Degree competences to which the subject contributes

Transversal:
CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.
CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

Teaching methodology
This is a subject integrated in the framework of Erasmus+ programme, which consists in a collaboration activity among 7 Universities from different countries (coordinated by University of Aalborg, DK). There are two face-to-face seminars (one in April and the final one in July) which are mandatory to attend, and a main part of autonomous off-line student work. In the first phase the student works on different theoretical modules which are evaluated during the April meeting. Then, the student is assigned to a multi-national group which works in a project evaluated at the July meeting.

Learning objectives of the subject
Knowledge of Future Internet technologies
Knowledge of Future Internet seen from social and business perspectives.
Skills in exploring the opportunities in Future Internet, by relating technical, social and business aspects.
Competences in working together in teams across scientific areas, countries and cultures, and to bring into play his/her own knowledge in such a context.
### Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group: 20h</th>
<th>16.00%</th>
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<tbody>
<tr>
<td></td>
<td>Hours small group: 19h</td>
<td>15.20%</td>
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<tr>
<td></td>
<td>Self study: 86h</td>
<td>68.80%</td>
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</table>
### Advances in information systems

**Description:**
This module gives the student an introduction to advances and trends in information systems. More specifically, this module covers the state of the art in aspects such as big data, cloud computing and sociotechnical systems.

**Related activities:**
Autonomous work, learning assessment

**Specific objectives:**
- Knowledge of issues, architecture, technologies and impact concerning big data
- Knowledge of issues, architecture, technologies and impact concerning cloud computing
- Knowledge of issues, technologies and impact concerning usability and sociotechnical systems

**Learning time:**
- 10h
- Self study: 10h

### Nanonetworking and Molecular Communications

**Description:**
Nano-networks and molecular communications principles.

**Specific objectives:**
- Major molecular communication systems, namely the communication via diffusion, calcium signalling, and molecular motors and how these mechanisms can be translated into the telecommunication domain.
- Skills in basic issues in the Tera-hertz band; the differences and challenges of working in the Tera-hertz band of the electromagnetic spectrum; and how the Shannon limit will be applied to the Tera-hertz band.
- Knowledge of the microscopic theory on diffusion and how it can work in conjunction with information theory to evaluate the performance of a communication via a diffusion system.

**Learning time:**
- 10h
- Theory classes: 10h

### Future Internet Architecture

**Description:**
To problems of the current Internet and introduces the approaches of new alternative Internet Architectures.

**Specific objectives:**
- Software Defined Networking (SDN),
- Overlay Networks (LISP - Locator/ID Separation Protocol)
- Information Centric Networking (ICN).

**Learning time:**
- 10h
- Theory classes: 10h
| **Services and Applications** | **Learning time:** 10h  
**Theory classes:** 10h |
<table>
<thead>
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<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Introduction to special issues and trends in Internet services and applications.</td>
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<tr>
<td><strong>Specific objectives:</strong></td>
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</tbody>
</table>
- Trends in Internet usage.  
- The Internet of things.  
- Design processes.  
- The creation and pricing of services. |

| **Advances in Wireless Technologies** | **Learning time:** 10h  
**Theory classes:** 10h |
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<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Basic concepts in radio communications and the state of the art wireless and mobile systems, including their applications.</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td></td>
</tr>
</tbody>
</table>
- Wireless sensor network.  
- IEEE 802.11 with latest extensions: carrier sense multiple access with collision avoidance (CSMA/CA).  
- Knowledge of mobile networks (cellular and latest evolutions LTE, LTE-A). |

| **Implementation of broadband networks** | **Learning time:** 10h  
**Theory classes:** 10h |
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<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Implementation procedure of broadband access and distribution networks, including master plans for broadband networks. Common architectures which are used to design long haul IP networks and common logical and physical topologies of real life broadband IP networks.</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td></td>
</tr>
</tbody>
</table>
- GIS tools.  
- Real-life architectures and equipment (and technologies) through the presentation of case studies.  
- Designing a network implementing proper topologies in each layer of the network. |
## 230688 - NFIO - Networking and Future Internet Opportunities

### Advances in Broadband Technologies

**Learning time:** 10h  
**Theory classes:** 10h

**Description:**  
Current and future network technologies.

**Specific objectives:**  
- Basic wired and wireless broadband access network technologies: Digital Subscriber Line (xDSL), Hybrid Fiber Coax (Cable TV & Cable Modems), Broadband Power Line (BPL), Fibre to the Home/Curb, CDMA, 3G, and WiFi and WiMax.  
- Basic backbone network technologies: MPLS, SDH, Carrier-Ethernet, and DWDM, in conjunction with scalability, statistical multiplexing, traffic engineering, reliability and QoS provisioning concepts.

### Network Security

**Learning time:** 8h 20m  
**Theory classes:** 8h 20m

**Description:**  
Introduction to network monitoring and security.

**Specific objectives:**  
- Concepts about common threats including bots, spyware, adware, DoS/DDoS attacks, click-fraud, spam, and information theft.

### Enterprise Architecture

**Learning time:** 8h 20m  
**Theory classes:** 8h 20m

**Description:**  
Introduction to enterprise architecture frameworks and enterprise architecture’s role in enterprise and infrastructure management.

**Specific objectives:**  
- Enterprise architecture frameworks.  
- Knowledge of how enterprise architecture supports sustainability of business architecture and alignment between business processes and IT.
Entrepreneurship and corporate entrepreneurship

| Description: | Linking technology and Future Internet prospects to commercial business models for ambitious corporate and start-up Entrepreneurs. |
| Specific objectives: | How to model an innovative idea and develop it into a successful enterprise through Business Model Canvas and through concrete examples of ?Future Internet?-related business models Knowledge of how to set up your team, how to identify and how to approach your customers |

Learning time: 10h
Theory classes: 10h

Qualification system

The final mark is obtained by adding 30% of the theoretical part and 70% from the project.

Regulations for carrying out activities

No specific rules.

Bibliography

Others resources:

- Audiovisual material
- Class Notes
- Resource