



## IDENTIFYING DATA

### Computer networks 1

|                     |   |           |      |            |
|---------------------|---|-----------|------|------------|
| Subject             | Computer networks 1   |           |      |            |
| Code                | 006G151V01207   |           |      |            |
| Study programme     | Grado en Ingeniería Informática   |           |      |            |
| Descriptors         | ECTS Credits  | Choose    | Year | Quadmester |
|                     | 6   | Mandatory | 2nd  | 2nd        |
| Teaching language   | #EnglishFriendly<br>Spanish<br>Galician   |           |      |            |
| Department          |   |           |      |            |
| Coordinator         | Gómez Meire, Silvana  |           |      |            |
| Lecturers           | Gómez Meire, Silvana<br>Ruano Ordás, David Alfonso  |           |      |            |
| E-mail              | sgmeire@uvigo.es  |           |      |            |
| Web                 | <a href="http://moovi.uvigo.gal">http://moovi.uvigo.gal</a>   |           |      |            |
| General description | This subject enters to the students in the foundations of the networks of computers, knowledge that has to form part of the basic training of an computer engineer. |           |      |            |

It can have some complementary material in English.

English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.

## Training and Learning Results

|      |   |
|------|---|
| Code |   |
| A2   | Students will be able to apply their knowledge and skills in their professional practice or vocation and they will show they have the required expertise through the construction and discussion of arguments and the resolution of problems within the relevant area of study. |
| A3   | Students will be able to gather and interpret relevant data (normally within their field of study) that will allow them to have a reflection-based considered opinion on important issues of social, scientific and ethical nature.   |
| A4   | Students will be able to present information, ideas, problems and solutions both to specialist and non-specialist audiences.  |
| B8   | Knowledge of the essential subjects and technologies that will allow students to learn and develop new methods and technologies, as well as those that will endow them with versatility to adapt to new situations.   |
| B9   | Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.  |
| C5   | Knowledge of the structure, organization, functioning and interconnection of computing systems, the foundations of their programming, and their application to the resolution of specific problems in engineering.  |
| C17  | Knowledge and application of the characteristics, functions and structure of Distributed Systems, Computer Networks and the Internet and design and implementation of applications based on them.   |
| C31  | Ability to understand the environment of an organization and its needs in the area of information and communication technologies.   |
| C32  | Ability to select, design, implement, integrate, assess, build, manage, exploit and maintain hardware, software and network technologies, within the appropriate costs and quality requirements.  |
| C34  | Ability to select, design, implement, integrate and manage networks and communications infrastructures in organizations.  |
| D4   | Analysis, synthesis and evaluation capacity   |
| D5   | Organizational and planning skills  |
| D6   | Ability to abstract: ability to create and use models that reflect real situations  |
| D7   | Ability to search, relate and structure information from various sources and to integrate ideas and knowledge.  |
| D8   | Ability to work in situations of lack of information and / or under pressure  |
| D11  | Critical thinking   |

| Expected results from this subject  |       |                               |          |
|---|-------|-------------------------------|----------|
| Expected results from this subject  |       | Training and Learning Results |          |
| RA1: Apply the concepts of network architecture for LANs. Know the structure of a local network and differentiate between different transmission media and network topologies.  | A2 A4 | B8 C17                        |          |
| RA2: Identify the main functions associated with the fundamental link, network and transport level protocols of a computer network, identify to which level each protocol belongs and interpret the header fields of these protocols. | A3    |                               | D4       |
| RA3: Designing IP addressing of a network   |       | B9 C17 C31 C32 C34            | D4 D5    |
| RA4: Creating and using real network models using network simulators  |       | C32 C34                       | D5 D6 D7 |
| RA5: Configure interconnection devices in LANs and interpret the contents of routing tables.  |       | C5 C32 C34                    | D8 D11   |

