Universida_{de}Vigo

IDENTIFYING DATA
(*)Redes de ordenadores

Subject	(*)Redes de ordenadores			
Code	V05G300V01403			
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	López Ardao, José Carlos			
Lecturers	Herrería Alonso, Sergio López Ardao, José Carlos Rodríguez Pérez, Miguel Sousa Vieira, Estrella			
E-mail	jardao@det.uvigo.es			
Web	http://www.socialwire.es/groups/profile/155431/ro1314			
General description	Operating principles, architecture, technology and norms of computer networks, especially of Internet. Design-oriented course, complemented by practical skills			

Competencies

Code	
A1	CG1: The ability to write, develop and sign projects in the field of Telecommunication Engineering, according to the knowledge acquired as considered in section 5 of this Law, the conception and development or operation of networks, services and applications of Telecommunication and Electronics.
A3	CG3: The knowledge of basic subjects and technologies that capacitates the student to learn new methods and technologies, as well as to give him great versatility to confront and update to new situations
A4	CG4: The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity.
A6	CG6: The aptitude to manage mandatory specifications, procedures and laws.
A9	CG9: The ability to work in multidisciplinary groups in a Multilanguage environment and to communicate, in writing and orally, knowledge, procedures, results and ideas related with Telecommunications and Electronics.
A20	CE11/T6: The ability to conceive, deploy, organize and manage networks, systems, services and Telecommunication infrastructures in residential (home, city, digital communities), business and institutional environments, being responsible for launching of projects and continuous improvement like knowing their social and economical impact.
A26	CE17/T12: The knowledge and usage of concepts of communication network architecture, protocols and interfaces.
A27	CE18/T13: The ability to differentiate the concepts of access and transport networks, packet and circuit switched networks, mobile and fixed networks, as well as distributed newtwork application and systems, voice, data, video, audio, interactive and multimedia services.
A28	CE19/T14: The knowledge of methods of networking and routing, as well as the fundamentals of planning and network evaluation based on traffic parameters.

Learning aims

Expected results from this subject	Training and Learning Results
CG1 The ability to write, develop and sign projects in the field of Telecommunication Engineering, according to the knowledge acquired as considered in section 5 of this Law, the conception and development or operation of networks, services and applications of Telecommunication and Electronics.	A1

CG3 The knowledge of basic subjects and technologies that capacitates the student to learn new methods and technologies, as well as to give him great versatility to confront and update to new situations	A3
CG4 The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity.	A4
CG6: The aptitude to manage mandatory specifications, procedures and laws.	A6
CG9 The ability to work in multidisciplinary groups in a Multilanguage environment and to communicate, in writing and orally, knowledge, procedures, results and ideas related with Telecommunications and Electronics	A9
CE11/T6 The ability to conceive, deploy, organize and manage networks, systems, services and Telecommunication infrastructures in residential (home, city, digital communities), business and institutional environments, being responsible for launching of projects and continuous improvement like knowing their social and economical impact.	A20
CE17/T12 The knowledge and usage of concepts of communication network architecture, protocols and interfaces	A26
CE18/T13 The ability to differentiate the concepts of access and transport networks, packet and circuit switched networks, mobile and fixed networks, as well as distributed newtwork application and systems, voice, data, video, audio, interactive and multimedia services	A27
CE19/T14 The knowledge of methods of networking and routing, as well as the fundamentals of planning and network evaluation based on traffic parameters	A28

