Course guides
230154 - EQSIP - Quality of Service Engineering in IP Networks

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering.

Degree: BACHELOR’S DEGREE IN NETWORK ENGINEERING (Syllabus 2010). (Optional subject).
        BACHELOR’S DEGREE IN TELECOMMUNICATIONS SCIENCE AND TECHNOLOGY (Syllabus 2010). (Optional subject).
        BACHELOR’S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).
        BACHELOR’S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Optional subject).

Academic year: 2019    ECTS Credits: 6.0    Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: MÓNICA AGUILAR IGARTUA
Others: MÓNICA AGUILAR IGARTUA

PRIOR SKILLS

Basic knowledge of communications networking protocols.

REQUIREMENTS

Basic knowledge of communications networking protocols.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

The course includes basic engineering concepts for the provision of QoS (quality of service, QoS) in IP networks. We will work with analytical and simulation tools to conduct a performance evaluation of IP networks in various scenarios, with particular emphasis on infrastructureless wireless networks (ad hoc networks). Various objective and subjective QoS metrics will be studied and used to analyze the performance of multimedia services such as video on demand.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>39,0</td>
<td>26.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>13,0</td>
<td>8.67</td>
</tr>
<tr>
<td>Self study</td>
<td>98,0</td>
<td>65.33</td>
</tr>
</tbody>
</table>

Total learning time: 150 h
## 1. Introduction

**Description:**
- Arquitectures to provide quality of service (QoS, Quality of Service) in the Internet. Integrated services and data flow.
- Differentiated services and classes of services.
- Most important QoS parameters for each type of traffic (data, video, voice...).
- Most important QoS parameters for each type of traffic (data, voice, video).
- Objective and subjective QoS parameters for video-on-demand services.
- Main characteristics of the video-on-demand traffic.
- QoS-aware routing protocols for Mobile and Vehicular ad hoc networks (MANET and VANET).
- Laboratory practices with the simulators Scalev and NS2.

**Full-or-part-time:** 26h  
Theory classes: 6h  
Laboratory classes: 2h  
Self study: 18h

## (ENG) 2. Algorithms to support the provision of QoS over the Internet

**Description:**
- Control de admisión de un nuevo flujo de paquetes.
- Algoritmos de disciplina de servicio (scheduling). First-In-First-Out (FIFO), Round Robin (RR), Weighted Round Robin (WRR), Weighted Fair Queueing (WFQ).

**Full-or-part-time:** 27h  
Theory classes: 7h  
Laboratory classes: 2h  
Self study: 18h

## (ENG) 3. Transmissió de video sota demanda a Internet

**Full-or-part-time:** 26h  
Theory classes: 6h  
Laboratory classes: 2h  
Self study: 18h

## 4. QoS metrics for video on demand services over the Internet

**Description:**
- Subjective QoS parameters: Quality of Experience (QoE), Mean Opinion Score (MOS).
- Measure of objective and subjective QoS parameters.

**Full-or-part-time:** 30h  
Theory classes: 9h  
Laboratory classes: 3h  
Self study: 18h
(ENG) 5. Transmission of video on demand over infrastructureless wireless networks (MANET, Mobile Adhoc Network)

Description:
- Main characteristics and applications of the MANETs.
- Multipath routing protocol based on DSR (Dynamic Source Routing) which uses various metrics to make the routing decisions. MMDSR (Multipath Multimetric Dynamic Source Routing).
- Performance evaluation of a video on demand service over MANETs using the NS2 simulator.

Full-or-part-time: 41h
Theory classes: 11h
Laboratory classes: 4h
Self study : 26h

ACTIVITIES

LABORATORY

Description:
Performance evaluation of IP networks using the NS-2 simulator.

Full-or-part-time: 14h
Theory classes: 14h

(ENG) EXERCICIS

(ENG) CONTROLS DE RESPOSTA CURTA

(ENG) EXAMEN DE RESPOSTES LLARGUES

GRADING SYSTEM

Final exam: 50%
Midle exam and controls: 20%
Laboratori practices: 30%

BIBLIOGRAPHY

Basic:

Complementary:
RESOURCES

Hyperlink:
- https://sertel.upc.edu/~maguilar/simulators.html
- http://sertel.upc.es/content/scalev-project