SOUND AND IMAGE ENGINEERING
B. Eng.

SEMESTER 5

Table of Contents

Year 2015/16

Course Name:	Audiovisual Systems	**Course Code:**	595000119
Year:	3	**Semester:**	5
Credits (ECTS):	4,5	**Credit Hours:**	3
Area:	Communication Systems	**Type:**	Engineering Topic / Required
Term:	Spring	**Language:**	Spanish
Prerequisites / Co-requisites:		Waves Propagation Signals and System Communication Theory	
Coordinator:		Elena Blanco	
Bachelor Engineering Program:		Sound and Image Engineering Communications Electronics Engineering Telecommunications Systems Engineering Telematics Engineering	

Course Contents

1. Capture and playback of sound and image devices
2. Sound and Image signals and formats
3. Introduction to streaming video and audio systems

ABET Student Outcomes

(b) An ability to design and conduct experiments, as well as to analyze and interpret data

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) An ability to function on multidisciplinary teams

(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

(i) A recognition of the need for, and an ability to engage in life-long learning

(j) A knowledge of contemporary issues

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Study Outcomes (according to the Spanish program definition)

CG 04 Ability to abstract, analyze, and synthesize, and to solve problems.

CG 10 Ability to handle specifications, rules and regulations and to apply them in the practice of the profession.

CE TEL 04 Ability to analyze and specify the fundamental parameters of a communication

system.

CE TEL 05 Ability to weigh up the advantages and disadvantages of different technological alternatives to deploy or implement communication systems, from the point of view of signal space, perturbations and noise, and analog and digital modulation systems.

CE TEL 16 Knowledge of telecommunication legislation and regulations at the National, European and International levels.

Specific outcomes of instruction (according to the Spanish program definition)

1.- Identify and recognize the technical specifications of the capture and video playback devices.
2.- Select from technical specifications device capture video and playback most suitable for a specific use.
3.- Describe the scheme of connection of a simple video system.
4.- Describe the process of digitalization of the video signal.
5.- Identify the formats of storage and transmission of video signals.
6.- Identify and recognize the technical specifications of capture and audio playback devices.
7.- Select most suitable capture and audio playback device from technical specifications for a specific use.
8.- Describe the connection scheme of a simple audio system.
9.- Describe the process of digitalization of the audio signal.
10.- Identify the storage formats and transmission of audio signals.
11.- Recognize the basic characteristics of by cable, fiber optic, radio link and satellite transmission system.
12.- Calculate the basic settings (bandwidth, power and s/n) of satellites, radio link, optical fiber and cable communications system.

Bibliography

"Transmisión por radio", Hernando Rábanos, J.M., Centro de estudios Ramón Areces.

"Micrófonos", Sánchez Bote, J.L. Dpto. Publicaciones EUITT.

Year 2015/16

Course Name:	Economics and Business Management	**Course Code:**	595000123
Year:	3	**Semester:**	5
Credits (ECTS):	4,5	**Credit Hours:**	3
Area:	Organization Engineering	**Type:**	Basic / Required
Term:	Fall	**Language:**	Spanish
Prerequisites / Co-requisites:		None	
Coordinator:		Waldo Pérez	
Bachelor Engineering Program:		Sound and Image Engineering Communications Electronics Engineering Telecommunications Systems Engineering Telematics Engineering	

Course Contents

1. Enterprise theory and markets
2. Behavior, specialization and exchange
3. Democratic governance and contractual process
4. Company and entrepreneur
5. Legal status and company governance
6. Financial information I
7. Financial information II
8. The strategic process: objectives and analysis
9. Strategies and business model

ABET Student Outcomes

(b) An ability to design and conduct experiments, as well as to analyze and interpret data

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) An ability to function on multidisciplinary teams

(g) An ability to communicate effectively

(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

(i) A recognition of the need for, and an ability to engage in life-long learning

(j) A knowledge of contemporary issues

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Study Outcomes (according to the Spanish program definition)

CG 03 Ability to express oneself in oral and written form, and to convey information

through documents and public presentations..

CG 05 Ability for teamwork in multidisciplinary environments..

CG 06 Ability for adaptability, negotiation, conflict resolution and leadership

CG 08 Ability to organize, plan and make decisions.

CE B5 Acceptable knowledge of the concept of company, institutional and juridical frame of the company. Companies Organization and management.

CE TEL 01 Ability to independently learn new knowledge and skills adequate for the design, development or utilization of telecommunication systems and services.

CE TEL 02 Ability to use communication and computer applications (office automation, databases, advanced calculus, project management, visualization...) to support the development and utilization of networks, services and telecommunication and electronics applications

CE TEL 06 Ability to design, deploy, organize and manage telecommunication networks, systems, services and infrastructures in residential (home, city and digital communities), business or institutional contexts, including setup, continuous improvement, and understanding of their economic and social impact.