## Contents

| Topic                                 |   |
|---------------------------------------|---|
| 1. Introduction to computer networks. | 1.1. Communication systems and networks<br>1.2. Physical devices<br>1.3. Network topologies<br>1.4. Classification of networks<br>1.5. Network design and standardisation   |
| 2. Application services and protocols | 2.1. Introduction to Network Applications<br>2.2. Web Browsing<br>2.3. Domain Name Service<br>2.4. Electronic mail<br>2.5. P2P Architecture<br>2.6. Multimedia Applications |
| 3. Transport Layer                    | 3.1. Introduction<br>3.2. Communication between application processes<br>3.3. UDP Protocol<br>3.4. TCP Protocol   |
| 4. The Network Layer                  | 4.1. Introduction<br>4.2. IP Protocol<br>4.3. ICMP Protocol<br>4.4. Routing Algorithms  |
| 5. The Link Layer and LANs            | 5.1. Introduction<br>5.2. Error Detection and Correction Techniques<br>5.3. Multiples Access Links<br>5.4. LANs   |
| Laboratory Practices                  | P1. Physical devices and protocols.<br>P2. HTTP and DNS protocols<br>P3. UDP and TCP protocols<br>P4. IP Addressing, Routing and ICMP<br>P5. Ethernet and ARP               |

## Planning

|                            | Class hours | Hours outside the classroom | Total hours |
|----------------------------|-------------|-----------------------------|-------------|
| Lecturing                  | 18          | 18                          | 36          |
| Laboratory practical       | 26          | 26                          | 52          |
| Autonomous problem solving | 0           | 8                           | 8           |
| Self-assessment            | 0           | 10                          | 10          |
| Objective questions exam   | 3           | 30                          | 33          |
| Laboratory practice        | 1           | 10                          | 11          |

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

## Methodologies

| Description |
|-------------|
|-------------|

|                            |   |
|----------------------------|---|
| Lecturing                  | Lectures for the development of the theoretical and practical contents of the necessary subject to comprise and make the exercises and practical of laboratory.<br>They will use audiovisual means to support the exhibition of the contents and will stimulate the participation of the students to base of questions and activities.    |
| Laboratory practical       | Practical classes in which they will work the concepts entered in the lectures. Each practice includes some questions or practical cases that they have to be delivered when finalising the same.<br><br>*Continuous evaluation<br>Character: Compulsory<br>Attendance: Compulsory<br><br>*Global Evaluation<br>Character: Not compulsory |
| Autonomous problem solving | Pose problems that improve the skills and capacities to learn, comprise and apply the knowledges.   |

### Personalized assistance

| Methodologies        | Description   |
|----------------------|---|
| Laboratory practical | The performance of the practical exercises will be monitored on an individual basis during the small group classes. |

### Assessment

|                          | Description   | Qualification | Training and Learning Results |          |                                |                                   |
|--------------------------|---|---------------|-------------------------------|----------|--------------------------------|-----------------------------------|
| Laboratory practical     | It will evaluate the understanding of each one of the practices made.<br>Results of learning: RA1, RA2, RA3, RA4, RA5   | 10            | A3<br>A4                      | B8<br>B9 | C5<br>C17<br>C31<br>C32<br>C34 | D4<br>D5<br>D6<br>D7<br>D8<br>D11 |
| Self-assessment          | Evaluation made by the student of autonomous form that includes self-knowledge and an assessment of his evolution in the learning.<br>Results of learning: RA1, RA2 | 20            | A3                            |          | C17                            | D4<br>D8<br>D11                   |
| Objective questions exam | Objective proof to evaluate the theoretical and practical knowledges purchased.<br>Results of learning: RA1, RA3, RA4, RA5, RA7                                     | 40            | A2<br>A4                      | B8<br>B9 | C17<br>C31<br>C32<br>C34       | D4<br>D5<br>D7<br>D8<br>D11       |
| Laboratory practice      | Proof of evaluation of the practical skills purchased.<br>Results of learning: RA3, RA4, RA5  | 30            |                               | B9       | C17<br>C31<br>C32<br>C34       | D4<br>D5<br>D6<br>D8<br>D11       |

### Other comments on the Evaluation

#### CONTINUOUS ASSESSMENT SYSTEM

##### TEST 1: Self-assessment

Description: At the end of each subject, the student will be able to self-evaluate the understanding of the theoretical and/or practical contents.

