

Course guide

230604 - NPAE - Network Performance Analysis and Evaluation

Last modified: 06/10/2016

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

Degree: Academic year: 2016 ECTS Credits: 5.0
Languages: English

LECTURER

Coordinating lecturer: 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



STUDY LOAD

Type	Hours	Percentage
Hours large group	39,0	31.20
Self study	86,0	68.80

Total learning time: 125 h

CONTENTS

1. Introduction

Description:

- Introduction to network analysis and evaluation.

Full-or-part-time: 4h

Theory classes: 2h

Self study : 2h

2. Evaluation and modelling of transmission Systems

Description:

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

Full-or-part-time: 45h

Theory classes: 13h

Self study : 32h

3. Evaluation of network access mechanisms

Description:

- TDMA, FDMA, Polling, Aloha and S-Aloha, CSMA, CSMA/CD, CSMA/CA.

Full-or-part-time: 45h

Theory classes: 13h

Self study : 32h

ACTIVITIES

LABORATORY SESSION 1. STUDY OF THE PROBABILITY DENSITY FUNCTION OF RANDOM VARIABLES WITH MATLAB.

Description:

Random variables generation.
Functions and scripts in MATLAB.

Material:

MATLAB.

Full-or-part-time: 6h

Laboratory classes: 2h

Self study: 4h

LABORATORY SESSION 2. SIMULATION AND PERFORMANCE EVALUATION OF DELAY SYSTEMS.

Description:

Delay systems $M/M/1$ and $M/M/\infty$ and $M/M/m$ are thoroughly studied.

Material:

Scalev Lite.

MATLAB.

Full-or-part-time: 12h

Laboratory classes: 4h

Self study: 8h

LABORATORY SESSION 3. SIMULATION AND PERFORMANCE EVALUATION OF LOSS SYSTEMS.

Description:

Loss systems $M/M/1/K$ and $M/M/m/m$ are thoroughly studied.

Material:

Scalev Lite.

MATLAB.

Full-or-part-time: 6h

Laboratory classes: 2h

Self study: 4h

LABORATORY SESSION 4. SEMIMARKOVIAN AND PRIORITY SYSTEMS.

Description:

$M/G/1$ and priority systems are thoroughly studied.

Material:

Scalev Lite.

MATLAB.

Full-or-part-time: 6h

Laboratory classes: 2h

Self study: 4h



LABORATORY CONTROL.

Description:

Laboratory control to be done individually by the students.

Full-or-part-time: 1h

Laboratory classes: 1h

MIDTERM CONTROL

Description:

Theoretical midterm control.

Full-or-part-time: 2h

Theory classes: 2h

FINAL EXAMINATION

Description:

Theoretical final examination.

Full-or-part-time: 3h

Theory classes: 3h

GRADING SYSTEM

Final exam: 50%

Mid-Term exam: 25%

Laboratory: 25%

BIBLIOGRAPHY

Basic:

- Bertsekas, D.P.; Gallager, R.G. Data networks. 2nd ed. Englewood Cliffs, NJ: Prentice-Hall, 1992. ISBN 0132009161.
- Kleinrock, L. Queueing systems: vol 1: theory. New York: John Wiley & Sons, 1975. ISBN 0471491101 (V. 1).

Complementary:

- Kleinrock, L. Queueing systems: vol 2: computer applications. New York: John Wiley and Sons, 1976. ISBN 047149111X (V.2).