

Academic Year/course: 2021/22

30380 - Audiovisual Communications

Syllabus Information

Academic Year: 2021/22

Subject: 30380 - Audiovisual Communications

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 581 - Bachelor's Degree in Telecommunications Technology and Services Engineering

ECTS: 6.0

Year: 4

Semester: Second semester

Subject Type: Optional

Module:

1. General information

1.1. Aims of the course

The objective of the Audiovisual Communications course is to provide the student with the knowledge and methodologies necessary to build, operate and manage both traditional audiovisual communication systems, e.g. television, as new multimedia systems through the Internet. The course focuses both on the analysis, coding and processing of audiovisual signals and on the systems for capturing, transporting and presenting multimedia information.

1.2. Context and importance of this course in the degree

The Audiovisual Communications course is taught in the 6th semester of the Degree in Telecommunications Technology and Services Engineering. It is a compulsory subject within the itinerary of the specific technology of Communication Systems. Together with the subject Applications of Digital Signal Processing) it forms the Information Processing block.

The objectives of this subject are built on the learning results obtained in the matters of the *Signal and Communications, Networks, Systems and Services* and in the subjects *Applications of Digital Signal Processing* and *Image and audio processing*.

Students already have knowledge of the basic tools for the analysis of audiovisual signals (image, video, voice and audio) and are familiar with the basic and advanced techniques of digital signal processing and the programming of algorithms for their implementation. They also know the elements that are part of a communications system and a telecommunication network, the fundamentals of planning and dimensioning networks based on traffic parameters, network and transport level protocols, and the programming of networks and services.

The Audiovisual Communications course allows the student to use the knowledge acquired in various basic subjects of the telecommunication branch in the implementation of communication systems based on audiovisual signals.

1.3. Recommendations to take this course

It is recommended that the student have taken the subjects of Signals and Systems, Probability and Processes, Digital Signal Processing, Communication Theory, Digital Communications, taught in the first two courses of the Degree in Telecommunications Technology and Services Engineering and the subject *Imagen and Audio Processing* taught in the 6th semester and in *Digital Signal Processing Applications* taught in the 7th semester in the Communication Systems itinerary.

2. Learning goals

2.1. Competences

Upon passing the subject, the student will be more competent to ...

C3: Combine general and specialized knowledge of Engineering to generate innovative and competitive proposals in professional activity.

C4: Solve problems and make decisions with initiative, creativity and critical reasoning.

C5: Communicate and transmit knowledge, abilities and skills in Spanish.

C6: Use the engineering techniques, skills and tools necessary to practice it.

C8: Work in a multidisciplinary group and in a multilingual environment.

C10: Learn continuously and develop autonomous learning strategies.

ST1: Build, exploit and manage telecommunications networks, services, processes and applications, understood as capture, transport, representation, processing, storage, management and presentation of multimedia information, from the point of view of transmission systems .

ST6: Analyze, encode, process and transmit multimedia information using analog and digital signal processing techniques.

2.2. Learning goals

The student must demonstrate the following results ...

- R1. Learn about the particularities, similarities and differences of visual, voice and sound information signals.
- R2. Learn about the way in which relevant audiovisual signals are obtained or reproduced in communications.
- R3. Learn about the mechanisms for digitizing analogue audiovisual signals as well as the most typical digital formats.
- R4. Understand the theoretical foundations of the most widespread techniques for compression of audio and video signals.
- R5. Learn basic and advanced aspects of some of the most widely applied standards for encoding voice and audio signals
- R6. Learn basic and advanced aspects of some of the most widely applied standards for encoding image and video signals
- R7. Learn about the basics of the digital audio and video broadcast standard (DAB, DVB).
- R8. Relate the different physical media (terrestrial, satellite, cable) for digital television with the appropriate digital communication techniques according to DVB (modulation, channel coding, etc.), being able to size some relevant parameters.
- R9. Know the differences between the transmission of audiovisual signals in the contexts of broadcasting, telematic networks and reproduction from physical media.
- R10. Learn about basic and advanced aspects of some of the most widely applied standards for multiplexing various information flows in encoding multimedia signals.

2.3. Importance of learning goals

The importance of the learning results designed for this subject lies in the skill that the student acquires for the design, analysis and implementation of audiovisual and multimedia communication systems, which have become in recent years a sector with increasing weight and significance for the economy. Audiovisual content and its demand are part of the environment of the citizen of the 21st century. The course address the new trends in the audiovisual sector towards the convergence between traditional exploitation (radio and television) and the present future that is the internet. This course also aims to provide the student with critical capacity for the evaluation of different alternatives that will be presented when implementing audiovisual communication systems.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate that they have achieved the expected learning outcomes through the following assessment activities

E0: Gradual liberatory evaluation

There will be written tests throughout the course for evaluating learning results R1 to R4 and R5 to R7. At the end of the course, the student will be able to release the theory part of the final exam (E1) with the grade obtained in the gradual evaluation if they so wish. You can also take the theory part of the exam (E1) of the global test keeping the best of the two marks.

