Course guide
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: 2022  ECTS Credits: 5.0  Languages: English

LECTURER

Coordinating lecturer: Consultar aquí / See here:
https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura

Others: Consultar aquí / See here:
https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma

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>
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</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

### NFC

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

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

### 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

### 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

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**Testx**

**Description:**
Intermediate tests

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

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**GRADING SYSTEM**