VNIVERSITAT Ò ID VALÈNCIA

COURSE DATA

Data Subject	
Code	34858
Name	Multimedia networks
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)			
Degree	**Center**	**Acad. year**	**Period**
1407 - Degree in Multimedia Engineering	School of Engineering	3	Second term

Subject-matter		
Degree	**Subject-matter**	**Character**
1407 - Degree in Multimedia Engineering	13 - Redes Multimedia	Obligatory

Coordination	
Name	**Department**
SORIANO GARCIA, FRANCISCO R	240 - Computer Science

SUMMARY

The Multimedia Network subject is framed within a subject group of telematic networks, closely related, divided into two classes. This course is part of the basic knowledge acquired in the second course in Fundamentals of Computer Networks, deepening technologies and advanced network protocols and related multimedia applications.

Fundamentals of Computer Networks with Multimedia Networks form a field of 12 credits with the name of Multimedia Networks.

The course is designed using a methodology adapted to the new European Higher Education Area (EHEA), and intends to focus on student learning. Matter, and in particular subjects, are designed with a joint plan focused on the methodology of Problem Based Learning (PBL). These methods improves student involvement and support its assessment on an ongoing basis, reinforcing and complementing the knowledge acquired in lectures.

Multimedia networking is based on the expansion of knowledge acquired by the student networks. To do this, we study new technologies through network applications that use them as VoIP, MPLS or Multicast. To improve the assimilation of the theoretical concepts shall be proposed problems and labs in which they

must apply the theory and technology in the theoretical views.

The main overall objectives of the course are:
• Acquire basic knowledge of advanced networking and related protocols in order to understand the network applications that use them.
• Acquire the knowledge to carry out a project that requires the assimilation of theoretical content and the deployment of a multimedia network taking into account technical and economic factors.
• Develop collaborative, group work and leadership, to carry out a project-oriented work.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

It is recommended to have completed the following subjects / courses:
computing
programming
Fundamentals of Computer Networks

The latter being more related to the subject Multimedia Networks

OUTCOMES

1407 - Degree in Multimedia Engineering

- B5- Know the structure, organisation, operation and interconnection of computer systems, the fundamentals of their programming and their application to solve engineering problems.

- I6 - Know and apply the features, functionalities and structure of distributed systems, computer networks and Internet and be able to design and implement applications based on them.

- MM3 - Be able to implement methodologies, technologies, processes and tools for the professional development of multimedia products in a real context of use by applying the appropriate solutions for each environment.

- MM6 - Conceive, design, and implement projects related to multimedia products by using engineering methodologies, applying the principles of human resources management and applying economic principles.

- MM10 - Be able to analyse and integrate software components to develop multimedia applications.

- MM15 - Be able to respond professionally to the requirements at each step of a multimedia production process: show skills for preparing and understanding scripts and communication, graphic design for communication, management of streaming technology, web design and production and post-production processes.

- **MM24** - Be able to design, develop, evaluate and ensure the accessibility, ergonomics, usability and security of multimedia systems, services and applications and of the information that these manage.

LEARNING OUTCOMES

This course allows for the following learning outcomes:

- Discuss the necessary elements on security in a computer network

- Design network-based programs using transport libraries and sockets

- Apply traffic engineering criteria for deployment of networks with MPLS technologies, QoS, Multicast
- Understand the advantages and limitations of different technologies used in today's networks
- Know the different protocols that develop distributed multimedia applications over the network
- Be able to configure and manage server-based multimedia streaming technologies

- Design and evaluate the security policy of a multimedia system, including both prior analysis and incident management
- Identify and evaluate the development of multimedia on mobile telephony networks
- Understand the factors influencing the QoS in multimedia networks and relevant regulations.
- Understand and be able to determine the appropriate transmission formats for media distribution system

DESCRIPTION OF CONTENTS

1. Data transport protocols

Data transport protocols
- Generalities of the transport protocols
- Congestion control
- Socket concept
TCP Transmission Control Protocol
UDP User Datagram Protocol

2. Application layer protocols

e-mail. SMTP. Protocols POP3 and IMAP. MIME format.
DNS. Domain Name System.
Otras aplicaciones: SNMP, FTP, Telnet, SSH, HTTP

3. Multicast

Multicast:

Overview
Address Resolution
IGMP
Multicast Routing. PIM

4. Multimedia Networks

Characterization and multimedia traffic requirements. Digitizing audio and video.
RTP and RTCP protocols
WebRTC, DASH and QUIC.
QoS.
Videoconferencing.
Telephony. Voice over IP.
SIP Protocol.
MPLS.

