230604 - NPAE - Network Performance Analysis and Evaluation

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering
Academic year: 2016
Degree: MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Optional)
ECTS credits: 5
Teaching languages: English

Teaching staff
Coordinator: Cruz Llopis, Luis Javier De La
Others: Demirkol, Ilker Seyfettin
Hesselbach Serra, Xavier
Pallares Segarra, Esteve

Degree competences to which the subject contributes

Specific:
1. Ability to design and dimension transport, broadcast and distribution networks for multimedia signals
2. Ability to model, design, implement, manage, operate, administrate and maintain networks, services and contents
3. Ability to plan networks and decision-making about services and applications taking into account: quality of service, operational and direct costs, implementation plan, supervision, security processes, scalability and maintenance. Ability to manage and assure the quality during the development process

Transversal:
4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

Teaching methodology
- Lectures
- Application classes
- Laboratory sessions
- Extended answer test (Mid-Term and Final Exam)

Learning objectives of the subject

Objectives
The finality of the course is to capacitate to the students in methods of design, dimensionment and evaluation of networks of communications. First we consider the parameters of interest for the planification and the tools mathematical of which we dispose.

Results
Hability for to model and evaluate networks of commutation of circuits and paquets
Hability for to model and evaluate networks of access meding diverse techniques
Analysis qualitative and quantitative
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Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group: 39h</th>
<th>31.20%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group: 0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Guided activities: 0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Self study: 86h</td>
<td>68.80%</td>
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Content

1. Introduction

Learning time: 4h
- Theory classes: 2h
- Self study: 2h

Description:
- Introduction to network analysis and evaluation.

2. Evaluation and modelling of transmission Systems

Learning time: 45h
- Theory classes: 13h
- Self study: 32h

Description:
- Markovian queuing Systems.
- Markovian systems with losses.
- Markovian systems with finite costumer population.
- Semimarkovian systems.
- Priority systems.

3. Evaluation of network access mechanisms

Learning time: 45h
- Theory classes: 13h
- Self study: 32h

Description:
- TDMA, FDMA, Polling, Aloha and S-Aloha, CSMA, CSMA/CD, CSMA/CA.
# Planning of activities

<table>
<thead>
<tr>
<th>Laboratory session</th>
<th>Description</th>
<th>Support materials</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td><strong>LABORATORY SESSION 1. STUDY OF THE PROBABILITY DENSITY FUNCTION OF RANDOM VARIABLES WITH MATLAB.</strong></td>
<td>Random variables generation. Functions and scripts in MATLAB.</td>
<td>MATLAB.</td>
<td><strong>6h</strong></td>
</tr>
<tr>
<td><strong>LABORATORY SESSION 2. SIMULATION AND PERFORMANCE EVALUATION OF DELAY SYSTEMS.</strong></td>
<td>Delay systems M/M/1 and M/M/∞ and M/M/m are thoroughly studied.</td>
<td>Scalev Lite. MATLAB.</td>
<td><strong>12h</strong></td>
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<tr>
<td><strong>LABORATORY SESSION 3. SIMULATION AND PERFORMANCE EVALUATION OF LOSS SYSTEMS.</strong></td>
<td>Loss systems M/M/1/K and M/M/m/m are thoroughly studied.</td>
<td>Scalev Lite. MATLAB.</td>
<td><strong>6h</strong></td>
</tr>
<tr>
<td><strong>LABORATORY SESSION 4. SEMI-MARKOVIAN AND PRIORITY SYSTEMS.</strong></td>
<td>M/G/1 and priority systems are thoroughly studied.</td>
<td>Scalev Lite. MATLAB.</td>
<td><strong>6h</strong></td>
</tr>
<tr>
<td><strong>LABORATORY CONTROL.</strong></td>
<td></td>
<td></td>
<td><strong>1h</strong></td>
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</tbody>
</table>
Description:
Laboratory control to be done individually by the students.

MIDTERM CONTROL

<table>
<thead>
<tr>
<th>Description</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Theoretical midterm control.</td>
<td>2h</td>
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</table>

FINAL EXAMINATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical final examination.</td>
<td>3h</td>
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Qualification system

Final exam: 50%
Mid-Term exam: 25%
Laboratory: 25%

Bibliography

Basic:

Complementary: