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 trasmission 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

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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