



## IDENTIFYING DATA

### Computer networks 1

Subject	Computer networks 1			
Code	O06G151V01207			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Gómez Meire, Silvana			
Lecturers	Gómez Meire, Silvana Ruano Ordás, David Alfonso			
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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

<b>Expected results from this subject</b>			
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
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

## Contents

Topic	
1. Introduction to computer networks.	1.1. Communication systems and networks 1.2. Physical devices 1.3. Network topologies 1.4. Classification of networks 1.5. Network design and standardisation
2. Application services and protocols	2.1. Introduction to Network Applications 2.2. Web Browsing 2.3. Domain Name Service 2.4. Electronic mail 2.5. P2P Architecture 2.6. Multimedia Applications
3. Transport Layer	3.1. Introduction 3.2. Communication between application processes 3.3. UDP Protocol 3.4. TCP Protocol
4. The Network Layer	4.1. Introduction 4.2. IP Protocol 4.3. ICMP Protocol 4.4. Routing Algorithms
5. The Link Layer and LANs	5.1. Introduction 5.2. Error Detection and Correction Techniques 5.3. Multiples Access Links 5.4. LANs
Laboratory Practices	P1. Physical devices and protocols. P2. HTTP and DNS protocols P3. UDP and TCP protocols P4. IP Addressing, Routing and ICMP 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. 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.  *Continuous evaluation Character: Compulsory Attendance: Compulsory  *Global Evaluation 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			
			A3	B8	C5	D4
Laboratory practical	It will evaluate the understanding of each one of the practices made. Results of learning: RA1, RA2, RA3, RA4, RA5	10	A3 A4	B8 B9	C5 C17 C31 C32 C34	D4 D5 D6 D7 D8 D11
Self-assessment	Evaluation made by the student of autonomous form that includes self-knowledge and an assessment of his evolution in the learning. Results of learning: RA1, RA2	20	A3		C17	D4 D8 D11
Objective questions exam	Objective proof to evaluate the theoretical and practical knowledges purchased. Results of learning: RA1, RA3, RA4, RA5, RA7	40	A2 A4	B8 B9	C17 C31 C32 C34	D4 D5 D7 D8 D11
Laboratory practice	Proof of evaluation of the practical skills purchased. Results of learning: RA3, RA4, RA5	30		B9	C17 C31 C32 C34	D4 D5 D6 D8 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

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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/examenes>).

### **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