COMMUNICATIONS ELECTRONICS ENGINEERING B. Eng.

SEMESTER 6

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Year 2015/16

Course Name:	Computer Networks	**Course Code:**	595000020
Year:	3	**Semester:**	6
Credits (ECTS):	4,5	**Credit Hours:**	3
Area:	Telecommunications Networks	**Type:**	Engineering Topic / Required
Term:	Spring	**Language:**	Spanish
Prerequisites / Co-requisites:		Telecommunication Networks and Services	
Coordinator:		Oscar Ortiz	
Bachelor Engineering Program:		Communications Electronics Engineering Telecommunications Systems Engineering Sound and Image Engineering Telematics Engineering	

Course Contents

1. Link layer and Local Area Networks
2. Internet Network Layer
3. Internet Transport Layer
4. Introduction to Internet Applications and Services

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

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

(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 06	Ability for adaptability, negotiation, conflict resolution and leadership.
CG 08	Ability to organize, plan and make decisions.
CG 10	Ability to handle specifications, rules and regulations and to apply them in the practice of the profession.
CG 13	Learning skills with a high degree of autonomy.
CE TEL 13	Knowledge and use of the concepts of network architecture, protocols and communication interfaces.
CE TEL 14	Ability to differentiate the concepts of access and transport network, packet and circuit switching network, fixed and mobile network, as well as distributed systems and networked applications, voice, data, audio, video, interactive and multimedia services.
CE TEL 15	Knowledge of network interconnection and routing methods, and of the fundamentals of network planning and dimensioning based on traffic parameters.

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

1.- Contextualize the local area in the Internet architecture networks.
2.- Enumerate the physical media for the deployment of local area networks.
3.- Explain the problem and the classical solutions to the shared media access control.
4.- Describe the characteristics and operation of Ethernet.
5.- Identify local area networking devices.
6.- Describe the level of Internet protocols.
7.- Describe the different Internet routing algorithms and protocols.
8.- Indicate the structure of bodies involved in the Organization of Internet.
9.- Describe the level of Internet transport protocols.
10.- The relationship between the Internet level and the link layer protocols.
11.- Differentiate the Internet networking elements.
12.- Describe the main Internet services and applications.
13.- Set up an IP computers network.

Bibliography

"Redes de computadoras: un enfoque descendente", Kurose, J.F., Ross, K.W., Pearson Addison Wesley, 2010

"Comunicaciones y Redes de Ordenadores" Stallings, Séptima Edición W., Prentice-Hall International, 2004.

"Redes de computadores e Internet", Halsall, F., Pearson, Addison-Wesley, 2006

Year 2015/16

Course Name:	Digital Design II	**Course Code:**	595000031
Year:	3	**Semester:**	6
Credits (ECTS):	6	**Credit Hours:**	4
Area:	Digital Electronics	**Type:**	Engineering Topic / Required
Term:	Spring	**Language:**	Spanish
Prerequisites / Co-requisites:		Signals and Systems Digital Signal Processign Electronics I Analog Electronics I	
Coordinator:		Miguel Ángel Freire Rubio	
Bachelor Engineering Program:		Communications Electronics Engineering	

Course Contents

1. Technology
2. Synchronous Design
3. Complex Digital Systems Designing

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

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

CG 04	Ability to abstract, analyze, and synthesize, and to solve problems.
CG 07	Ability to design, manage, and direct projects.
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 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 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.

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

1. - Knowing the characteristics of the different technologies of configurable integrated circuits to make wiring digital systems.
2. - Know and apply the methodology of synchronous design.
3. - Learn about and assess the specific characteristics of the different technologies for the realization of digital systems.
4. - Perform complex digital systems, including the architectural design of the system, the logical design of the modules and the design of the verification tests.
5. - Designing architectures of digital systems using hierarchical design methodologies.
6. - Learn the techniques to design verification tests for digital systems.
7. - Apply CAD tools to capture, simulate and realize digital systems.
8. - Learn about the technologies for the realization of ASICs.
9. - Know the structure, interface and operation of complex cabling subsystems: multipliers, dividers, synchronous memories, etc.

Bibliography

Slides and activities, Moodle documentation.

