VNIVERSITAT DE VALÈNCIA

Course Guide
34899 Network planning

COURSE DATA

Data Subject	
Code	34899
Name	Network planning
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1403 - Degree in Telematics Engineering	School of Engineering	4	Second term

Subject-matter

Degree	Subject-matter	Character
1403 - Degree in Telematics Engineering	18 - Network planning	Obligatory

Coordination

Name	Department
ORDUÑA HUERTAS, JUAN MANUEL	240 - Computer Science

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.

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.

OUTCOMES

1403 - Degree in Telematics Engineering

- 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.
- 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.
- 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.

LEARNING OUTCOMES

Following the completion of this course, students will achieve the learning outcomes that achieve general and specific skills described in section 4 of this document. These learning outcomes are related to the competencies of the grade (G1, G4, G5, R14, E2, E6).

Specifically, the student must acquire the following skills:

- Capacity of analysis and critical thinking, to investigate independently and self-criticism, and to seek and use information to document ideas (G4).

- Work as a team to make designs and configurations required, distributing the workload to address complex problems (G1).

- Ability to access and understand technical literature as well as the ability to access the information required to know the details of a specific configuration (G1, E2).

- Designing a data network integration of different technologies with different sizes (R14, E2, E6).

- Ability to specify the rules in order to write a specification for the deployment of a network (G1, G5 E6).

- Ability to design specific network simulators. Capacity for the right choice of existing network simulator, and to correct design workload and performance measures to make the network simulator (R14, E2).

- Apply the criteria for traffic engineering for network deployment technologies (R14, E2, E6).

- Understand the advantages and limitations of the different technologies used in today's networks (R14, E2, E6).

The student must acquire the following social skills:

- Identify the most relevant technological applications in the social environment (G1, G4, G5).

- Organize the work and put it into practice in a group (G1).

- Ability to defend and arguments rigorous criteria, and clearly expose in public in a multilingual environment (G1).

DESCRIPTION OF CONTENTS

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.

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

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

2. 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.

3. 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.

4. Network design

Network design. Specification of requirements. Planning services. Choice of technology. Backbones and access networks. Installation and operation of networks. Quality of Service. documentation.
Pricing. Economic terminology. Decision models. Models of charging for bandwidth. Information required for the calculation of rates. For peak load pricing. Internet pricing models. Flat rate. Multilevel pricing. Pricing models private networks.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Development of group work	20,00	0
Study and independent work	20,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	20,00	0
TOTAL	**150,00**	

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.

EVALUATION

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

Criteria	1st Round	2nd Round
Written exam at the end of the 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).

REFERENCES

Basic

- Raj Jain, The Art of Computer Systems Performance Analysis, Ed. Wiley & Sons, 1991.
  Darren L. Spohn, "Data Network Design", 3rd. Ed., 2002. ISBN: 0-07-219312-3
  Dally, W. And Towles, B., "Principles and Practices of Interconnection Networks". Morgan & Kaufmann Publishers, 2004.ISBN: 978-0-12-200751-4

Additional

- Kenyon, T.: "High Performance Data Network Design", Ed. Digital Press, 2002. ISBN: 1-55558-207-9
Stallings, William: Comunicaciones y Redes de Computadores, Prentice-Hall
Kurose, James F.: Redes de Computadores: un enfoque descendente, Prentice Hall

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

Contents

If students have to be divided into two rotating groups, the contents of the course may be reduced if necessary to allow both groups to repeat some face-to-face classes.

Workload and temporary teaching planning

The different activities described in the teaching guide are maintained with the planned dedication.

The material for the follow-up of the classes of theory/practices allows to continue with the professor of temporary planning so much in days as in schedule, so much if the teaching is face-to-face in the classroom or if it is not.

Teaching methodology

In classroom theory and practices, students will tend to have the maximum physical attendance possible, always respecting the sanitary restrictions that limit the capacity of the classrooms as indicated by the competent public health authorities to the estimated percentage of their usual occupation.

Depending on the capacity of the classroom and the number of students enrolled, it may be necessary to distribute the students into two groups. If this situation arises, each group will attend classroom theory and practical sessions with physical presence in the classroom by rotating shifts, thus ensuring compliance with the criteria for occupying spaces.

The rotation system will be established once the actual enrollment data is known, guaranteeing, in any case, that the attendance percentage of all the students enrolled in the subject is the same.

With respect to laboratory practices, attendance at sessions scheduled in the schedule will be totally face-to-face.

Once the actual enrollment data is available and the availability of spaces is known, the Academic Committee of the Degree will approve the Teaching Model of the Degree and its adaptation to each subject, establishing in said model the specific conditions in which it will be developed teaching the subject.

If there is a closure of the facilities for sanitary reasons that totally or partially affects the classes of the subject, these will be replaced by non-contact sessions following the established schedules.

Evaluation

The evaluation system described in the teaching guide of the subject in which the different evaluable activities have been specified as well as their contribution to the final grade of the subject is maintained.

If there is a closure of the facilities for health reasons that affect the development of any face-to-face evaluable activity of the subject, it will be replaced by a test of a similar nature that will be carried out in virtual mode using the computer tools licensed by the Universitat de València.

The contribution of each evaluable activity to the final grade for the course will remain unchanged, as established in this guide.

Bibliography

The bibliography recommended in the teaching guide.