Course guides
230699 - SHORT - Short Range Communications

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering.

Degree: MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Optional subject).

Academic year: 2020  ECTS Credits: 5.0  Languages: English

LECTURER

Coordinating lecturer: Paradells Aspas, Josep
Others:

PRIOR SKILLS

The course assumes some basics about radio frequency concepts and transmission techniques such modulation and coding.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

Introduce students to the short-range communications technologies presenting and justifying its operation

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>86.0</td>
<td>68.80</td>
</tr>
<tr>
<td>Hours large group</td>
<td>39.0</td>
<td>31.20</td>
</tr>
</tbody>
</table>

Total learning time: 125 h

CONTENTS

Contents and organisation

Description:
Introduction to the subject, content motivation
Organisation of the subject, contents and evaluation

Full-or-part-time: 1h
Theory classes: 1h
# RFID

**Description:**
- Basics principles
- Applications
- Examples of usage: Mifare Ultralight

**Full-or-part-time:** 6h  
Theory classes: 6h

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# NFC

**Description:**
- Physic Layer
- Information structure
- Example of usage
- Home Lab: NFC

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

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# Bluetooth

**Description:**
- Evolution
- Protocol architecture (physical layer, link layer, HCI, SDP, profiles,..)
- Connection procedures
- Bluetooth Low Energy
- Home Lab: BLE

**Full-or-part-time:** 9h  
Theory classes: 9h

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# Personal area networks IEEE802.15.4

**Description:**
- Channels and access mechanisms (includes IEEE802.15.4e)
- Capacity and power consumption performance
- Channel
- Procedures
- Example of channel Ultra Wide Band (UWB) IEEE802.15.4a
- Distance ranging and location
- Home Lab: Usage of an UWB system

**Full-or-part-time:** 12h  
Theory classes: 12h
## Wireless Area Networks IEEE802.11

**Description:**
- Architecture and roles
- Physical channels: 11, 11b, 11g/a, 11ac, 11ad
- Access Mechanisms and performance
- Service quality (IEEE802.11e)
- Power saving
- Security
- Mesh networks (IEEE802.11s)
- Deployment and optimization
- Home Lab: Trace analysis of system IEEE802.11

**Full-or-part-time:** 6h

**Theory classes:** 6h

## Testx

**Description:**
- Intermediate tests

**Full-or-part-time:** 2h

**Theory classes:** 2h

## GRADING SYSTEM