



POLITÉCNICA

INTERNATIONAL
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PR/CL/001



E.T.S. de Ingenieros de
Telecomunicacion

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

93000806 - Media Data System Design

DEGREE PROGRAMME

09AQ - Master Universitario En Ingenieria De Telecomunicacion

ACADEMIC YEAR & SEMESTER

2021/22 - Semester 2

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1. Description

1.1. Subject details

Name of the subject	93000806 - Media Data System Design
No of credits	6 ECTS
Type	Optional
Academic year of the programme	Second year
Semester of tuition	Semester 4
Tuition period	February-June
Tuition languages	English
Degree programme	09AQ - Master Universitario en Ingenieria de Telecomunicacion
Centre	09 - Escuela Tecnica Superior De Ingenieros De Telecomunicacion
Academic year	2021-22

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Fco. Javier Casajus De Quiros	C-328	javier.casajus@upm.es	Sin horario. Appointment arranged by email.
Jose Manuel Menendez Garcia (Subject coordinator)	C-300	jm.menendez@upm.es	Sin horario. Appointment arranged by email.

Jose Luis Blanco Murillo	C-303	jl.blanco@upm.es	Sin horario. Appointment arranged by email.
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* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

- Sistemas Y Servicios Multimedia

3.2. Other recommended learning outcomes

- Multimedia Production. Elective subject. Mandatory for the students willing to major in Sound and Image. Fourth year of the Bachelor of Engineering in Telecommunication Technologies and Services Eng.

- Audiovisual Equipment and Systems. Elective subject. Mandatory for the students willing to major in Sound and Image. First semester of the 4th. year of the Bachelor of Engineering in Telecommunication Technologies and Services Eng.

4. Skills and learning outcomes *

4.1. Skills to be learned

CE1 - Capacidad para aplicar métodos de la teoría de la información, la modulación adaptativa y codificación de canal, así como técnicas avanzadas de procesamiento digital de señal a los sistemas de comunicaciones y audiovisuales.

CE4 - Capacidad para diseñar y dimensionar redes de transporte, difusión y distribución de señales multimedia.

CG2 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.

CG4 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades.

CG5 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

CT1 - Capacidad para comprender los contenidos de clases magistrales, conferencias y seminarios en lengua inglesa.

CT2 - Capacidad para dinamizar y liderar equipos de trabajo multidisciplinares.

CT3 - Capacidad para adoptar soluciones creativas que satisfagan adecuadamente las diferentes necesidades planteadas.

CT4 - Capacidad para trabajar de forma efectiva como individuo, organizando y planificando su propio trabajo, de forma independiente o como miembro de un equipo.

CT5 - Capacidad para gestionar la información, identificando las fuentes necesarias, los principales tipos de documentos técnicos y científicos, de una manera adecuada y eficiente.

4.2. Learning outcomes

RA229 - Conocimiento de las aplicaciones basadas en el análisis y tratamiento espacio-temporal de la señal de vídeo

RA23 - Capacidad de abordar la gestión de un proyecto de ingeniería sencillo, en todas sus fases: planificación, asignación de recursos, estudio de la viabilidad económica y seguimiento y control. (CG1, CG2, CT3)

RA228 - Manejar algunas de las herramientas informáticas fundamentales para la implementación de algoritmos de Tratamiento Digital de Vídeo

RA9 - Saber redactar informes técnicos sobre trabajos realizados, con una estructura, contenidos y lenguaje del nivel adecuado a un trabajo de ingeniería

RA14 - El alumno conoce y es capaz de cuantificar los principales parámetros que definen los requisitos de los tráficos multimedia, estableciendo un compromiso calidad/coste y es capaz de aplicarlo al dimensionado de las redes de soporte.

RA10 - Saber realizar una presentación de carácter técnico, ante una audiencia de pares, que describa el trabajo realizado y sus resultados, de forma clara y bien estructurada, en el tiempo establecido, y usando un lenguaje preciso

RA45 - Conocimiento de las técnicas de captación, representación, tratamiento, almacenamiento, compresión, transporte, y presentación que se utilizan en los servicios y aplicaciones multimedia

RA44 - Conocimiento y caracterización de los elementos de los sistemas multimedia

RA13 - El alumno es capaz de conocer la estructura, elementos y prestaciones de las redes de distribución de contenidos.

