230699 - SHORT - Short Range Communications

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering
Academic year: 2020
Degree: MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Teaching unit Optional)
MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Optional)
ECTS credits: 5
Teaching languages: English

Teaching staff
Coordinator: Paradells Aspas, Josep

Opening hours
Timetable: Wednesday from 15h to 18h
Thursday from 17h to 20h

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

Learning objectives of the subject
Introduce students to the short-range communications technologies presenting and justifying its operation

Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group: 39h</th>
<th>31.20%</th>
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<tr>
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<td>Self study: 86h</td>
<td>68.80%</td>
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| **Contents and organisation** | **Learning time:** 1h  
| Theory classes: 1h |
| **Description:** |  
| Introduction to the subject, content motivation  
| Organisation of the subject, contents and evaluation |

| **RFID** | **Learning time:** 6h  
| Theory classes: 6h |
| **Description:** |  
| Basics principles  
| Applications  
| Examples of usage: Mifare Ultralight |

| **NFC** | **Learning time:** 3h  
| Theory classes: 3h |
| **Description:** |  
| Physic Layer  
| Information structure  
| Example of usage  
| Home Lab: NFC |

| **Bluetooth** | **Learning time:** 9h  
| Theory classes: 9h |
| **Description:** |  
| Evolution  
| Protocol architecture (physical layer, link layer, HCI, SDP, profiles,..)  
| Connection procedures  
| Bluetooth Low Energy  
| Home Lab: BLE |
### 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

**Learning 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

**Learning time:** 6h  
Theory classes: 6h

### Testx

**Description:**
- Intermediate tests

**Learning time:** 2h  
Theory classes: 2h

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**Bibliography**