



## Teaching Guide

| Teaching Guide      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |                               |           |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------------------------|-----------|
| Identifying Data    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |                               | 2020/21   |
| Subject (*)         | Network Administration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        | Code                          | 614G01048 |
| Study programme     | Grao en Enxeñaría Informática                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |                               |           |
| Descriptors         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |                               |           |
| Cycle               | Period                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Year   | Type                          | Credits   |
| Graduate            | 2nd four-month period                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Third  | Optional                      | 6         |
| Language            | SpanishGalician                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |                               |           |
| Teaching method     | Hybrid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |                               |           |
| Prerequisites       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |                               |           |
| Department          | Ciencias da Computación e Tecnoloxías da InformaciónComputación                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |                               |           |
| Coordinador         | Novoa De Manuel, Francisco Javier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | E-mail | francisco.javier.novoa@udc.es |           |
| Lecturers           | Novoa De Manuel, Francisco Javier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | E-mail | francisco.javier.novoa@udc.es |           |
| Web                 | moodle.udc.es/course/view.php?id=29132                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |                               |           |
| General description | This subject introduces the student to the problems associated with the design and operation of a computer network. It covers all aspects related to basic network services, monitoring, high availability and traffic control mechanisms. From a case of use, the different elements that make up a network will be shelled, as well as the problem of scalability and related security mechanisms.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |                               |           |
| Contingency plan    | 1. Modifications to the contents: none<br><br>2. Methodologies<br>*Teaching methodologies that are modified<br>- Master Session: will be taught through videoconference<br>- ICT practices are maintained through the use of simulators and Teams<br><br>*Teaching methodologies that are maintained: objective test<br><br>3. Mechanisms for personalized attention to students<br>- Moodle: always. All teaching resources (slides, practice statement, announcements, software, etc.) are available through Faitic.<br>- Teams or other video conferencing tool: weekly. The tutorials are attended by Teams in the official schedules of each teacher.<br>- Email: always. To answer any question<br><br>4. Modifications in the evaluation<br><br>*Evaluation observations:<br>In the event that it cannot be done in person, the following will be carried out:<br>- Objective test: through Faitic and Remote Campus or Teams<br>- Practical test: using simulators and / or remote access mechanisms<br><br>5. Modifications to the bibliography or webgraphy: none |        |                               |           |

## Study programme competences

| Code | Study programme competences                                                                                                                                                                                   |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A53  | Capacidade para seleccionar, deseñar, despregar, integrar, avaliar, construír, xestionar, explotar e manter as tecnoloxías de hardware, software e redes dentro dos parámetros de custo e calidade adecuados. |
| A55  | Capacidade para seleccionar, deseñar, despregar, integrar e xestionar redes e infraestruturas de comunicacións nunha organización.                                                                            |
| B1   | Capacidade de resolución de problemas                                                                                                                                                                         |



|    |                                                                                                                                                                                                                                                        |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B3 | Capacidade de análise e síntese                                                                                                                                                                                                                        |
| C3 | Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.                                                                        |
| C4 | Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común. |
| C6 | Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.                                                                                                                      |
| C8 | Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.                                                                                                          |

| Learning outcomes                                                                                                                                                                                                                                        |  |                             |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------|-------|
| Learning outcomes                                                                                                                                                                                                                                        |  | Study programme competences |       |
| Know aspects related to the design, administration and management of computer equipment in the network, as well as their involvement in the implementation of systems and network services.                                                              |  | A53                         |       |
| Ability to select, design, deploy, integrate and manage communications networks and infrastructures in an organization.                                                                                                                                  |  | A55                         |       |
| Ability to solve problems. Critically assess the knowledge, technology and information available to solve the problems they must face.                                                                                                                   |  |                             | B1 C6 |
| Capability for analysis and synthesis.<br>The student will be able to analyze communication project requirements and propose solutions, performing works where they will synthesize the knowledge acquired during the course                             |  |                             | B3    |
| Use the basic tools of information and communication technologies (ICT) necessary for the exercise of their profession and for learning throughout their lives. They will learn to use their own tools of network administration. know to do.            |  |                             | C3    |
| Develop for the exercise of an open, cultured, critical, committed, democratic and supportive citizenship, capable of analyzing reality, diagnosing problems, formulating and implementing solutions based on knowledge and oriented to the common good. |  |                             | C4    |
| Critically assess the knowledge, technology and information available to solve the problems they must face.                                                                                                                                              |  |                             | C6    |
| Assess the importance of research, innovation and technological development in the socio-economic and cultural progress of society                                                                                                                       |  |                             | C8    |

| Contents                          |                                                               |
|-----------------------------------|---------------------------------------------------------------|
| Topic                             | Sub-topic                                                     |
| Network Design                    | Network design models<br>Structured cabling                   |
| Network technologies fundamentals | Routing<br>Switching<br>First hop redundancy                  |
| Network Management                | Management plane<br>Syslog<br>SNMP<br>Netflow                 |
| Network Security                  | Firewalls<br>Network addresses translation<br>Security Policy |
| Network automation                | NetDevOps<br>Software defined networks                        |