Contents

Topic	
1. Introduction I. General concepts	a) Nodes, lonks and networks b) Access networks c) Core network: circuit & packet switching
2. Introduction II	a) Layered model. Encapsulation b) Performance: throughput, delay, losses
3. Internet	a) Architecture. Service model b) Layering
4. Links and subnetworks	a) LAN switching. Technology b) VLAN and trunking c) Spanning tree d) Wireless networks
5. IP	a) Anatomy b) Addressing & fragmentation
6. IP switching & forwarding	a) IP forwarding b) Switching fabrics
7. Name and address translation	a) ARP b) DNS c) NAT
8. Routing	a) Graph theory. Shortest distance paths b) Link state: Dijkstra's algorithm c) Distance vector: Bellman-Ford d) Broadcast routing
9. Internet routing	a) Routing hierarchy b) Intradomain routing: RIP, OSPF c) Interdomain routing: BGP
10. Midterm	Lectures 1 to 8
11. Transport protocols	a) Service model b) TCP & UDP c) Transport connections: establishment, retransmissions, flow control
12. Congestion control	a) Network model b) Dynamics, fairness and stability c) TCP Reno, Vegas, FAST
13. Web. Content distribution networks	a) HTTP protocol b) Proxy web. Caching. Persistence c) Content distribution networks: architecture and operations
14. Network security	a) Vulnerabilities. Protection c) Secure network and transport layers c) Denial of service. Spoofing d) Fundamentals of cryptography e) Digital signatures

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	26	52	78
Troubleshooting and / or exercises	16	24	40
Workshops	6	6	12
Autonomous troubleshooting and / or exercises	0	12	12
Long answer tests and development	4	0	4
Jobs and projects	4	0	4

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

Methodologies

	Description
Master Session	Exposition of ideas, concepts, techniques and algorithms that shape every lecture.
Troubleshooting and / or exercises	Resolution by the students of problems and exercises about the material covered in the lectutres. Work supervised by the teaching staff.
Workshops	Learning of basic tools stop the diagnostic, monitor and control of computer networks. Development of basic software for networking (20%) and participation in online activities (10%)
Autonomous troubleshooting and / or exercises	Midterm (20%) and final exam (50%)

Personalized attention

Methodologies	Description
Master Session	Individual tuitition will be dispensed to the students in the office hours announced at the beginning of the term. It is not mandatory to book the appointment.

Assessment

	Description	Qualification
Autonomous troubleshooting and / or exercises	Midterm	20
Long answer tests and development	Final exam	50
Jobs and projects	Project: software development (20%) and class participation (10%)	30

Other comments on the Evaluation

The students will choose their grading method between two possibilities: continuous assessment or single examination.

The **continuous assessment** comprises three intermediate tasks plus a final exam:

- A midterm (20% of the final grade) proposed on week 10, covering all material up to lecture 8.
- A programming assignment (10% of the final grade). Due date in week 13. Correct implementation and software quality will be the key issues for grading this task.
- Participation in the online learning activities proposed weekly (10% of the final grade).
- A final exam covering all the course material (lectures, problem sessions, programming skills). 60% of the final grade.

The **single examination** option will require the student to pass a written exam about the contents of the subject. The final grade will be equal to the points awarded to this exam.

Every student who commits to to the midterm, the programming assignment or the final exam will be graded. Attending the midterm or submitting the software project will be considered as choosing the continuous assessment mode.

Any gradings are only valid during the academic year, and will be reported to the students within ten labour days after the due date.

Those who fail the subject in the first call at the end of the ordinary term can use the second call in July, which consist in taking a single written exam. The students will be graded according to the option (continuos or single) of their preference, as marked in the exam cover.

Sources of information

J.F. Kurose, K.W. Ross, **Computer networking: a top-down approach featuring the Internet**, 6,
L. Peterson, B. Davie, **Computer networks: a systems approach**, 5,
C. López, M. Rodríguez, S. Herrería, M. Fernández, **Cuestiones de redes de datos: principios y protocolos**, 1,

Recommendations

Subjects that continue the syllabus

(*)Arquitectura e tecnoloxía de redes/V05G300V01542

(*)Teoría de redes e conmutación/V05G300V01642

Subjects that are recommended to be taken simultaneously

(*)Comunicación de datos/V05G300V01301

Other comments

Though advisable, it is not necessary prior exposure to computer programming.