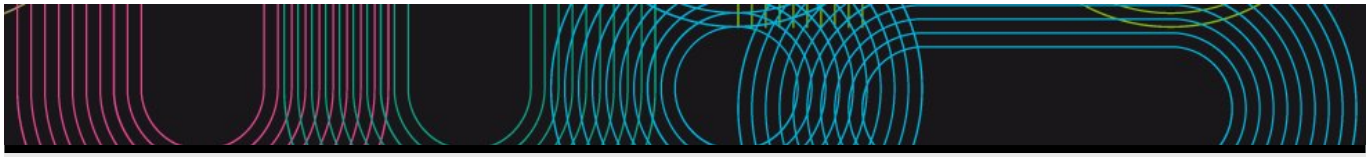
Universidade Vigo

Subject Guide 2013 / 2014



IDENTIFYING DATA				
(*)Comunicación de datos				
Subject	(*)Comunicación de datos			
Code	V05G300V01301			
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	Spanish			
Department				
Coordinator	López García, Cándido Antonio			
Lecturers	Fernández Veiga, Manuel López García, Cándido Antonio Sousa Vieira, Estrella			
E-mail	candido@det.uvigo.es			
Web	http://faitic.uvigo.es			
General description	In this subject the efficiency and reliability of data transmission using discrete memoryless channels will be analyzed, and the next issues will be introduced: * lossless data compression methods, * linear error control codes, * data link layer protocols, and * multiple access channels protocols and technologies.			

Competencies	
Code	
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.
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.
A29	CE20/T15: The knowledge of national, European and international telecommunication regulations and laws.

Learning aims	
Expected results from this subject	Training and Learning Results
Knowledge of the foundations of discrete Information Theory	A3
Understanding of the basic properties of lossless data compression methods and linear error control codes	A4
Knowledge of logical link protocols and physical level interfaces	A26 A29
Understanding the principles and fundamental technologies of local area networks, as well as their interconnection possibilities among them and with other types of networks	A20 A27

Contents

Topic	
Unit 1. Fundamentals of discrete Information Theory	1.1. A basic model of data communication systems 1.1.1. Discrete sources: discrete memoryless sources 1.1.2. Discrete channels: discrete memoryless channels 1.1.3. Source coding and channel coding 1.2. Information measures 1.2.1. Entropy. Joint entropy 1.2.2. Conditional entropy 1.2.3. Mutual information 1.3. Shannon's source coding theorem 1.3.1. Uniquely decodable codes: instantaneous codes 1.3.2. Kraft's theorem. McMillan's theorem 1.3.3. Optimal codes. Code redundancy 1.3.4. Shannon's source coding theorem 1.3.5. Compact codes. Huffman's algorithm 1.4. Shannon's noisy channels coding theorem 1.4.1. Channel capacity 1.4.2. Symmetric channels 1.4.3. Shannon's noisy channels coding theorem
Unit 2. Data transmission error control	2.1. Linear codes 2.1.1. Definition and matrix description 2.1.2. Syndrome decoding 2.1.3. Error detection and correction properties 2.1.4. Hamming codes 2.1.5. Cyclic codes 2.2. ARQ protocols 2.2.1. Stop and wait 2.2.2. Go-back n 2.2.3. Selective repeat
Unit 3. Multiple access channels and local area networks	3.1. Multiple access channels 3.1.1. The multiple access channel: definition and types 3.1.2. MAC protocols: Aloha, CSMA and variants, token passing 3.1.3. Performance of MAC protocols 3.2. Local area networks 3.2.1. Wi-Fi networks 3.2.2. Ethernet networks 3.2.3. Switching ethernet 3.2.4. Virtual local networks

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	26	0	26
Previous studies / activities	0	47	47
Troubleshooting and / or exercises	26	0	26
Autonomous troubleshooting and / or exercises	0	47	47
Long answer tests and development	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	Systematic exposition of the theoretical contents of the subject, emphasizing the aims, fundamental concepts and relationships between the different units.
Previous studies / activities	Students will study the theoretical contents of the subject using the textbook and/or further material.
Troubleshooting and / or exercises	Selected problems and/or exercises will be solved in detail, emphasizing the theoretical concepts involved and the methodology of resolution.
Autonomous troubleshooting and / or exercises	Students will try to autonomously solve a problems and/or exercises from a proposed collection.

Personalized attention

Methodologies	Description
Previous studies / activities	Individual tuitition will be dispensed to the students in the office hours announced at the beginning of the term.
Autonomous troubleshooting and / or exercises	Individual tuitition will be dispensed to the students in the office hours announced at the beginning of the term.

Assessment		
	Description	Qualification
Long answer tests and development	(*)Exame final da materia.	100

Other comments on the Evaluation

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

The continuous assessment comprises two midterm exams (20% each) and a final written exam (60%).

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 any of the midterms or the final exam will be graded. Attending one of the midterm exams will be considered as choosing the continuous assessment mode.

Any gradings are only valid during the academic year.

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

C. López García, M. Fernández Veiga, **Teoría de la Información y Codificación**, 2002,
C. López García, M. Fernández Veiga, **Cuestiones de Teoría de la Información y Codificación**, 2003,
J. F. Kurose, K. W. Ross, **Computer Networking, 5/e**, 2010,

Recommendations

Subjects that continue the syllabus

(*)Redes de ordenadores/V05G300V01403

Subjects that it is recommended to have taken before

(*)Matemáticas: Probabilidade e estatística/V05G300V01204