Specific outcomes of instruction (according to the Spanish program definition)

1.- Recognize memory and other financial documents that are part of the annual accounts
2.- Distinguish the main features of the other corporations
3.- Recognize the main tools for external strategic analysis
4.- Extending the model of behavior of economic agents as utility maximizers for situations where operating with imperfect information
5.- Approaching the issue of company governance
6.- Explain a model of behavior of economic agents as utility maximizers that have perfect information
7.- Interpret the market, political and organizational solutions as various complementary solutions to the economic problem
8.- Conceptualize the organization as complex form of hiring
9.- Become familiar with the different meanings of businessman
10.- Know the main characteristics of the individual entrepreneur and unincorporated partnerships
11.- Recognizing the level of debt and working capital from financial information
12.- Analyze the profitability of a company from the information provided in the annual accounts
13.- Identify the model of behavior of the final consumer
14.- Describe the model of company behavior characterized by a transformation function, both from the point of view of production and costs
15.- Recognize the pattern of market behavior in perfect competition and monopoly, with interest in their differences

Bibliography

"Economía y Empresa para Ingenieros", Martinez Núñez, M.; Pérez Aguiar, W. S., Dpt. Publicactions, 2014.

Year 2015/16

Course Name:	Operating Systems	**Course Code:**	595000125
Year:	3	**Semester:**	5
Credits (ECTS):	4,5	**Credit Hours:**	3
Area:	Informatics	**Type:**	Engineering Topic / Required
Term:	Fall	**Language:**	Spanish
Prerequisites / Co-requisites:		Programming I Programming II Telecommunication Networks and Services Microprocessors	
Coordinator:		Javier Martín	
Bachelor Engineering Program:		Sound and Image Engineering Communications Electronics Engineering Telecommunications Systems Engineering Telematics Engineering	

Course Contents

1. Concepts, objectives and components of the operating system
2. Processor management
3. Memory management
4. Concurrency
5. Input/output management
6. Files system

ABET Student Outcomes

(b) An ability to design and conduct experiments, as well as to analyze and interpret data

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) An ability to function on multidisciplinary teams

(g) An ability to communicate effectively

(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

(i) A recognition of the need for, and an ability to engage in life-long learning

(j) A knowledge of contemporary issues

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Study Outcomes (according to the Spanish program definition)

CG 04 Ability to abstract, analyze, and synthesize, and to solve problems.

CG 05	Ability for teamwork in multidisciplinary environments..
CG 08	Ability to organize, plan and make decisions.
CG 11	Skills for the use of Information and Communication Technologies.
CG 13	Learning skills with a high degree of autonomy..
CE B2	Basic knowledge on using and programming computers, operating systems, databases and software used in engineering.
CE TEL 07	Knowledge and use of the principles of programming in telecommunication networks, systems and services.

Specific outcomes of instruction (according to the Spanish program definition)

1.- Install and use a multi-programmed general purpose operating system.

2.- Learn general principles about general purpose and real time operating systems, as well as the basic mechanisms of resource management.

3.- Use Unix systems to develop applications in the field of telecommunications.

4.- Carry out a top-down design of an application from a medium complexity problem specification.

5.- Use the POSIX system calls.

6.- Program in a high-level language, applications of complexity half according to the rules of structured programming.

7.- Use standard application development tools for a general purpose operating system.

8.- Understand the specific problems of concurrent applications. Learn the basic tools for developing applications with these characteristics.

Bibliography

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Year 2015/16

Course Name:	Audio Engineering I	**Course Code:**	595000126
Year:	3	**Semester:**	5
Credits (ECTS):	4,5	**Credit Hours:**	3
Area:	Audio Engineering	**Type:**	Engineering Topic / Required
Term:	Fall	**Language:**	Spanish
Prerequisites / Co-requisites:		Sound and Image Fundamentals Signals and Systems Communication Theory	
Coordinator:		Francisco Javier Tabernero	
Bachelor Engineering Program:		Sound and Image Engineering	

Course Contents

1. Psychoacoustic basis for Audio Engineering
2. Multichannel sound techniques
3. Audio Engineering equipment
4. Mixing consoless

ABET Student Outcomes

(b) An ability to design and conduct experiments, as well as to analyze and interpret data

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) An ability to function on multidisciplinary teams

(g) An ability to communicate effectively

(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

(i) A recognition of the need for, and an ability to engage in life-long learning

(j) A knowledge of contemporary issues

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Study Outcomes (according to the Spanish program definition)

CE TEL 01 Ability to independently learn new knowledge and skills adequate for the design, development or utilization of telecommunication systems and services.

Specific outcomes of instruction (according to the Spanish program definition)

1.- Ability to understand and analyze the characteristics of the different equipment and processors used in audio engineering.

2.- Ability to understand and analyze the characteristics of different mixing consoles used in audio systems.

Bibliography

Moodle Web Resources.

