230699 - SHORT - Short Range Communications

**Coordinating unit:** 230 - ETSETB - Barcelona School of Telecommunications Engineering  
**Teaching unit:** 744 - ENTEL - Department of Network Engineering  
**Academic year:** 2018  
**Degree:** 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**

| Total learning time: 125h | Hours large group: 39h | 31.20%  
| Self study: 86h | 68.80% |
## Content

<table>
<thead>
<tr>
<th>Contents and organisation</th>
<th>Learning time: 1h</th>
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<tr>
<td></td>
<td>Theory classes: 1h</td>
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**Description:**
- Introduction to the subject, content motivation
- Organisation of the subject, contents and evaluation

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<table>
<thead>
<tr>
<th>RFID</th>
<th>Learning time: 6h</th>
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<td>Theory classes: 6h</td>
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**Description:**
- Basics principles
- Applications
- Examples of usage: Mifare Ultralight

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<table>
<thead>
<tr>
<th>NFC</th>
<th>Learning time: 3h</th>
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<td>Theory classes: 3h</td>
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**Description:**
- Physic Layer
- Information structure
- Example of usage
- Home Lab: NFC

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<table>
<thead>
<tr>
<th>Bluetooth</th>
<th>Learning time: 9h</th>
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<td>Theory classes: 9h</td>
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**Description:**
- Evolution
- Protocol architecture (physical layer, link layer, HCI, SDP, profiles,..)
- Connection procedures
- Bluetooth Low Energy
- Home Lab: BLE
## Bibliography

### 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