5. Residential access networks

Residential access networks:

Overview.
CATV networks.
xDSL.
Satellite
Wireless Networks

6. Informatics security

Secutiry in computer networks
- Criptography, hashs, digital certificate, digital signature and application
- Concept of host security (server) and perimetral security

7. IMS

IMS:
IP Multimedia

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WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Study and independent work	15,00	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	25,00	0
Preparing lectures	30,00	0
Preparation of practical classes and problem	10,00	0
TOTAL	150,00	

TEACHING METHODOLOGY

Activities are to be conducted in accordance with the following distribution:

40% of the hours of ECTS credits (1 credit is 25 hours) will go to the following classroom activities:

• Theory:
In the theoretical issues will be developed to provide a global and inclusive, analyzing in detail the key issues and more complex, promoting at all times, participation / student.

• Practical activities:
Complement the theoretical activities in order to apply the basic concepts and extend them with knowledge and experience they acquire during the course of the work proposed. They include the following types of classroom activities:

• Classes of problems and issues in the classroom:

- discussion sessions and problem solving exercises and previously worked by students
- Lab
- Oral Presentations
- Scheduled Tutorials (individual or group)

• Evaluation:
Individual classroom teacher attended.

60% of the hours of the ECTS (25 ECTS hours) is devoted to the following activities to be considered:

• **Work in small groups or independent**
Realisation, by small groups of students from independent jobs or tasks related to issues, problems outside the classroom.

• **Individual's activities**
Realization (outside the classroom) of monographs, literature search conducted, issues and problems, and readings and class preparation and exams (study). This task is done individually and tries to promote self-employment.

It will use the platform of e-learning (virtual classroom) from the University of Valencia in support of communication with students. Through it you will have access to learning materials used in class as well as solve problems and exercises.

EVALUATION

The evaluation of the subject will be carried out by means of:

• Continuous evaluation, based on participation and degree of involvement in the teaching-learning process, taking into account the regular attendance at the planned activities of theory, problems and issues (CE). This part is not recoverable.

• Individual objective test, consisting of one or several exams, or knowledge tests (Examination).

• Evaluation of practical laboratory activities based on the achievement of objectives in the laboratory sessions, and the preparation of papers / reports. Occasionally oral presentations can be made (individually and / or in groups) to assess the ability to prepare documents and transmit knowledge (Lab).

 Final grade = 20% EC + 35% Exam + 45% Lab

 It will be necessary to obtain, at least 4 in Exam and a 5 in Lab to be able to mediate the note. If any of those notes does not reach the minimum the final grade will be 4 or less than 4.

Alternative evaluation:

Final grade = 10% EC + 50% Exam + 40% Lab

In this case, the concept Exam will only include the final exam (and not the note of the partial exams if any). The minimum of 4 is still applied in the Examination part.

Second call:

Only the alternative assessment will be applied and if in addition the student did not reach the 5th in Lab, a special Lab test will be done, which will replace the Lab grade. The minimum of 4 in the exam part is still applied.

In all previous cases, if the final exam grade is less than 4, this will be the final grade for the subject.

In any case, the evaluation will be in agreement with the *Reglament d'avaluació i qualificació de la Universitat de València per a títols de grau i de màster*, adopted in the Consell de Govern session on may 30th, 2017. (ACGUV 108/2017).

REFERENCES

Basic

- Transparencias de la asignatura
- Tanenbaum, Andrew S.: Computer Networks, Prentice-Hall. Fifth Edition. 2011. ISBN 9780133485936. Safari Books Online
- Vidal, Ivan. Multimedia Networking Technologies, Protocols, and Architectures / Ivan Vidal [and 5 Others]. Norwood, Massachusetts: Artech House, 2019. Print. ISBN 1-63081-379-6}

Additional

- Georg Mayer: THE IMS: IP Multimedia Concepts and Services, John Wiley & Sons. 2009. ISBN 0470722983, 9780470722985
- Mihaela van der Schaar et altres: Multimedia over IP and Wireless Networks, Elsevier/Academic Press. 2007. ISBN 9780080474960
- Vinod Joseph et altres: Deploying Next Generation Multicast-enabled Applications. Ed. Elsevier, 2011. ISBN 9780123849243
- Martínez Perea, Rogelio: Internet multimedia communications using SIP: a modern approach including Java practice. Elsevier. 2008. ISBN 0-12-374300-1, 978-0-12-374300-8.
- Computer and Communication Networks, Second Edition. Nader F. Mir. Prentice Hall, 2014. 978-0-13-381474-3