



| Teaching Guide      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |                               |           |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------------------------|-----------|
| Identifying Data    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |                               | 2020/21   |
| Subject (*)         | Networks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        | Code                          | 614G01017 |
| Study programme     | Grao en Enxeñaría Informática                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |                               |           |
| Descriptors         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |                               |           |
| Cycle               | Period                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Year   | Type                          | Credits   |
| Graduate            | 2nd four-month period                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Second | Obligatory                    | 6         |
| Language            | SpanishGalicianEnglish                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |                               |           |
| Teaching method     | Hybrid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |                               |           |
| Prerequisites       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |                               |           |
| Department          | Ciencias da Computación e Tecnoloxías da InformaciónComputación                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |                               |           |
| Coordinador         | Cacheda Seijo, Fidel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | E-mail | fidel.cacheda@udc.es          |           |
| Lecturers           | Cacheda Seijo, Fidel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | E-mail | fidel.cacheda@udc.es          |           |
|                     | Fernández Iglesias, Diego                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |        | diego.fernandez@udc.es        |           |
|                     | Fernández López-Vizcaíno, Manuel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |        | manuel.fernandezl@udc.es      |           |
|                     | Losada Perez, Jose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        | jose.losada@udc.es            |           |
|                     | Montoto Castelao, Paula                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |        | paula.montoto@udc.es          |           |
|                     | Novoa De Manuel, Francisco Javier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        | francisco.javier.novoa@udc.es |           |
| Web                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |                               |           |
| General description | Transmission medium. Network technologies. Access networks. Routing protocols and network services.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |                               |           |
| Contingency plan    | <div>1. Modifications to the contents</div> <div>- Not modified</div> <div>2. Methodologies</div> <div>*Teaching methodologies that are maintained</div> <div>- Laboratory practice</div> <div>- Seminar</div> <div>- Objective test</div> <div>- Guest lecture / keynote speech</div> <div>*Teaching methodologies that are modified</div> <div>3. Mechanisms for personalized attention to students</div> <div>- Email: teachers will be available by email on a daily basis to solve doubts.</div> <div>- Moodle: according to the student need, there are forums available to expose theory, practice doubts in Spanish, Galician and English, that the teachers will check daily.</div> <div>- Teams: teachers are available at Teams on a weekly basis during the teaching and tutorial classes to solve doubts.</div> <div>4. Modifications in the evaluation</div> <div>- There are no changes in the evaluation.</div> <div>- In case the evaluation can not be performed in-person, it will be performed online using the pertinent tools.</div> <div>*Evaluation observations:</div> <div>5. Modifications to the bibliography or webgraphy</div> <div>- There are no changes in the bibliography</div> |        |                               |           |

| Study programme competences |                             |
|-----------------------------|-----------------------------|
| Code                        | Study programme competences |



|     |                                                                                                                                                                                               |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A17 | Coñecemento e aplicación das características, funcionalidades e estrutura dos sistemas distribuídos, as redes de computadores e internet, e deseñar e implementar aplicacións baseadas nelas. |
| B1  | Capacidade de resolución de problemas                                                                                                                                                         |
| B3  | Capacidade de análise e síntese                                                                                                                                                               |
| C2  | Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.                                                                                                           |
| 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.               |

| Learning outcomes                                                    |  |                             |             |
|----------------------------------------------------------------------|--|-----------------------------|-------------|
| Learning outcomes                                                    |  | Study programme competences |             |
| To understand the networks division on protocol layers.              |  | A17                         | B3 C2 C3    |
| To understand the operation of the main application layer protocols. |  | A17                         | B3 C2 C3    |
| To understand the how the transport protocols UDP and TPC work.      |  | A17                         | B1 B3 C2 C3 |
| To understand the operation of routing and network services.         |  | A17                         | B1 B3 C2 C3 |
| To know the basic link layer technologies.                           |  | A17                         | B3 C3       |