RA25 - P ráctica de habilidades transversales necesarias para la gestión y participación en proyectos de ingeniería. (CG4, CT2, CT4)

RA43 - Conocimiento de los problemas prácticos que pueden resolverse mediante sistemas multimedia

RA46 - Conocimiento las técnicas y herramientas necesarias para analizar, especificar, implantar y mantener sistemas y servicios multimedia

RA47 - Conocimiento de las técnicas requeridas para la manipulación y distribución de contenidos multimedia: creación, codificación, gestión, transporte y difusión

RA49 - Manejo de las herramientas informáticas requeridas para la implantación y gestión de sistemas y servicios multimedia

RA227 - Manejar las herramientas matemáticas y conceptuales que sirven de base a las técnicas de Tratamiento Digital de Vídeo

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

5. Brief description of the subject and syllabus

5.1. Brief description of the subject

The subject includes the study of main functional components of media asset management systems (MAMs), allowing the student to design media integrated environments for both live (linear) and video on-demand (VoD) content exploitation, fulfilling functional requirements according to the pre-defined technical specifications, data characteristics, and expected working flows (ingest, production, post-production, storage, emission, VoD exploitation, over-the-top (OTT) services)

The subject has a strong practical component aim, and so it is complemented with several laboratory exercises, according to the Project Based Learning philosophy. The students will be organised in small groups that must properly organise and coordinate themselves to be able to cover all the functional aspects that the exercises require, in a given time slot. Resources from the Laboratory of Signals and Communications will be used, including

workstations with professional video and audio editing capabilities, a compact professional production studio equipped with a stage, high quality video cameras and multi-channel audio acquisition resources, and live streaming infrastructure.

5.2. Syllabus

1. The media data pyramid
2. Media dataflows
3. Media asset management (MAM)
4. Standardisation for MAM
5. Design of systems for media data
 - 5.1. Media data sources, storage, distribution and exploitation
 - 5.2. Live media data exploitation
 - 5.3. Media data for video on demand (VoD) services
6. Trending topics
7. Industrial systems

6. Schedule

6.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	<p>Chapter 1 Duration: 01:00 Lecture</p> <p>Chapter 2 Duration: 01:00 Lecture</p> <p>Chapter 3 Duration: 01:00 Lecture</p> <p>Chapter 4 Duration: 01:00 Lecture</p>			
2	<p>Chapter 4 Duration: 01:00 Lecture</p> <p>Chapter 5 Duration: 03:00 Lecture</p>			
3	<p>Chapter 5 Duration: 04:00 Lecture</p>			
4	<p>Chapter 5 Duration: 03:00 Lecture</p> <p>Chapter 6 Duration: 01:00 Lecture</p>			
5		<p>Laboratory Exercise 1: Multi-channel high quality audio acquisition, and operation of the audio console Duration: 04:00 Laboratory assignments</p>		<p>Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation. Group work Continuous assessment and final examination Not Presential Duration: 04:00</p>
6		<p>Laboratory Exercise 2: Multi-camera high quality video acquisition, and operation of the video console Duration: 04:00 Laboratory assignments</p>		<p>Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation. Group work Continuous assessment and final examination Not Presential Duration: 04:00</p>

