# Audiovisual Services

**Academic Year: ( 2024 / 2025 )** **Review date: 20-01-2025**

**Department assigned to the subject: Telematic Engineering Department**

**Coordinating teacher: VIDAL FERNANDEZ, IVAN**

**Type: Compulsory ECTS Credits : 6.0**

**Year : 4 Semester : 1**

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Communications Networks and Services (Bachelor in Telematics Engineering, 2nd course, 2nd semester).

## SKILLS AND LEARNING OUTCOMES

CB1: Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study
CB2: Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
ECRT1: Ability to learn and acquire autonomously the requisite new knowledge for the design, development and utilization of telecommunication systems and services.
ECRT12: Knowledge and use of the concepts of network architecture, protocol and communications interfaces.
ECRT13: Ability to differentiate the concepts of network access and transport, circuit switching and packet switching networks, fixed and mobile networks as well as systems and applications of distributed networks, voice services, audio, data, video and interactive services and multimedia.
ETEGT1: Ability to construct, develop and manage telecommunication networks, services, processes and applications, such as systems for capture, transport, representation, processing, storage, multimedia information presentation and management, from the point of view of telematics systems.
ETEGT2: Capacity to apply techniques on which telematics networks, services and applications are based. These include systems for management, signaling and switching, routing, security (cryptographic protocols, tunneling, firewalls, payment mechanisms, authentication and content protection), traffic engineering (graph theory, queuing theory and tele-traffic). tarification and service reliability and quality, in fixed, mobile, personal, local or long distance environments, with different bandwidths, including telephone and data.
ETEGT4: Ability to describe, program, validate and optimize communication protocols and interfaces at different levels in a network architecture.
ETEGT6: Ability to design network architectures and telematics services.
RA1: Knowledge and Understanding. Knowledge and understanding of the general fundamentals of engineering, scientific and mathematical principles, as well as those of their branch or specialty, including some knowledge at the forefront of their field.
RA3: Design. Graduates will have the ability to make engineering designs according to their level of knowledge and understanding, working as a team. Design encompasses devices, processes, methods and objects, and specifications that are broader than strictly technical, including social awareness, health and safety, environmental and commercial considerations.
RA4: Research. Graduates will be able to use appropriate methods to carry out detailed research and studies of technical aspects, commensurate with their level of knowledge. The research involves bibliographic searches, design and execution of experiments, interpretation of data, selection of the best proposal and computer simulation. May require consultation of databases, standards and security procedures.
RA5: Applications. Graduates will have the ability to apply their knowledge and understanding to solve problems, conduct research, and design engineering devices or processes. These skills include knowledge, use and limitations of materials, computer models, process engineering, equipment,

practical work, technical literature and information sources. They must be aware of all the implications of engineering practice: ethical, environmental, commercial and industrial.

## OBJECTIVES

With respect to knowledge, at the end of the course the student will be able to:
- Know the different signaling architectures of voice services, in both circuit-switched networks (SS7 Signaling System) and packet networks (H.323 and SIP).
- Know the different architectures of IP video telephony (SIP and H.323), Video on demand (VoD) and existing IPTV.
- Know scalable implementation alternatives.
- Know the limitations and alternatives for transporting real-time multimedia streams over packet networks.
- Know the multicast service and the main multicast routing algorithms.
- Know the quality of service facilities in various network technologies.
- Know multimedia transport protocols over packet networks, such as RTP.

In terms of competences, they can be classified into two groups: specific competences and generic competences or skills.

With regards to specific competences, after the course students will be able to:
- Analyze and compare different design alternatives of multimedia services.
- Configure various QoS parameters in a network to support a telephony system.
- Identify and solve multicast distribution issues.
- Create services with group support.
- Use of transport protocols for applications or networks with special characteristics.

With respect to general competences or skills, the course will focus on:
- Broad view on the various protocols in multimedia networks judiciously applying the knowledge gained.
- Ability to function on disciplinary teams to solve the raised work, distributing the workload to deal with complex problems.
- Recognition of the need for continuous learning and ability to access and understand technical literature.
- Contact with technologies widely used in the networks of telecommunications operators and of distribution of multimedia content.
- Ability to design systems and content distribution networks, as well as to design multi-network multimedia applications.

In terms of attitudes, after completing the course students should have:
- Proactive with respect to collaborating with colleagues, to complete complex tasks as a group.
- Proactive about the need to understand the technologies considered prior to their configuration.

## DESCRIPTION OF CONTENTS: PROGRAMME

This course covers multimedia networking protocols, where basic techniques are studied to design, configure and operate networks and multimedia services.

The program is divided into five parts:

PART I: Introduction. Audiovisual services and distributed multimedia applications. Network requirements and protocol architectures.
PART II. Multicast routing service. Case study: IP television in telecommunication operator networks.
PART III. Multimedia transport protocols over packet networks
PART IV. Services based on multimedia streaming. Case studies: video-on-demand services in the Internet (Netflix and YouTube).
PART V. Signaling of multimedia services over packet networks. IP telephony services.

## LEARNING ACTIVITIES AND METHODOLOGY

The teaching methodology will include:

1) Theoretical lectures, which will include the main knowledge that students must acquire. Discussions

and resolution of doubts about the concepts acquired by the student in the self-learning process. Review activities. To facilitate its development students will have basic reference texts, enabling them to delve into the various topics covered by the course.
2) Laboratory classes, where students will cooperate in working groups of two or more persons to engage in practices designed to apply, consolidate and deepen into the various theoretical knowledge thought during lecture sessions.
3) Resolution of exercises by the student that will serve to assess their knowledge and acquire the necessary competences.
4) Classes of practical exercises, to address a joint correction of the proposed exercises, which should serve to consolidate knowledge and develop the ability to analyze and communicate the relevant information to solve problems.
5) Project-oriented activity, where the student will accomplish the development and validation of a networked audiovisual service. This activity will be carried out during the course, which includes practical classes to develop the work and monitor the progress done.

## ASSESSMENT SYSTEM

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| **% end-of-term-examination:** | 0 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 100 |

100% is continuous assessment. The note of the continuous assessment will consist of four blocks:

- Knowledge tests: 75 points.
- Laboratory exercises: 10 points.
- Practical study case: 15 points.
- Deliverables (questions, theoretical and practical study cases, specific work assigned by teachers): they are considered in the case of limits between grades.

To pass the course the student must obtain at least 50 points as the sum of all the blocks (without requiring a minimum mark in any of the blocks).

According to the continuous assessment rules specified by the University, in the ordinary term students that have not followed the continuous assessment will be allowed to do a final examen with a value of 60% of the grade of the subject. In the extraordinary term, the student will have the right to be evaluated with a final exam with a value of 100% of the grade of the subject.

## BASIC BIBLIOGRAPHY

- Iván Vidal, Ignacio Soto, Albert Banchs, Jaime Garcia-Reinoso, Ivan Lozano, Gonzalo Camarillo. Multimedia networking: Technologies, protocols, and architectures. , Artech House. ISBN 9781630813789, 2019

## ADDITIONAL BIBLIOGRAPHY

- Alan B. Johnston. SIP: Understanding the Session Initiation Protocol, Third Edition., Artech house. ISBN 9781607839958., 2009

- Daniel Minoli. IP multicast with applications to IPTV and mobile DVB-H., Wiley. ISBN: 9780470258156., 2008.

- James F. Kurose and Keith W. Ross. Computer Networking. A Top-Down Approach. Seventh edition., Pearson. ISBN 9781292153605, 2017