Year 2015/16

Course Name:	Acoustic Engineering	**Course Code:**	595000127
Year:	3	**Semester:**	5
Credits (ECTS):	6	**Credit Hours:**	3
Area:	Acoustic Engineering	**Type:**	Engineering Topic / Required
Term:	Fall	**Language:**	Spanish
Prerequisites / Co-requisites:		Sound and Image Fundamentals	
Coordinator:		Danilo Simón	
Bachelor Engineering Program:		Sound and Image Engineering	

Course Contents

1. Longitudinal and transverse vibrations in acoustic and mechanical systems in one and two dimensions
2. Acoustic transmission through various means
3. Acoustic diffraction. Noise barriers
4. Electroacoustic Analogies
5. Electroacoustic Transducers

ABET Student Outcomes

(a) An ability to apply knowledge of mathematics, science, and engineering

(b) An ability to design and conduct experiments, as well as to analyze and interpret data

(d) An ability to function on multidisciplinary teams

(e) An ability to identify, formulate, and solve engineering problems

(j) A knowledge of contemporary issues

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Study Outcomes (according to the Spanish program definition)

CE B02 Basic knowledge on using and programming computers, operating systems, databases and software used in engineering.

CE B03 Knowledge and command of basic concepts on the general laws of Mechanics, Thermodynamics, electromagnetic fields and waves, and its application to solve engineering problems.

CE SI03 Ability to carry out projects for studios and facilities which will be used for audio and video signal production and recording.

CE SI04 Ability to carry out acoustic engineering projects on: acoustic isolation and

acoustic conditioning, PA installations; specification, analysis and selection of electroacoustic transductors; measurement, analysis and noise and vibration control systems; environmental acoustics; underwater acoustics systems.

CE SI06 Ability to carry out professional projects in the specific field of telecommunication technologies in which competences attained in the program have to be synthesized and integrated.

CE TEL 9 Ability to understand the mechanisms of electromagnetic and acoustic wave propagation and transmission, as well as corresponding transmitters and receivers.

CG02 Ability to search and select information, develop critical thinking and produce and defend arguments within the area.

CG03 Ability to express oneself in oral and written form, and to convey information through documents and public presentations.

CG04 Ability to abstract, analyze, and synthesize, and to solve problems.

CG05 Ability for teamwork in multidisciplinary environments..

CG09 Ability to analyze and assess the social and environmental impact of technical solutions.

CG10 Ability to handle specifications, rules and regulations and to apply them in the practice of the profession.

CG13 Learning skills with a high degree of autonomy..

Specific outcomes of instruction (according to the Spanish program definition)

1.- Understand the vibratory behavior of the mechanical and acoustic systems.

2.- Ability to analyze the problems of acoustic diffraction and transmission of acoustic waves through several means.

3.- Ability to analyze the behavior of the mechanical and acoustic systems from electric models.

4.- Ability to understand the physical principles and electric models of the electroacoustic transducers: speakers and microphones.

5.- Know the operation and management of microphones and microphone systems.

6.- Learn to interpret the technical characteristics of the speakers and microphones commercial models. Learn to measure and characterize professional microphones and speakers.

7.- Know how to analyze and design systems with speakers and microphones.

8.- Ability to analyze the sound field of a local.

Bibliography

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Year 2015/16

Course Name:	Image and Video Technologies	**Course Code:**	595000128
Year:	3	**Semester:**	5
Credits (ECTS):	6	**Credit Hours:**	4
Area:	Video Engineering	**Type:**	Engineering Topic / Required
Term:	Fall	**Language:**	Spanish
Prerequisites / Co-requisites:		Signals and Systems Sound and Image Fundamentals Communication Theory Digital Signal Processing	
Coordinator:		Martina Eckert	
Bachelor Engineering Program:		Sound and Image Engineering	

Course Contents

1. Basic features of Audio and Video signals
2. Digitalization and Encoding
3. Image and Video Compression
4. Advanced Video Encoding

ABET Student Outcomes

(a) An ability to apply knowledge of mathematics, science, and engineering

(b) An ability to design and conduct experiments, as well as to analyze and interpret data

(d) An ability to function on multidisciplinary teams

(e) An ability to identify, formulate, and solve engineering problems

(g) An ability to communicate effectively

(i) A recognition of the need for, and an ability to engage in life-long learning

(j) A knowledge of contemporary issues

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Study Outcomes (according to the Spanish program definition)

CE SI01 Ability to build, utilize and manage telecommunication services and applications for the purpose of acquiring, treating analogically and digitally, encoding, transporting, representing, processing, storing, reproducing, managing and presenting audiovisual services and multimedia information.

CE SI05 Ability to create, encode, manage, broadcast and distribute multimedia content,

taking into account usability and accessibility criteria for audiovisual, broadcast and interactive services.

CE TEL01 Ability to independently learn new knowledge and skills adequate for the design, development or utilization of telecommunication systems and services.

CG 02 Ability to search and select information, develop critical thinking and produce and defend arguments within the area.

CG 03 Ability to express oneself in oral and written form, and to convey information through documents and public presentations.

CG 04 Ability to abstract, analyze, and synthesize, and to solve problems.

CG 05 Ability for teamwork in multidisciplinary environments..

CG 11 Skills for the use of Information and Communication Technologies.

CG 13 Learning skills with a high degree of autonomy..

Specific outcomes of instruction (according to the Spanish program definition)

1.- Ability to understand some advanced video encoding processes.

2.- Ability to understand the process of compressing video signals and auxiliary signals.

3.- Ability to understand the processes of digitization and encoding of images.

4.- Ability to understand the different formats of the video signal, for the various resolutions used in initial format, uncompressed.

Bibliography

Moodle Web Resources.