Methodology(ies) applied: Self-assessment.

Grading: 20% Minimum

Minimum %: The student must achieve a grade of at least 70% in each self-assessment in order for this section to count towards the grade.

Assessed competences: A3, C17, D4, D8, D11

Assessed learning outcomes: RA1, RA2

##### TEST 2: Deliverables

Description: Throughout the course, the student must carry out and hand in a series of activities related to the theoretical and/or practical content of the subject.

Methodology(ies) applied: Laboratory Practicals

Grading: 10% Minimum: 10% Grade: 10% Minimum

Minimum %: The student must deliver at least 80% of the deliverables proposed throughout the course to count towards the grade for this section.

Assessed competences: A2, B9, C2, C4, D4, D5

Assessed learning outcomes: RA3, RA4, RA5

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#### TEST 3: First Assessment Test

Description: A multiple-choice test that will assess the theoretical/practical content of the first three subjects of the course. In order to take this test, the student must have delivered at least 80% of the proposed Deliverables up to the date of the test.

Methodology(ies) applied: Objective questions exam.

Grading: 20% Minimum

Minimum %: The student must obtain a grade equal to or higher than 5 points out of 10 to pass the test. If the student does not obtain this grade, he/she will have to take the Final Assessment corresponding to the Overall Evaluation System.

Competences assessed: A2, A4, B8, B9, C17, C31, C32, C34, D4, D5, D7, D8, D11.

Assessed Learning Outcomes: RA1, RA3, RA4, RA5, RA7

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#### TEST 4: Second Assessment Test

Description: A multiple-choice test that will assess the theoretical/practical content of the last two topics of the course. In order to take this test, the student must have passed the First Assessment Test and delivered at least 80% of the proposed Deliverables up to the date of the test.

Methodology(s) applied: Examination of objective questions.

Grading: 20% Minimum %: 20% Grade: 20% Minimum %: 20% Grade: 20% Grade: 20% Minimum %: Minimum

Minimum %: The student must obtain a grade equal to or higher than 5 points out of 10 to pass the test. If the student does not obtain this grade, he/she will have to take the final exam in the second sitting.

Competences assessed: A2, A4, B8, B9, C17, C31, C32, C34, D4, D5, D7, D8, D11.

Assessed Learning Outcomes: RA1, RA3, RA4, RA5, RA7

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#### TEST 5: Practical Assessment

Description: Practical network simulation test that will assess the practical understanding of network configuration and the ability to apply them.

Methodology(s) applied: Practical Laboratory Practice

Qualification % Marking: 30% Minimum %: 30% Minimum %: 30% Minimum %: 30% Minimum %: Minimum %: Minimum

Minimum %: To pass this part of the subject the student must obtain a grade equal to or higher than 6 points out of 10.

Assessed competences: B9, C17, C31, C32, C34, D4, D5, D6, D7, D8, D11

Assessed learning outcomes: RA 3, RA4, RA5

### **OVERALL EVALUATION SYSTEM**

**Procedure for choosing the global assessment system:** Students are considered to have chosen the global assessment system if they do not take Test 3 of the continuous assessment system.

#### TEST 1: Final Assessment

Description: A multiple-choice test that will evaluate the theoretical/practical content of the subject.

Methodology(s) applied: Examination of objective questions.

Qualification: 40% Minimum: 40% Minimum: 40% Minimum: 40% Minimum: 40% Minimum: 40% Minimum: Minimum

Minimum %: The student must obtain a grade equal to or higher than 5 points out of 10 to pass the test.