| Contents          |                                                                 |
|-------------------|-----------------------------------------------------------------|
| Topic             | Sub-topic                                                       |
| Introduction      | Computer networks and Internet<br>Introduction to TCP/IP        |
| Application layer | Application layer protocols I<br>Application layer protocols II |
| Transport layer   | UDP and TCP<br>TCP data transfer                                |
| Network layer     | IP and subnetting<br>Routing<br>ICMP<br>IPv6                    |
| Link layer        | TCP/IP and the link layer<br>Link layer technologies            |

| Planning                       |              |                      |                               |             |
|--------------------------------|--------------|----------------------|-------------------------------|-------------|
| Methodologies / tests          | Competencies | Ordinary class hours | Student?s personal work hours | Total hours |
| Laboratory practice            | A17 B1 C3    | 20                   | 40                            | 60          |
| Seminar                        | A17 B3 C2    | 10                   | 15                            | 25          |
| Objective test                 | A17 B1 B3    | 2.5                  | 7.5                           | 10          |
| Guest lecture / keynote speech | A17 B3       | 30                   | 20                            | 50          |
| Personalized attention         |              | 5                    | 0                             | 5           |

(\*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

| Methodologies |             |
|---------------|-------------|
| Methodologies | Description |



|                                |                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Laboratory practice            | The university virtual platform will be used as a basis to publish all the required material to do the laboratory practices. In the laboratory the students must deepen certain theoretical issues of the subject. In order to achieve this objective, there will be Java programming laboratories and laboratories based on network emulation/simulation tools. |
| Seminar                        | Through the seminars (TGRs) we will deepen certain issues of the subject, both theoretical and practical, in a more personalized way, with a more specific treatment and solving student's doubts and matters individually.                                                                                                                                      |
| Objective test                 | At the end of the four-month period there will be an exam where the student must prove his knowledge of the subject.                                                                                                                                                                                                                                             |
| Guest lecture / keynote speech | The university virtual platform will be used as a basis to publish all the required material to follow the lectures. During the lectures the theoretical concepts of the subject will be presented, encouraging the student participation.                                                                                                                       |

## Personalized attention

| Methodologies                  | Description                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Laboratory practice<br>Seminar | The personalized attention for laboratory practices and seminars is essential for an adequate subject development for the student. Moreover, the students are recommended to attend tutorials as a support method.<br><br>From the teacher perspective, the personalized attention will allow to detect possible imbalances in the subject methodology and improve the quality in continuously. |

## Assessment

| Methodologies       | Competencies | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Qualification |
|---------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Laboratory practice | A17 B1 C3    | The laboratory practices done by the students throughout the course will be evaluated.<br>The laboratory practices grade can not be recovered in the second opportunity nor in the December call.                                                                                                                                                                                                                                                                | 25            |
| Seminar             | A17 B3 C2    | Related with the seminars, a series of works will be proposed to the student, that will be evaluated.<br>The seminars grade can not be recovered in the second opportunity nor in the December call.                                                                                                                                                                                                                                                             | 5             |
| Objective test      | A17 B1 B3    | At the end of the four-month period there will be an exam where the student must prove his knowledge of the subject.<br>In case of obtaining less than a 4 (out of 10) in the exam, the subject will receive a failing grade and the final qualification will be the obtained in the exam.<br>In other case, the final grade is calculated from the grades of each part, proportionally, and must be equal to or greater than 5 (out of 10) to pass the subject. | 70            |

## Assessment comments

|                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The laboratory practices and the seminars are part of the subject continuous evaluation as therefore can not be recovered in the second opportunity nor in the December call. The part-time students will be helped in the timetable election for laboratories and seminars. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Sources of information

|               |                                                                                                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic         | - James F. Kurose, Keith W. Ross (). Computer Networking. A top-down approach.. Addison Wesley<br>- W. Richard Stevens (2011). TCP/IP Illustrated, Vol. 1: The Protocols. Addison Wesley |
| Complementary |                                                                                                                                                                                          |

## Recommendations

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

Computer Science Preliminaries/614G01002  
Discrete Mathematics/614G01004

### Subjects that are recommended to be taken simultaneously



|                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                   |
| Subjects that continue the syllabus                                                                                                               |
| Internet and Distributed Systems/614G01023<br>Infrastructure Management/614G01025<br>Network Design/614G01082<br>Network Administration/614G01213 |
| 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.