320108 - FXT - Foundations of Telematic Networks

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering  
Teaching unit: 744 - ENTEL - Department of Network Engineering  
Academic year: 2019  
Degree: BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)  
ECTS credits: 6  
Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: JOSE LUIS MUÑOZ TAPIA  
Others: JUAN JOSE ALINS DELGADO

Degree competences to which the subject contributes

Specific:
1. AUD_COMMON: Ability to analyse and specify the fundamental parameters of a communication system.
2. AUD_COMMON: Ability to differentiate between the concepts underlying access and transport networks, circuit-switching and packet-switching networks, fixed and mobile networks and systems and applications for distributed networks and voice, data, audio, interactive and multimedia services.
3. AUD_COMMON: Understand the national, European and international standards and legislation governing telecommunications.
4. AUD_COMMON: Understand interconnecting and routing methods and basic planning and network-sizing approaches depending on traffic parameters.

Transversal:
5. EFFECTIVE USE OF INFORMATION RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.

Teaching methodology

The hours of directed learning they consist of making theoretical classes (big group) in which the teaching staff makes an exposure to introduce the goals of learning generals related with the basic concepts of the subject. Later and through practical exercises the teacher attempts to motivate and to involve the student so he/she participates actively. They also consist to teaching (medium group) in what from 3 to 4 members, through the resolution of exercises or problems in groups related with the goals to learning of each of the contents of the subject. It is also necessary to consider other hours of autonomous learning like those that dedicate themselves to the directed readings or the resolution of the problems proposed of the different contents through the virtual campus ATENEA.

Learning objectives of the subject

By finishing the subject the student has to be capable of:
Understanding the concept of protocol of communication, service and layer.
Knowing the main architectures of protocols based on layers.
Understanding the basic concepts related with each of the layers of an architecture of protocols.
Knowing the particular operation of the architecture of protocols TCP/IP in what is based the Internet.
### Study load

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Guided activities:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong> 150h</td>
<td>45h</td>
<td>0h</td>
<td>15h</td>
<td>0h</td>
<td>90h</td>
</tr>
<tr>
<td></td>
<td>30.00%</td>
<td>0.00%</td>
<td>10.00%</td>
<td>0.00%</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
### TOPIC 1: Introduction to telematic networks

**Description:**
- Parts of a network.
- Transmission media.
- Switching modes.
- Switching, addressing and routing.
- Multiplexing and encapsulation.
- Flow and congestion control.
- Protocol architectures and the OSI reference model.
- Standards, legislation and regulatory bodies.

**Related activities:**
- Problem-based lectures
- Activity 1. Mid-semester test
- Activity 2. End-of-semester test

**Learning time:** 35h
- Theory classes: 9h
- Practical classes: 4h
- Self study: 22h

### TOPIC 2: The link level

**Description:**
- Asynchronous and synchronous transmissions
- Structure
- Access mechanisms for shared media
- Ethernet and switched networks

**Related activities:**
- Problem-based lectures
- Activity 1. Mid-semester test
- Activity 2. End-of-semester test

**Learning time:** 20h
- Theory classes: 6h
- Practical classes: 2h
- Self study: 12h
<table>
<thead>
<tr>
<th>TOPIC 3: The network level. IP</th>
<th>Learning time: 37h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 10h</td>
</tr>
<tr>
<td>Interconnected networks</td>
<td>Practical classes: 4h</td>
</tr>
<tr>
<td>Address resolution at the link level (ARP)</td>
<td>Self study: 23h</td>
</tr>
<tr>
<td>Addressing</td>
<td></td>
</tr>
<tr>
<td>Subnetting/supernetting</td>
<td></td>
</tr>
<tr>
<td>Static routing</td>
<td></td>
</tr>
<tr>
<td>Fragmentation</td>
<td></td>
</tr>
<tr>
<td>The IP datagram</td>
<td></td>
</tr>
<tr>
<td>The control protocol (ICMP)</td>
<td></td>
</tr>
<tr>
<td>Switching versus routing</td>
<td></td>
</tr>
</tbody>
</table>

**Related activities:**
- Problem-based lectures
- Activity 1. Mid-semester test
- Activity 2. End-of-semester test

<table>
<thead>
<tr>
<th>TOPIC 4: Transport levels. TCP/UDP</th>
<th>Learning time: 24h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 7h</td>
</tr>
<tr>
<td>Communication between processes</td>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td>The client/server model</td>
<td>Self study: 15h</td>
</tr>
<tr>
<td>Unreliable transport: UDP (user datagram protocol)</td>
<td></td>
</tr>
<tr>
<td>Reliable transport: TCP (transport control protocol)</td>
<td></td>
</tr>
<tr>
<td>Controlling transport flux, errors and congestion</td>
<td></td>
</tr>
</tbody>
</table>

**Related activities:**
- Problem-based lectures
- Activity 2. End-of-semester test
TOPIC 5: Additional Internet protocols and mechanisms

**Learning time:** 19h
- Theory classes: 5h
- Practical classes: 2h
- Self study: 12h

**Description:**
- Network address translation (NAT)
- Domain name system (DNS) translation
- Dynamic host configuration protocol (DHCP)

**Related activities:**
- Problem-based lectures
- Activity 2. End-of-semester test

TOPIC 6: World Wide Web

**Learning time:** 10h
- Theory classes: 3h
- Practical classes: 1h
- Self study: 6h

**Description:**
- Fundamentals of HTML
- HTTP protocols: 1.0 and 1.1
- Dynamic applications

**Related activities:**
- Problem-based lectures
- Activity 2. End-of-semester test

### Planning of activities

**(ENG) PROVA PARCIAL (CONTINGUT 1, 2 I 3)**

- **Hours:** 2h
- Theory classes: 2h

**(ENG) PROVA FINAL (CONTINGUT 1, 2, 3, 4, 5 I 6)**

- **Hours:** 3h
- Theory classes: 3h
**Qualification system**

1st stage: partial control 25%
2a prova: laboratory control 25%
3a prova: final control 50%

If the end note is greater than the average of the notes of the individual controls, the note of the final control will be the final grade.

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.

If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

**Bibliography**

**Basic:**


**Complementary:**