7		<p>Laboratory Exercise 3: Musical production Duration: 04:00 Laboratory assignments</p>		<p>Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation. Group work Continuous assessment and final examination Not Presential Duration: 04:00</p>
8	<p>Chapter 6 Duration: 04:00 Lecture</p>			
9		<p>Laboratory Exercise 4: Titling, graphics and acquisition of raw audio-visual material. Duration: 04:00 Laboratory assignments</p>		<p>Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation. Group work Continuous assessment and final examination Not Presential Duration: 04:00</p>
10	<p>Chapter 6 Duration: 04:00 Lecture</p>			
11		<p>Laboratory Exercise 5: Streaming of audio-visual off-line and on-line content Duration: 04:00 Laboratory assignments</p>		<p>Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation. Group work Continuous assessment and final examination Not Presential Duration: 04:00</p>
12	<p>Chapter 6 Duration: 03:00 Lecture</p> <p>Chapter 7 Duration: 01:00 Lecture</p>			
13		<p>Laboratory Exercise 6: Production and streaming of live audio-visual signal Duration: 04:00 Laboratory assignments</p>		<p>Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation. Group work Continuous assessment and final examination Not Presential Duration: 04:00</p>
14		<p>Laboratory Exercise 6: Production and streaming of live audio-visual signal Duration: 04:00 Laboratory assignments</p>		<p>Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation. Group work Continuous assessment and final examination Not Presential Duration: 04:00</p>

15				
16				
17				Final exam (Chapters 1 to 7) Written test Continuous assessment and final examination Presential Duration: 02:00

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
5	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	5%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE1
6	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	5%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
7	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	5%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
9	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	5%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1

11	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	5%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
13	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	10%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
14	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	15%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
17	Final exam (Chapters 1 to 7)	Written test	Face-to-face	02:00	50%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
5	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	5%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE1

6	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	5%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
7	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	5%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
9	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	5%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
11	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	5%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
13	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	10%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1

14	Collaborative work. Presentation of the laboratory exercise memory in time, following the specified procedure, to allow a continuous evaluation.	Group work	No Presential	04:00	15%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
17	Final exam (Chapters 1 to 7)	Written test	Face-to-face	02:00	50%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1

7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Final exam (Chapters 1 to 7)	Written test	Face-to-face	02:00	50%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4 CE1
Presentation of the laboratory exercise memory in time, following the specified procedure or oral exam about all the laboratory exercises	Individual work	Face-to-face	02:00	50%	5 / 10	CT3 CG4 CT2 CT4 CT1 CT5 CG2 CG5 CE4

7.2. Assessment criteria

This subject belongs to the Master of Science in Telecommunication Engineering. The master's degree requires compulsory attendance by the student for those activities whose competences cannot be acquired remotely.

Students will be assessed, by default, by continuous assessment. Students who wish to waive the continuous assessment and opt for the evaluation by final test (consisting of one or more activities of global assessment of the subject), must communicate it in writing, through the Registry of the School Secretary, addressed to the coordinator of the subject, before the **FOURTH WEEK OF THE SEMESTER** according to the school calendar published by the Head of Studies of the ETSIT-UPM.

The evaluation will check if the students have acquired the competences of the subject. Therefore, the assessment by final exam will use the same types of assessment techniques used in the continuous assessment (EX, ET, TG, etc.), and will be carried out on the dates and times of final assessment approved by the School Board for the current academic year and semester, except for those learning outcomes assessment activities that are difficult to grade in a final exam. In this case, these assessment activities will be carried out throughout the course.

The student's attendance and active participation in the classes will be taken into account in the continuous assessment. In this continuous assessment modality, partial exams of specific contents may be proposed, which will be announced by the teachers in the classroom sufficiently in advance.

The activities carried out in the laboratory are related to the assessment of learning outcomes that are difficult to grade in a final exam, as they involve the use of equipment necessary to acquire certain competences. Therefore, laboratory activities are part of ALL assessment modalities, and must be carried out by ALL students.

Assessment of the laboratory is carried out by means of daily monitoring by the teachers with the students, as well as on the basis of the reports handed in on the laboratory exercises carried out. The delivery of the reports in due time and form is compulsory and necessary to pass in ALL the calls and evaluation modalities. Partial exams may be proposed for certain specific laboratory contents, which will be announced by the teachers sufficiently in advance.

The grade obtained in the laboratory exercises may be maintained exclusively for the following year (not for subsequent years) upon written request by the student, through the School Secretary's Office Register, addressed to the subject coordinator. The request to maintain the grade for the previous year's practicals must be submitted before the end of the **THIRD WEEK** of the semester.

