



Universitat de Lleida

DEGREE CURRICULUM

ICT PROJECT:

COMMUNICATION SERVICES

AND SECURITY

Coordination: FERNANDEZ CAMON, CESAR

Academic year 2023-24

Subject's general information

Subject name	ICT PROJECT: COMMUNICATION SERVICES AND SECURITY			
Code	103087			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Master's Degree in Informatics Engineering	1	COMPULSORY	Attendance-based
Course number of credits (ECTS)	9			
Type of activity, credits, and groups	Activity type	PRALAB	TEORIA	
	Number of credits	6	3	
	Number of groups	1	1	
Coordination	FERNANDEZ CAMON, CESAR			
Department	COMPUTER ENGINEERING AND DIGITAL DESIGN			
Teaching load distribution between lectures and independent student work	6 ECTS = 25x6 = 150 working hours 30% --> 45 working hours at class/lab rooms 70% --> 105 non guided working hours			
Important information on data processing	Consult this link for more information.			
Language	English			
Distribution of credits	Cèsar Fernández Camon 9			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
FERNANDEZ CAMON, CESAR	cesar.fernandez@udl.cat	9	

Subject's extra information

The subject gives an overview of today's computer networks, dealing with their inherent congestion and mobility problems. At one hand, flow control, congestion and quality of service issues are studied, showing how requirements such as high demand, multimedia traffic and low delay are met. At the other hand, wireless technologies are explained, from technical solutions to security aspects, showing as well design and deployment issues, based on state-of-the-art technologies. Finally, it is shown how such a heterogeneous services (voice, data, video, ...) are integrated under a unique network architecture.

Learning objectives

To understand flow control mechanisms in current data communications networks

To understand different quality of service mechanisms in current data communications networks

To configure and test quality of service solutions in network devices

To understand wireless communication technologies

To understand and analyze security mechanisms in wireless communications

To deploy and configure common communication services: authentication, DNS, DHCP, VoIP, ...

To design, configure and test wireless deployments

Competences

Degree-general competences

- CG1 Ability to design, calculate and design products, processes and facilities in all areas of computer engineering
- CG2 Capacity for the management of works and installations of computer systems, complying with current regulations and ensuring the quality of the service
- CG3 Ability to lead, plan and supervise multidisciplinary teams
- CG9 Ability to understand and apply the ethical responsibility, legislation and professional ethics of the activity of the profession of Computer Engineer

University of Lleida strategic competences

- UdL1 Correction in written oral expression
- UdL2. Master a foreign language
- UdL3. Master Information and Communication Technologies

Degree-specific competences

- CE1. Capacity for the integration of technologies, applications, services and systems of computer engineering, with a generalist character, and in broader and multidisciplinary contexts
- CE2. Capacity for strategic planning, elaboration, direction, coordination and technical and economic management in the fields of computer engineering related, among others, to: systems, applications, services, networks, infrastructures or computer facilities and software development centers or factories, respecting the adequate compliance with environmental quality criteria and in multidisciplinary work environments
- CE4. Capacity to draft, design, define architecture, introduce, manage, use, run and maintain computer applications, networks, systems, services and contents
- CE5. Capacity to comprehend and gain knowledge of using the internet and organize component models, intermediary software and services of new generation network technologies and protocols
- CE7. Ability to design, develop, manage and evaluate certification mechanisms and guarantee security in the treatment and access to information in a local or distributed processing system

Degree-transversal competences

- EPS1 Ability to plan and organize personal work
- EPS4. Capacity to draft, design and implement projects and/or give novel solutions, using engineering-related tools

Degree-basic competences

- CB2. Know how to apply the knowledge acquired and have the ability to solving problems in new or little-known environments within broader (or multidisciplinary) contexts related to their area of study
- CB3 Be able to integrate knowledge and face the complexity of formulating judgments from information that, being incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments

Subject contents

1. Network congestion control
 - TCP operations
 - TCP flow control
 - TCP congestion control
 - Service policies
2. Quality of Service (QoS):
 - Traffic classification
 - Congestion management
 - Congestion avoidance
 - Policing and shaping
 - RSVP
3. Wireless networks:
 - Wireless LAN
 - Security
 - Deployments
4. VoIP
 - Telephony essentials
 - Digital telephony
 - Solutions. Asterisk

Methodology

Every topic of this subject is presented in master classes. Based on contents, a couple of practice problems per topic are proposed, as well a practical case. Both types of work are developed in group, partially advised by the professor at class time and finally subjected to avaluation.

Development plan

Week 1. Theme 1. Congestion control
Week 2. Theme 1. Congestion control
Week 3. Practice 1. Congestion control
Week 4. Theme 2. QoS
Week 5. Theme 2. QoS
Week 6. Practice 2. QoS
Week 7. Theme 3. Wireless networks
Week 8. Holiday
Week 9. Theme 3. Wireless networks
Week 10. TIC project announcement
Week 11. Practice 3. Wireless networks
Week 12. Practice 3. Wireless networks
Week 13. Theme 4. VoIP
Week 14. Theme 4. VoIP
Week 15. Practice 4. VoIP
Week 16. TIC project defense

Evaluation

- Week 3. Exercise 1 ($5/42 \cdot 100\%$)
- Week 3. Exercise 2 ($5/42 \cdot 100\%$)
- Week 6. Exercise 3 ($6/42 \cdot 100\%$)
- Week 8. Exercise 4 ($6/42 \cdot 100\%$)
- Week 10. Exercise 5 ($5/42 \cdot 100\%$)
- Week 11. Exercise 6 ($5/42 \cdot 100\%$)
- Week 12. Practical case ($10/42\% \cdot 100\%$)

Each of the above items are not mandatory. More than a 50% required to pass the subject

Bibliography

- Internetworking with TCP/IP: Volume I. Douglas E. Comer. Prentice Hall, 1991
- TCP/IP Illustrated, Volume I. William R. Stevens. Addison-Wesley, 1994
- 802.11 Wireless Networks: The Definitive Guide. Matthew Ed. O'Reilly, 2002.
- Implementing 802.1x. Security Solutions for Wired and Wireless Networks. Jim Geier. Wiley Publishing, 2008.
- Switching to VoIP. Ted Wallingford. O'Reilly, 2005
- Asterisk: The Future of Telephony. Jim Van Meggelen, Leif Madsen & Jared Smith. O'Reilly, 2007