Competences assessed: A2, A4, B8, B9, C17, C31, C32, C34, D4, D5, D7, D8, D11

Assessed Learning Outcomes: RA1, RA3, RA4, RA5, RA7

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#### TEST 2: Practical Assessment

Description: Practical network simulation test that will assess the practical understanding of network configuration and the ability to apply them.

Methodology(s) applied: Practical Laboratory Practice

Qualification % Marking: 40% Minimum %: 40% Minimum %: 40% Minimum %: 40% Minimum

Minimum %: To pass this part of the subject the student must obtain a grade equal to or higher than 6 points out of 10.

Assessed competences: B9, C17, C31, C32, C34, D4, D5, D6, D7, D8, D11

Assessed Learning Outcomes: RA3, RA4, RA5

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#### TEST 3: Practical Laboratory Assessment

Description: Practical test that will evaluate the understanding and execution of the practices proposed in the subject.

Methodology(ies) applied: Laboratory practicals.

Qualification: 20% Minimum: 20% Minimum: 20% Minimum: 20% Minimum: 20% Minimum: Minimum

Minimum %: To pass this part of the subject the student must obtain a grade equal to or higher than 6 points out of 10.

Assessed competences: A2, B9, C2, C4, D4, D5

Assessed learning outcomes: RA3, RA4, RA5

## **ASSESSMENT CRITERIA FOR EXTRAORDINARY AND FINAL EXAMINATIONS**

The global assessment system described above will be used.

### **GRADING PROCESS**

Regardless of the call, the points obtained in each of the assessed parts will be added up in the grade in the minutes. In the case of not obtaining the minimum score required in the assessment tests, the numerical grade in the minutes will be the sum of the other parts. If this sum is >5, the grade in the report will be 4 and the qualifications of the parts passed will be retained for the 2nd call for the report.

### **ASSESSMENT DATES**

The dates of the exams corresponding to the continuous assessment system will be published in the calendar of activities available on the ESEI website (<https://www.esei.uvigo.es/docencia/horarios>).

The official exam dates for the different exam dates, officially approved by the ESEI's Xunta de Centro, are published on the ESEI's website (<https://www.esei.uvigo.es/docencia/examen>).

**USE OF MOBILE DEVICES**  
All students are reminded of the prohibition of the use of mobile devices in exercises and practices, in compliance with article 13.2.d of the University Student Statute, regarding the duties of university students, which establishes the duty to "Refrain from using or cooperating in fraudulent procedures in assessment tests, in the work carried out or in official university documents".

### **CONSULTATION/REQUEST FOR TUTORIALS**

Tutorials can be consulted through the personal page of the teaching staff, accessible through the ESEI website (<https://www.esei.uvigo.es/docencia/profesorado>).

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#### **Sources of information**

##### **Basic Bibliography**

Kurose, J.F. Ross, K.W., **Redes de Computadores. Un enfoque Descendente Basado en Internet.**, 978-84-7829-061-1, 7ª, Pearson Education, 2017

Stallings, William, **Comunicaciones y Redes de Computadores**, 978-84-205-4110-5, 7ª, Prentice Hall, 2004

Forouzan, Behrouz A., **Transmisión de datos y redes de comunicaciones**, 978-84-481-5617-6, 4ª, McGrawHill, 2007

Kurose, J.F. Ross, K.W., **Computer Networking: A Top-Down Approach**, 978-1-292-40546-9, 7ª, Pearson Education, 2022

Stallings, William, **Data and Computer Communications**, 978-1-292-01438-8, 10ª, Pearson Education, 2014

##### **Complementary Bibliography**

García-Teodoro P., Díaz-Verdejo J., López-Soler J., **Transmisión de datos y Redes de Computadores**, 978-84-9035-461-2, 2ª, Pearson Education, 2014

Cisco Networking Academy, <https://www.netacad.com/>,

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#### **Recommendations**

##### **Subjects that continue the syllabus**

Computer networks 2/O06G151V01302

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