n, 802.11p, 802.11.

**Specific objectives:**
2

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

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### Use case: Mobile Application Design

**Description:**
The goal is to design a mobile application. You can choose an application. It will analyze the applications available on Apple App Store or Android Market with similar characteristics, comparing our implementation with the competition. We will choose a business model (ie, how will money with this application), marketing, etc.. We will design the application (graphics, functionality, etc.). On a voluntary basis can we deploy the application for Android OS and IOS. In this case you can publish the application for the market.

**Specific objectives:**
3, 4, 5

**Related competencies:**
- G2. SUSTAINABILITY AND SOCIAL COMPROMISE: to know and understand the complexity of the economic and social phenomena typical of the welfare society. To be capable of analyse and evaluate the social and environmental impact.

**Full-or-part-time:** 20h
- Laboratory classes: 9h
- Self study: 11h

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### item 4

**Description:**

**Specific objectives:**
2

**Full-or-part-time:** 21h
- Theory classes: 9h
- Self study: 12h
Partial Review

Description:
Exam topics 1-3

Specific objectives:
1, 2, 3

Related competencies:
G2. SUSTAINABILITY AND SOCIAL COMPROMISE: to know and understand the complexity of the economic and social phenomena typical of the welfare society. To be capable of analyse and evaluate the social and environmental impact.

Full-or-part-time: 6h
Guided activities: 1h
Self study: 5h

item 5

Description:
Bluetooth. Zigbee. RFID and NFC. Mesh Networks and adhoc networks. Sensor networks. 6LowPAN and CoAP.

Specific objectives:
7

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

item 6

Description:

Specific objectives:
2

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

item 7

Description:
Positioning techniques and Location Based Services (LBS). Secure Payment. Mobile Advertising.

Specific objectives:
8

Full-or-part-time: 9h
Theory classes: 5h
Self study: 4h
item 8

Description:
Sensors. Signal processing

Specific objectives:
4

Related competencies:
G2. SUSTAINABILITY AND SOCIAL COMPROMISE: to know and understand the complexity of the economic and social phenomena typical of the welfare society. To be capable of analyse and evaluate the social and environmental impact.

Full-or-part-time: 12h
Theory classes: 3h
Laboratory classes: 6h
Self study: 3h

Presentation mobile application

Description:
Presentation of the application designed

Specific objectives:
3, 4, 5, 6

Related competencies:
G2. SUSTAINABILITY AND SOCIAL COMPROMISE: to know and understand the complexity of the economic and social phenomena typical of the welfare society. To be capable of analyse and evaluate the social and environmental impact.

Full-or-part-time: 6h
Guided activities: 3h
Self study: 3h

Final Exam

Description:
Review of issues 1-8

Specific objectives:
1, 2, 3, 4, 5, 6, 7, 8

Related competencies:
G2. SUSTAINABILITY AND SOCIAL COMPROMISE: to know and understand the complexity of the economic and social phenomena typical of the welfare society. To be capable of analyse and evaluate the social and environmental impact.

Full-or-part-time: 13h
Guided activities: 3h
Self study: 10h

GRADING SYSTEM

$Ep$: Mideterm exam : $0 \leq Ep \leq 10$
$Ef$: Final exam: $0 \leq Ef \leq 10$
$Ec$: Use case: $0 \leq Ec \leq 1$

Final mark = $0.8\times\text{MAX}(Ef, 0.75 \times Ef + 0.25 \times Ep) + 2\times Ec$
BIBLIOGRAPHY

Basic: