Learning objectives of the subject

Learning objectives of the subject:
The aim of this course is to train students in access and core network technologies, both wired and wireless and understand the functioning and organization of the new generation Internet technologies, protocols, component models and services.

Learning results of the subject:

- Ability to specify, design networks, services, processes and applications of telecommunications in both fixed and mobile environments, personal, local or long distance, with different bandwidths, in multicast networks, including voice and data.
- Ability to apply both traffic engineering as planning tools, dimensioning and network analysis.
- Ability to analyse, model and implement new architectures, network protocols, communication interfaces and new network services and applications.
- Ability to implement and design the convergence and interoperability of heterogeneous networks considering local, access and core networks.

<table>
<thead>
<tr>
<th>Study load</th>
<th>Total learning time: 125h</th>
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<tbody>
<tr>
<td></td>
<td>Hours large group:</td>
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<tr>
<td></td>
<td>Hours medium group:</td>
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<td>Hours small group:</td>
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<td>Guided activities:</td>
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<td></td>
<td>Self study:</td>
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# 230650 - CN - Communication Networks

## Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Learning time</th>
<th>Description</th>
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</table>
| **1. Wireless local area networks**          | 32h           | Theory classes: 12h  
Self study : 20h  

**Description:**  
- EEE802.11 standard including versions, physical layer, MAC layer and access schemes (PCF and DCF), quality of service, power management, fairness and performance analysis. |

| **2. Low-Rate Wireless Personal Networks**   | 9h            | Theory classes: 3h  
Self study : 6h  

**Description:**  
- IEEE 802.15.4, ZigBee, 6LowPAN and Wireless Sensor Networks. |

| **3. Network level: IPv6 and routing**       | 27h           | Theory classes: 10h  
Self study : 17h  

**Description:**  
- Global routing and routing within Internet provider's domain:  
  - Algorithms: Distance Vector, Link State.  
  - Protocols: RIP, OSPF, BGP.  
  - IPv6, ICMPv6, autoconfiguration, migration. |

| **4. Fixed access networks**                 | 6h            | Theory classes: 2h  
Self study : 4h  

**Description:**  
- Cooper and optical fibre digital distribution networks: xDSL, FTTX. |
### 5. Core networks

**Learning time:** 18h
- Theory classes: 6h
- Self study: 12h

**Description:**
- Digital Hierarchies PDH and SDH: Definitions, frame format and hierarchies, SDH mapping.
- Core networks fundamentals: Service categories, control mechanisms, fairness, fair bandwidth allocation.
- MPLS networks.
- SDN networks: motivation, SDN architecture, the controller, OpenFlow controller.

### 6. Network optimization

**Learning time:** 12h
- Theory classes: 4h
- Self study: 8h

**Description:**
- Network modeling: Notation, metrics.
- Optimization: Linear and non-linear programming, complexity.

### Mid term test

**Learning time:** 10h
- Theory classes: 2h
- Self study: 8h

**Description:**
- Mid term test.

### Final test

**Learning time:** 11h
- Theory classes: 3h
- Self study: 8h

**Description:**
- Final test.

### Qualification system

Final examination: 40%.
Partial examinations and controls: 40%.
Individual assessments: 20%.
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Bibliography

Basic:


Complementary:

