

**COURSE DATA****DATA SUBJECT****Code:** 34899**Name:** Network planning**Cycle:** Undergraduate Studies**ECTS Credits:** 6**Academic year:** 2025-26**STUDY (S)**

Degree	Center	Acad. year	Period
1403 - Degree in Telematics Engineering	Escola Tècnica Superior d'Enginyeria	4	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1403 - Degree in Telematics Engineering	Network planning	COMPULSORY

COORDINATION

ORDUÑA HUERTAS JUAN MANUEL

SUMMARY

This course presents methods to aid the design, planning and dimensioning of communication networks, identifying user needs and creating technically viable solutions to meet those needs, and the associated analysis of the corresponding cost. Introducing the quality parameters of the service offered, with the aim of having a merit figures which allow to guide the planning process, and also input the measurement procedures of these parameters.

Also presented planning systems and network dimensioning for existing networks both in reality and for networks that are in the design phase. For the former also presents the network management systems, covering various modern management platforms.

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PREVIOUS KNOWLEDGE**RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE**

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS



Without having enrollment prerequisites, it is recommended to have completed the following subjects:

- Mathematics
- Networks (Fundamentals of Computer Networks and Computer Networks Architecture)

In particular, the field of mathematics is recommended fundamental knowledge of statistical concepts (module Math I), while the networking field recommended architecture knowledge of ISO / OSI networking protocols as well as the knowledge of the TCP / IP architecture.

COMPETENCES / LEARNING OUTCOMES

1403 - Degree in Telematics Engineering

E2 - Ability to apply the techniques under the telematic networks, services and applications, such as management systems, signaling and switching, routing, security (cryptographic protocols, tunneling, firewall, collecting mechanisms, authenticating and protecting contents), traffic engineering (graph theory, queuing theory and teletraffic) pricing and reliability and quality of service, in fixed, mobile, personal, local or long distance environments, with different bandwidths, and including telephony and data.

E6 - Ability to design networks and telematic services architectures.

G1 - Ability to write, develop and sign projects in the field of Telecommunication Engineering aimed - according to the knowledge acquired in section 5 of CIN/352/2009 regulation - at the conception and the development or the exploitation of networks, services and applications of telecommunications and electronics.

G4 - Ability to solve problems with initiative, decision-making and creativity, and to communicate and transmit knowledge, abilities and skills, understanding the ethical and professional responsibility of the activity of a telecommunications technical engineer.

G5 - Knowledge to carry out measurements, calculations, assessments, evaluations, loss adjustments, studies, reports, task planning, and other analogous work in the specific field of telecommunications.

R14 - Understand the interconnection and routing methods of network, as well as the fundamentals of planning, sizing networks according to traffic parameters.

DESCRIPTION OF CONTENTS

Introduction to evaluation of performance in interconnection networks.

Measures network performance: general basic measures. Basic measures interconnection network simulators. Performance measures in existing networks.

Simulation of networks: Levels of detail. Workload. Network simulators.



1. Performance Evaluation. simulation

Introduction to evaluation of performance in interconnection networks.

Measures network performance: general basic measures. Basic measures interconnection network simulators. Performance measures in existing networks.

Tools for performance evaluation of existing networks: tools for monitoring. Detecting bottlenecks.

2. Network design

Redes definidas por software (SDN) y virtualización de funciones de red (NFV): Concepto, arquitectura, aplicaciones. Virtualización. Definición. Características Protocolo Openflow e interfaces. Descripción. Herramientas de emulación y despliegue: mininet y Open vSwitch. Tarifación. Terminología económica. Modelos de decisión.

3. Interconnection network monitoring

Network management techniques and services.

Using tools and packet analysis.

Installing, configuring and using SNMP.

Internet Management, Network Management OSI.

Tools, protocols and procedures.

4. Network modeling

Introduction. Basics. Random variables: Probability distributions and densities.

Queuing theory: basic concepts. Performance measures. Basic and advanced models. teletraffic.

Queuing networks: operational laws. Bottleneck Analysis. Open Network Operational Analysis. Mean Value Analysis.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	20,00
Classroom practices	10,00
Total hours	60,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
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Attendance at other activities	0,00
Individual or group project	20,00
Independent study and work	25,00
Preparation of lessons	30,00
Preparation for assessment activities	15,00
Resolution of case studies	0,00
Total hours	90,00

TEACHING METHODOLOGY

The training activities are developed according to the following distribution: 40% of the hours of the ECTS credits (1 credit is 25 hours) will be allocated to the following classroom activities:

Theoretical activities (G5, R14, E2, E6).

In the lectures will develop the issues by providing a comprehensive and integrative, analyzing in detail the key issues and more complex, encouraging, at all times, the student's participation.

Practical activities (G1, G4, G5, R14, E2, E6).

They complement the theoretical activities in order to apply the basic concepts and expand the knowledge and experience they acquire during the course of the work proposed. They include the following types of classroom activities:

- Types of problems and issues in classroom

- Sessions for discussion and resolution of problems and exercises previously studied by students.

- Lab

- Tutorials programmed (individually or in groups). The objective of these will be to guide and resolve such doubts appear. To do this, students should be raised, thus allowing revise their work process.

Evaluation (G1, G4, G5, R14, E2, E6).

Making individual evaluation questionnaires in the classroom with the teacher present.

The 60% of the hours of the ECTS (25 hours per ECTS) is devoted to the following activities to be considered:

Working in small groups.



Realisation, by small groups of students (2-4) for the subject work. This work complements the individual work and fosters the ability to integrate into working groups.

Personal work of the student.

Place outside the classroom of issues and problems, as well as the preparation of classes and exams (study). This task will be performed individually and try to promote self-employment.

It will use the e-learning platform (LMS) to support communication with students. Through it you will have access to course materials used in class, as well as solving problems and exercises.

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EVALUATION

This course will be assessed (G1, G4, G5, R14, E2, E6) taking into account the following weights:

Criteria.....	1 ^a round	2 ^a round
Written exam at the end of semester	40%	55%(*)
Project report.....	30%	30%(*)
Labs.....	30%	15%
Total.....	100%	100%

To pass the course, students have to obtain a mark higher than 4 out of 10 on the written exam at the end of the term, in both rounds. Of not doing so, it will not be possible to average the exam mark with the rest of the marks of the course, and the final mark will be the one obtained in the exam.

The detection of plagiarism in any of the documents to be presented during the course or the detection of copy in either test or exams will mean that the student will have a grade of fail for the course in the two exam calls.

(*) If the student has submitted project on first call. Otherwise, the written exam will count 100% of the grade.

The performance of fraudulent actions in any of the tests or part of them will result in a rating of zero in it, regardless of the disciplinary procedure that may be opened and the sanction that is appropriate according



to current regulations. In any case, the evaluation of the subject will be done in accordance with the Regulation of evaluation and qualification of the University of Valencia for the undergraduate and master degrees approved by the Governing Council of May 30, 2017 (ACGUV 108/2017).

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020)

REFERENCES

- Raj Jain, ¿The Art of Computer Systems Performance Analysis¿, Ed. Wiley & Sons, 1991.
- Kenyon, T.: "High Performance Data Network Design", Ed. Digital Press, 2002. ISBN: 1-55558-207-9
- Stallings, William. ¿Foundations of modern networking : SDN, NFV, QoE, IoT, and Cloud¿. Pearson Education, 2016. ISBN: ISBN-13: 978-0-13-417539-3 ISBN-10: 0-13-417539-5 . Referencia
- Dally, W. And Towles, B., "Principles and Practices of Interconnection Networks". Morgan & Kaufmann Publishers, 2004.ISBN: 978-0-12-200751-4
- Stallings, William: Comunicaciones y Redes de Computadores, Prentice-Hall Referencia
- Kurose, James F.: Redes de Computadores: un enfoque descendente, Prentice Hall



- Darren L. Spohn, "Data Network Design", 3rd. Ed., 2002. ISBN: 0-07-219312-3