COMMUNICATIONS ELECTRONICS ENGINEERING B. Eng.

SEMESTER 5

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Course Name:	Economics and Business Management	Course Code:	595000024
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:		Communications Electronics Engineering Telecommunications Systems Engineering Sound and Image 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.

Course Name:	Operating Systems	Course Code:	595000026
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:		Communications Electronics Engineering Telecommunications Systems Engineering Sound and Image 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

Moodle Resources

Course Name:	Digital Design I	Course Code:	595000027
Year:	3	Semester:	5
Credits (ECTS):	4,5	Credit Hours:	3
Area:	Digital Electronics	Type:	Engineering Topic / Required
Term:	Fall	Language:	Spanish
Prerequisites / Co-requisites:		Electronics II	
Coordinator:		Matías Garrido	
Bachelor Engineering Program:		Communications Electronics Engineering	

Course Contents

1. CAD+VHDL+Technology

2. Subsystems

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

(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

(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 02   Skilled to searching and selecting information, critical reasoning and writing and defending the reasonings within the defined area.

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

CG 05   Ability for teamwork in multidisciplinary environments.

CE TEL10   Ability to analyze and design combinational and sequential circuits, synchronous and asynchronous, and to use microprocessors and integrated circuits.

CE TEL11   Knowledge and application of the fundamentals of hardware description languages

CE EC01   Ability to build, utilize and manage systems for the acquisition, transport, representation, processing, storage, management and presentation of multimedia information, from the point of view of electronic systems.

CE EC05   Ability to design analog and digital electronic circuits, analog-to-digital and digital-to-analog conversion circuits, radiofrequency circuits, and electric power supply and conversion circuits for applications in telecommunications and computing.

CE EC07   Ability to design devices for interfacing, data acquisition and storage, and terminals for telecommunication services and systems.

CE EC08   Ability to specify and use electronic instrumentation and measurement systems.

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

1.- Analysis, design, test and prototyping of simple digital subsystems (single-shot records, accumulators, frequency dividers, benches, counters BCD of several digits, counters programmable module, adding BCD and combinations of them) using VHDL.

2. - Apply CAD tools to capture, simulate and make digital systems.

3. - Search, select and use the relevant information provided by the manufacturers of configurable integrated circuits of average complexity.

4. - Perform analysis, design, test and prototyping of simple combinational and sequential systems using VHDL.

5. - Perform hierarchical descriptions of digital circuits using structural VHDL modeling.

6. - Know and use the configurable integrated circuits of different complexity for wired digital systems.

7. - Work in pairs with another student, planning weekly working hours and resolving small conflicts which may arise during the course.

8. - Use the oscilloscope to carry out and correctly interpret digital signal measures (logic levels, frequencies, indirect measures of current) in simple digital circuits.

Bibliography

Moodle Web Sources.

Year 2015/16

Course Name:	Microprocessor-based Systems	Course Code:	595000028
Year:	3	Semester:	5
Credits (ECTS):	6	Credit Hours:	4
Area:	Digital Electronics	Type:	Engineering Topic / Required
Term:	Fall	Language:	Spanish
Prerequisites / Co-requisites:		Programming I Programming II Microprocessors	
Coordinator:		Fernando Pescador	
Bachelor Engineering Program:		Communications Electronics Engineering	

Course Contents

1. Block 0: Review
2. Block 1: External devices management
3. Block 2: Timers
4. Serial Communications
5. Medium complexity application design

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

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

(f)   An understanding of professional and ethical responsibility

(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

(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 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 Technologies and Communications

CE TEL10   Ability to analyze and design combinational and sequential circuits, synchronous and asynchronous, and to use microprocessors and integrated circuits.

CE EC04   Ability to apply electronics as a support technology in other fields and activities, not just in the field of Information and Communication Technologies.

CE EC07   Ability to design devices for interfacing, data acquisition and storage, and terminals for telecommunication services and systems.

CE EC08   Ability to specify and use electronic instrumentation and measurement systems.

CE EC10   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.