Year 2015/16

Course Name:	Analog Electronics II	**Course Code:**	595000032
Year:	3	**Semester:**	6
Credits (ECTS):	6	**Credit Hours:**	4
Area:	Analog Electronics	**Type:**	Engineering Topic / Required
Term:	Spring	**Language:**	Spanish
Prerequisites / Co-requisites:		Circuit Analysis I Circuit Analysis II Electronics I Analog Electronics I	
Coordinator:		Javier Malo	
Bachelor Engineering Program:		Communications Electronics Engineering	

Course Contents

1. Feedback Circuits with operational amplifier
2. Frequency response of circuits based on operational amplifier
3. Parameters of commercial operational amplifiers

ABET Student Outcomes

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

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

CE EC02 Ability to select circuits and specialized electronic devices for transmission and routing, as well as terminal equipment, both in fixed and mobile environments.

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.

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

1.- Understand and interpret specifications and parameters of an operational amplifier from data sheets from the manufacturer.

2.- Designing active low and high pass filters of any order .

3.- Calculate the error of continuous, in the output of a circuit, due to errors of the amplifiers used offset.

4.- To assess the degree of stability of a feedback amplifier built with operational amplifier.

5.- Learn about the advantages and disadvantages produced by negative feedback on the behavior of an amplifier.

6.- Calculate the bandwidth of an amplifier built with a frequency compensated operational amplifier. The considered parameters are: Gain Bandwith Product and Slew Rate.

7.- Know and apply some of the most basic methods of compensation for feedback circuits built with operational amplifiers.

8.- Calculate the power of electronic noise in the output of a simple amplifier built with operational amplifier.

9.- Apply the theory of feedback circuits to the calculation of the gain and terminal resistances of a negative feedback amplifier, built with operational amplifier.

10.- Calculate the average power dissipated by an operational amplifier in a circuit.

11.- Apply a calculation procedure for obtaining the network function of an amplifier built around the op-amp.

12.- Represent and interpret, using Bode diagrams, the frequency response of the gain of an amplifier built with operational amplifier.

13.- Apply the theory of feedback circuits for the identification of positive or negative feedback in circuits built with operational amplifier.

14.- Build, put together and characterize, by means of appropriate measures in the laboratory, different analog circuits of medium complexity designed with operational amplifier.

Bibliography

Franco, S. (2014). Design with operational amplifiers and analog integrated circuits. 4th Ed. McGraw-Hill Higher Education.

Year 2015/16

Course Name:	Production Technologies of Electronics Systems	**Course Code:**	595000033
Year:	3	**Semester:**	6
Credits (ECTS):	4,5	**Credit Hours:**	3
Area:	Systems Engineering and Electronic Products	**Type:**	Engineering Topic / Required
Term:	Spring	**Language:**	Spanish
Prerequisites / Co-requisites:		Electronics I; Electronics II Microprocessors	
Coordinator:		Eduardo Nogueira Díaz	
Bachelor Engineering Program:		Communications Electronics Engineering	

Course Contents

1. Introduction to the technologies of production of electronic systems.
2. Design of printed circuit boards and design rules.
3. Materials, manufacturing processes and types of printed circuit board.
4. Improvement of noise and electromagnetic compatibility, CE marking.
5. Thermal analysis of printed circuit board's power.
6. Evaluation of quality and reliability of circuits.

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

(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.
CG 13	Learning skills with a high degree of autonomy.
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 EC09	Ability to analyze and solve interference and electromagnetic compatibility problems.

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

1.- Knowing the rules of design and analysis for a circuit of high frequency or high power density.
2.- Know the properties, capabilities and limitations of each interconnect technology.
3.- Learn about the encapsulated and parameters selection of the components.
4.- Understand the application of the physical and electrical design rules depending on the application.
5.- Perform CAD-CAM (Computer Aided Design - Manufacturing) design of a circuit.
6.- Understand the processes for the realization of a printed circuit board and apply them in a printed circuit board manufacturing laboratory.

Bibliography

Tecnología Microelectrónica Vol 2: Circuitos Impresos. Ramiro Álvarez Santos. Editorial Ciencia.

Printed Circuits Handbook. C.F. Coombs. McGraw Hill Handbooks

Complete PCB Design Using OrCAD® Capture and PCB Editor. Kraig Mitzner. Ed Newnes