Attendance at the Laboratory is compulsory. 2 unexcused absences will result in failure of the laboratory and, therefore, of the course, given that it is compulsory for ALL students to carry out the practicals and hand in the corresponding reports.

An exam will be held in the period of the ordinary official exam (after week 15) to assess the knowledge corresponding to the theory taught in the classroom and the knowledge acquired in the laboratory during the practical. The weight of this exam in the final mark will be 50%. The remaining 50% will be obtained from the student's work in the laboratory, and from the reports that must be handed in on this work. In order to be able to average both parts, it will be necessary to obtain a minimum mark of 3.5 points in each of them (separately).

For those students who require it, another exam will be held during the period of the official extraordinary exam (in the period set for this purpose by the Head of Studies) to assess the knowledge corresponding to the theory taught in the classroom and the knowledge acquired in the laboratory during the practicals. The weight of this extraordinary exam in the final mark will be 50%. The remaining 50% will be obtained from the student's work in the laboratory, and from the reports that must be handed in on this work. In order to be able to average both parts, it will be necessary to obtain a minimum mark of 3.5 points in each of them (separately).

The assessment in the extraordinary exam will be carried out exclusively by means of the final exam system, given that the reports on the student's work in the laboratory must have been handed in before the exam in the ordinary exam.

Students who have waived continuous assessment (class participation, mid-term exams, etc.), having communicated this in due time and form, and opt for assessment by final exam will take the final theory exam of the ordinary or extraordinary official exam, but must also take the laboratory assessment (and hand in the corresponding reports in due time and form) to facilitate the assessment of the corresponding competences.

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
J. M. Menéndez y J. Casajús, "Tecnologías de audio y vídeo", Dto. Publicaciones E.T.S.I.T., 2006.	Bibliography	
D. Austerberry, "Digital asset management". Focal Press, 2006.	Bibliography	
J. M. Castillo, "Televisión, realización y lenguaje audiovisual". Instituto RTVE, 2ª edición, 2013.	Bibliography	
A. Kovalick, "The Essentials of Professional Networked Media", Focal Press, 2006.	Bibliography	
B. Mendiburu, "3DTV and 3D Cinema", Focal Press, 2012.	Bibliography	
H. Moustafa and S. Zeadally, "Media Networks Architectures, Applications, and Standards". CRC Press, 2012	Bibliography	
J. Owens y G. Millerson, "Video Production Handbook", Focal Press, 15th Edition, 2012.	Bibliography	
J. Owens y G. Millerson, "Television Production", Focal Press, 15th Edition, 2013.	Bibliography	
K. Paulsen, "Moving Media Storage Technologies. Applications and Workflows for Video and Media Server Platforms". Focal Press, 2011	Bibliography	

Xpertia Soluciones Integrales in collaboration with Cluster ICT-Audiovisual de Madrid, "Estado del Arte de las tecnologías audiovisuales. De la captación de imágenes al usuario final. Actualización 2013".	Bibliography	
Grupo Técnico del Foro de la Televisión de Alta Definición en España, "Cuestiones Técnicas relevantes aplicables a los distintos tipos de servicio". Abril de 2008	Bibliography	
Web page of the subject http://moodle.upm.es/titulaciones/oficiales	Web resource	
Laboratory of Signals and Communications A.202-L	Equipment	
Group work room: Laboratory A.202-L	Equipment	

9. Other information

9.1. Other information about the subject

The subject supports the Sustainable Development Objectives from the United Nations, making emphasis in the following items:

- Increase the number of people with the professional and technical skills needed to access employment, decent work and entrepreneurship.
- Ensure that all students acquire the knowledge and skills necessary to promote sustainable development.
- Develop reliable, sustainable, resilient and quality infrastructure, with particular emphasis on affordable and equitable access for all.

- Increase access to ICTs and strive to provide universal and affordable access to the Internet in the least developed countries.
- Improve cooperation on and access to science, technology and innovation, and increase knowledge sharing on mutually agreed terms.