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

1. - Handle specific electronic instrumentation for the development of systems based on microprocessor, such as the Logic Analyzer.
2. - Development of applications in working groups
3. - Interpret the specifications of a system based on microcontroller of medium complexity...
4. - Write the code needed to develop an application based on microcontroller.
5. - Connect a peripheral to a microcontroller using interfaces based on standard protocols.
6. - Manage the initialization (reset) and clock sources in a microcontroller.
7. - Establish and manage a serial asynchronous communication between two systems.
8. - Learn how to handle any peripheral of medium complexity of a microcontroller from the documentation provided by the manufacturer.
9. - Send and receive data between two devices using serial synchronous communications
10. - Generate tensions and analogue wave forms, with sufficient accuracy, using a microcontroller´s analogue converters.
11. - Design the logic necessary to control a peripheral not included in the microcontroller through accesses to specific memory map addresses.
12. - Produce a report which justifies and describes the taking of decisions on the development of a project and defending it orally with accuracy and detail.
13. - Manage timers and counters, along with the modules of capture and comparison to develop applications based on the precise control of timing between events.
14. - Discuss software and hardware architecture of medium complexity microcontroller-based systems.

15. - Handle CAD environments for the coding, compilation, and debugging of applications based on microcontroller.
16. - Develop systems based on microprocessors from different fields of application

Bibliography

Moodle Web Resources

Course Name:	Control Systems	Course Code:	595000029
Year:	3	Semester:	5
Credits (ECTS):	6	Credit Hours:	4
Area:	Systems Engineering and Electronic Products	Type:	Engineering Topic / Required
Term:	Fall	Language:	Spanish
Prerequisites / Co-requisites:		Signals and Systems Digital Signal Processign Electronics I; Analog Electronics I	
Coordinator:		Ángel Manuel Groba	
Bachelor Engineering Program:		Communications Electronics Engineering	

Course Contents

1. - Fundamentals of control systems
2. - Temporal control systems analysis
3. - Analysis of control systems by the roots locus (LDR)
4.- Controller Design

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

(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

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

CE EC03   Ability to specify, implement, document and adjust equipment and electronic systems for instrumentation and control, considering both technical and regulatory aspects.

CE EC04   Ability to apply electronics as a support technology in other fields and activities, not just in the field of Information and Communication Technologies.

CE EC06   Ability to understand and use the feedback theory and electronic control systems.

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

1. Handle the transfer function in the Laplace domain and the Z domain as a means for modeling control systems continuous and discrete, respectively.
2. Obtain, through analytical and experimental methods, mathematical models of physical processes to control.
3. Calculate the accuracy of a feedback control system based on the concept of steady-state error.
4. Understanding the fundamental actions of PID control properties, including its practical limitations.
5. Use CASE tools as support for the analysis and design of control systems
6. Manage block diagrams and transfer functions as a means of continuous and discrete control systems graphical/analytical representation
7. Use electronic systems for the realization of control systems
8. Adjust the parameters of a PID controller to achieve certain specifications for temporary behavior in a control system
9. Characterize qualitatively and quantitatively the temporary behavior of a control system from its transfer function.
10. Use (draw and interpret) of a feedback control system as a means to relate its gain feedback with its temporal behavior.
11. Calculate the transfer function of the controller that would be necessary to apply to a control system to achieve certain temporal behavior specifications

Bibliography

S.Gomáriz, D.Biel, J.Matas y M.Reyes. Teoría de Control. Diseño Electrónico. Ed. UPC, 1998

B. C. Kuo. Automatic Control System (7ª edición). Prentice Hall. 1995

K. Ogata. Modern Control Engineering (4ª edición). Prentice Hall. 2002

K. Ogata. Discrete-Time Control Systems (2ª edición). Prentice-Hall, 1995

Several Authors. The Control Handbook. IEEE Press & CRC Press. EEUU. 1996

Course Name:	Audiovisual Systems	Course Code:	595000030
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:		Communications Electronics Engineering Telecommunications Systems Engineering Sound and Image 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 ETSIST.