ETSIT
Escuela Técnica Superior de
Ingenieros de **Telecomunicación**

Teletraffic and Quality of Service (TTQoS)			
Code number:	75099	Number of ECTS:	6 ECTS
Semester:	Autumn	Language:	English

Lecturer(s) and contact:

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Learning goals:

At the end of the course, the student must be able to:

- Know, understand and apply basic quantitative techniques involved in the planning, dimensioning and analysis of telematics networks and services.
- Understand the trade-offs involved in the design of protocols and architectures for telematics networks.

Contents:

TOPIC 1: Introduction to Teletraffic Engineering
- 1.1 Objectives
- 1.2 Motivation: an illustrative case
- 1.3 What is Teletraffic Engineering?
- 1.4 A brief history of Teletraffic Engineering
- 1.5 Basic concepts
- 1.6 Teletraffic Engineering techniques: Queuing Theory and Simulation
- 1.7 Summary

TOPIC 2: Introduction to Queuing Theory
- 2.1 Objectives, motivation, brief history
- 2.2 Defining and modelling queuing systems. Basic parameters
- 2.3 Little Formula
- 2.4 Poisson Processes. Definition and properties
- 2.5 Birth-Death Processes. Definition and properties. Relationship with Poisson processes and queuing systems.
- 2.6 Summary

TOPIC 3: Traffic models
- 3.1 Objectives
- 3.2 Kendall Notation
- 3.3 Models: M/M/1, M/M/m, M/M/m/m, M/M/m/m/N, M/M/m/k, M/G/1
- 3.4 Summary

TOPIC 4: Queuing networks
- 4.1 Objectives
- 4.2 Queuing networks: definition and typology
- 4.3 Solving queuing networks: Birth-Death processes
- 4.4 Burke and Jackson theorems
- 4.5 Summary

TOPIC 5: Introduction to data network simulation
- 5.1 Objectives
- 5.2 What does simulating consist of? Alternatives. Comparison
- 5.3 Simulation models
- 5.4 Types of simulations. Examples
- 5.5 Introduction to the ns-3 simulator

5.6 Summary

TOPIC 6: Simulation and estimation. Comparison with Queuing Theory

6.1 Objectives
6.2 Goals and techniques for inferential statistics
6.3 Estimating the mean. Confidence Intervals
6.4 Queuing Theory and Simulation
6.5 Summary

LAB ASSIGNMENT 1: Introduction to the ns-3 data network simulator
LAB ASSIGNMENT 2: Queuing Theory and simulation with ns-3

TOPIC 7: Quality of Service in TCP/IP Networks

7.1 Objectives
7.2 Basic concepts about Quality of Service
7.3 Evolution of Quality of Service solutions (PSTN, ATM, FR, IEEE 802, IntServ, DiffServ, Transport/Application)
7.4 Traffic Management (classification, tagging, shaping, policy, queue management, scheduling), QoS routing, Traffic Engineering (IP-TE, MPLS-TE, Planning)
7.5 Challenges for current approaches to QoS provision: business models, network neutrality, QoS and regulation

LAB ASSIGNMENT 3: Quality of Service in TCP/IP networks: the case of DiffServ.

Prerequisites:

None