| Planning                       |               |                      |                               |             |
|--------------------------------|---------------|----------------------|-------------------------------|-------------|
| Methodologies / tests          | Competencies  | Ordinary class hours | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | A53 A55 C4 C8 | 21                   | 48                            | 69          |



|                                                                                                                                 |                        |    |    |    |
|---------------------------------------------------------------------------------------------------------------------------------|------------------------|----|----|----|
| ICT practicals                                                                                                                  | A53 A55 B1 B3 C3<br>C6 | 21 | 56 | 77 |
| Objective test                                                                                                                  | A55 A53 B1             | 2  | 0  | 2  |
| Personalized attention                                                                                                          |                        | 2  | 0  | 2  |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. |                        |    |    |    |

| Methodologies                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Methodologies                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Guest lecture / keynote speech | In which the theoretical content of the syllabus will be exposed, including illustrative examples and with the support of audiovisual media. The student will have the support material (notes, copies of the slides, articles, etc.) beforehand and the teacher will promote an active attitude, recommending the previous reading of the topics to be discussed each day in class, as well as asking questions that allow to clarify concrete aspects and leaving open questions for the reflection of the student. The magisterial ideas will be complemented with the realization of conferences in which an external expert will be brought to discuss some topic in greater depth. |
| ICT practicals                 | In which the student will see the operation in practice of some of the theoretical contents seen in the lectures. In these practices, the student will use different tools (network simulators, monitoring tools, etc.) proposed by the professor, which will allow them to deepen and consolidate their knowledge about different aspects of network management. The practices will be presented in a way that facilitates their semi-face-to-face realization to those students who can not attend the face-to-face sessions. In addition to the basic practices that all students will have to do, additional practices that interested students can do optionally will be proposed.  |
| Objective test                 | At the end of the exposition of the subject, a test type will be carried out that will allow to assess the theoretical knowledge and practical skills acquired during the evolution of the course                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Personalized attention |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Methodologies          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| ICT practicals         | <p>The personalized attention during the practices will serve to guide and verify the work that the students are doing according to the indications that are provided to them, depending on the concrete practice in question.</p> <p>To carry out the supervised works, the teachers will provide the necessary initial indications, bibliography for consultation and will monitor the progress made by the student, in order to offer the relevant guidelines in each case, in order to ensure the quality of the works according to the criteria that are indicated.</p> <p>All the teachers of the subject will also propose a tutorial schedule in which the students will be able to answer any questions related to the development of the same. Students will be advised to attend tutorials as a fundamental part of learning support.</p> <p>It will facilitate the completion of practices and attention in the tutoring of work to students who, because they are enrolled part-time can not attend practical sessions or officially established tutoring sessions.</p> |

| Assessment     |                        |                                                                                                                                                                                                                            |               |
|----------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Methodologies  | Competencies           | Description                                                                                                                                                                                                                | Qualification |
| ICT practicals | A53 A55 B1 B3 C3<br>C6 | The practices of the subject will consist of different activities related to Network Management. A defense of the practices will be carried out to assess the level of understanding and the work developed by the student | 50            |
| Objective test | A55 A53 B1             | At the end of the exposition of the subject, an objective test type test will be carried out on the treated contents, both in the theoretical sessions and in the practical ones.                                          | 50            |

| Assessment comments |
|---------------------|
|---------------------|



To pass the subject, it will be necessary to obtain a minimum of 40% of the total mark in the objective test and in the practices. If not, the maximum grade that can be obtained is 4.5.

**STUDENTS ENROLLED TO PARTIAL TIME:** They must contact the professors of the subject to make it possible to carry out the tasks outside the regular organization of the subject.

## Sources of information

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Basic</b>         | <ul style="list-style-type: none"><li>- Anthony Bruno; Steve Jordan (2020). CCNP Enterprise Design ENSLD 300-420 Official Cert Guide: Designing Cisco Enterprise Networks. Cisco Press</li><li>- Wendell Odom (2019). CCNA 200-301 Official Cert Guide Library. Cisco Press</li><li>- Jason Edelman; Scott S. Lowe; Matt Oswalt (2018). Network Programmability and Automation. O'Reilly</li><li>- William Stallings (1999). SNMP, SNMPv2, SNMPv3 and RMON1 and 2. Prentice Hall Engineering</li></ul> |
| <b>Complementary</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## Recommendations

### Subjects that it is recommended to have taken before

Internet and Distributed Systems/614G01023  
Infrastructure Management/614G01025

### Subjects that are recommended to be taken simultaneously

Administration of Infrastructures and Information Systems/614G01093  
Operating Systems Administration/614G01212

### Subjects that continue the syllabus

Network Design/614G01082

### Other comments

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.