E1: Final exam (55%).

Written exam, with a score of 0 to 10 points, common to all students in the subject. To pass the subject, a minimum score of 4.0 points is required in the final exam.

E2: Tutored practical work (25%).

Score from 0 to 10 points. In the evaluation of the tutored works proposed throughout the semester, both the presented memory and the suitability, originality of the proposed solution and public presentation will be taken into account.

E3: Laboratory work (20%).

Score from 0 to 10 points. The evaluation of the practices will be carried out through the reports presented in them or answers to questions about the practices, as well as the work done in the laboratory. If circumstances warrant, laboratory sessions will be remote.

Students who do not complete the E2 and E3 assessment activities on the assigned dates must take an alternative test on the same date of the final exam.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The following teaching-learning methodologies are proposed:

Participatory master class (40 hours). Presentation of the main contents of the subject. This activity will be carried out in the classroom in person. This course is designed to provide students with the theoretical knowledge that will allow them to achieve the specified learning outcomes and competencies.

Classes of problems and practical cases in the classroom (10 hours) in which problem solving and practical cases proposed by the teacher are carried out, with the possibility of exposing them by the students individual or in groups. This activity will be carried out in the classroom in person.

Work associated with laboratory practices. The face-to-face part (M9) involves 10 hours of laboratory, divided into 5 practical sessions lasting 2 hours. The correct use of practices also requires some prior work to prepare them and some subsequent work to analyze results and establish concepts. These activities strengthen and reinforce all specified learning outcomes and competencies. In the scripts of each practice, the specific activities to be carried out (face-to-face and non-face-to-face) and the way in which the student has to demonstrate the acquisition of the corresponding results and skills will be detailed, since this work also constitutes one of evaluation activities (E3).

Completion of tutored practical work, individual and in group, tutored by the teacher, based on the contents of the subject and related to audiovisual systems. Possibility of attending seminars or external visits related to the theme of the subject. This activity is designed to consolidate all the specified learning outcomes and competencies and its development and outcome constitutes one of the assessment activities (E2).

Supervision of the tutored practical works. During the practical work, each group of students will meet periodically with the teacher to supervise the status of the work, assess its progress and resolve doubts. This activity constitutes a part of one of the assessment activities (E2).

Tutorships. Schedule of personalized attention to the student in order to review and discuss the materials and topics presented in both theoretical and practical classes.

Evaluation. Set of theoretical-practical written tests and presentation of reports or works used in the evaluation of student progress. The detail is in the section corresponding to the evaluation activities

If circumstances warrant, class sessions, problems, lab work, and evaluation will be remote.

4.2. Learning tasks

A01: Participatory Master Class. Exposure by the teacher of the main contents of the subject, combined with the active participation of the students. This activity will be carried out in the classroom in person. This methodology, supported by the individual student study (A07), is designed to provide students with the theoretical foundations of the subject content.

A02: Resolution of problems and cases. Resolution of problems and practical cases proposed by the teacher, with the possibility of exposing them by the students individually or in groups authorized by the teacher. This activity will be carried out in the classroom in person, and may require preparatory work by the students (A07).

A03: Laboratory work. Students will carry out 2-hour laboratory sessions. The work to be carried out will be carried out in small groups.

A06: Personalized tutor teacher-student. Schedule of personalized attention to the student in order to review and discuss the materials and topics presented in both theoretical and practical classes.

A08: Evaluation tests. Set of theoretical-practical written tests and reporting or work used in evaluating student progress. The detail is in the section corresponding to the evaluation activities.

If circumstances warrant, class sessions, problems, lab work, and evaluation will be remote.

4.3. Syllabus

The course will address the following topics:

- Topic 1. Basic elements of audiovisual communication
 - 1.1. The human audiovisual system: vision, hearing
 - 1.2. From the scene to the video signal
 - 1.3. Speech and audio signals
 - 1.4. Audio and Video Digitization
- Topic 2. Audiovisual information compression
 - 2.1. Image Compression
 - 2.2. Video Compression
 - 2.3. Speech and audio compression
- Topic 3. Standards for audiovisual signals Coding
 - 3.1. Speech: DPCM, ADPCM, LPC, CELP
 - 3.2. Audio: MPEG
 - 3.3. Image: JPEG2000
 - 3.4. Video: H26X, MPEG2, MPEG4, MPEG7
- Topic 4. Audiovisual transmission systems
 - 4.1. Digital Audio Broadcasting (DAB)
 - 4.2. Digital Video Broadcasting (DVB)
 - 4.3. Internet Protocol Television (IPTV)

4.4. Course planning and calendar

The subject's calendar, both for classroom sessions and laboratory sessions, will be determined by the academic calendar established by the center for the corresponding course.

The start and end dates of the theoretical and problem classes, as well as the dates for completing the laboratory work and the global assessment tests will be those set by the School of Engineering and Architecture. The dates of visit and delivery and follow-up of the tutored practical works will be announced in advance in class and on the website of the subject in the digital teaching ring, <https://moodle.unizar.es/>.

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=30380>