TELECOMMUNICATIONS SYSTEMS ENGINEERING B. Eng.

SEMESTER 6

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Year 2015/16

Course Name:	Computer Networks	**Course Code:**	595000329
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:		Telecommunications Systems Engineering Communications Electronics 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:	High Frequency Technologies	**Course Code:**	595000330
Year:	3	**Semester:**	6
Credits (ECTS):	6	**Credit Hours:**	4
Area:	Applied Electromagnetism	**Type:**	Engineering Topic / Required
Term:	Spring	**Language:**	Spanish
Prerequisites / Co-requisites:		Wave Transmission and Propagation	
Coordinator:		Carlos Cortés	
Bachelor Engineering Program:		Telecommunication Systems Engineering	

Course Contents

1. Introduction to Microwaves
2. S Parameters
3. Transmission Lines
4. Microwave Devices
5. Resonators
6. Amplifiers
7. Oscillators

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

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

(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)

CE ST03 Ability to analyze components and their specifications for guided and non-guided communication systems.

CE ST04 Ability to select radiofrequency, microwave, radio broadcasting, radio link and

radio localization circuits, subsystems and systems.

CE ST05 Ability to select aerials, equipment and transmission systems for guided and non-guided wave propagation, through electromagnetic, radiofrequency or optical channels. Ability to manage the associated radio electric space and frequency allocation.

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

CE TEL09 Ability to understand the mechanisms of electromagnetic and acoustic wave propagation and transmission, as well as corresponding transmitters and receivers.

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

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.- Understand and handle impedance matching techniques.

2.- Handling of the instrumentation used in microwave and high frequency technologies.

3.- Interpret the techniques used in high frequency circuits and subsystems.

4.- Specify technological requirements of high frequency integrated circuits.

5.- Characterize a transmission line by its electromagnetic parameters.

6.- To design and characterize high frequency circuits and subsystems.

7.- Interpret the mechanisms of propagation of electromagnetic waves in confined media: conductive guides and fiber optics.

Bibliography

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Year 2015/16

Course Name:	Communications Electronics II	**Course Code:**	595000331
Year:	3	**Semester:**	6
Credits (ECTS):	6	**Credit Hours:**	4
Area:	Communications Electronics	**Type:**	Engineering Topic / Required
Term:	Spring	**Language:**	Spanish
Prerequisites / Co-requisites:		Communication Electronics I	
Coordinator:		Federico Javier Ortega	
Bachelor Engineering Program:		Telecommunication Systems Engineering	

Course Contents

1. Transmitters and receivers
2. Small signal amplifiers
3. Conventional power amplifiers
4. Switched power amplifiers
5. Amplifier Design
6. Linearization
7. Frequency Mixers

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 SI01 Ability to construct, take advantage and manage services and telecom applications, understood these as systems of recording, analogical and digital

treatment, codification, transmission, representation, processing, storage, reproduction, management and presentation of audiovisual services and multimedia information.

CE SI05 Ability to create, encode, manage, transmit and distribute multimedia contents, according to usability and accesibility criteria of audiovisual, transmitting and interactive services.

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

1.- Handling of the instrumentation and procedures for a basic laboratory of communication systems, (generator/oscilloscope and Spectrum Analyzer RF modulator).

Bibliography

Herbert L. Krauss, Charles W. Bostian, Frederick H. Raab, Solid state Radio Engineering, Wiley, 1980, ISBN: 978-0-471-03018-8

Andrei Grebennikov, Nathan O. Sokal, Marc J. Franco, Switchmode RF and Microwave Power Amplifiers, 2nd edition, Academic Press (Eselvier) 2012, ISBN: 978-0-12-415907-5

Guillermo González, Microwave Transistor Amplifiers: Analysis and Design, 2nd edition, Prentice Hall, 1996, ISBN: 978-0132543354

Francisco Javier Ortega González, Análisis y Diseño de Amplificadores de Potencia en Alta Frecuencia, Departamento de Publicaciones de la EUIT de Telecomunicación, UPM

Year 2015/16

Course Name:	Telecommunication Systems	**Course Code:**	595000332
Year:	3	**Semester:**	6
Credits (ECTS):	4.5	**Credit Hours:**	4
Area:	Telecommunication Systems and Technologies	**Type:**	Engineering Topic / Required
Term:	Spring	**Language:**	Spanish
Prerequisites / Co-requisites:		Communication Theory	
Coordinator:		Jose Enrique González	
Bachelor Engineering Program:		Telecommunication Systems Engineering	

Course Contents

1. Introduction to Telecommunication Systems and Services
2. Optical Communications
3. Source Coding
4. Codes against Errors
5. Digital Communication Systems
6. Digital Hierarchies

ABET Student Outcomes

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

(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 (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

(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 ST01 Ability to build, utilize and manage telecommunication services and

applications for the acquisition, transport, representation, processing, storage, management and presentation of multimedia information, from the point of view of transmission systems.

CE ST05 Ability to select aerials, equipment and transmission systems for guided and non-guided wave propagation, through electromagnetic, radiofrequency or optical channels. Ability to manage the associated radio electric space and frequency allocation.

CE ST06 Ability to analyze, encode, process and transmit multimedia information using analog and digital signal processing techniques.

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

CE TEL16 Knowledge of telecommunication legislation and regulations at the National, European and International levels.

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

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.

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

1.- Learn about the different elements of a system of optical communications (fibre, source, photodetector, EDFA, WDM devices, other devices).

2.- Familiarize yourself with the basic procedures of measurement in optical communications.

3.- Be able to design and evaluate optical communication systems, with power balance and dispersion, with BER calculations, and the necessary adaptations for WDM.

4.- Learn about the elements of a telecommunication systems, in a block diagram, understanding the role of each part.

5.- Understand and be able to use different codes of block and cyclic error protection.

6.- Learn about line codes and digital modulations of advanced features.

7.- Learn about the key features of digital hierarchies, PDH and SDH.

8.- Learn about different systems of Telecommunication (ADSL, DVB, etc.).

9.- Apply all previous knowledge to be able to understand and design telecommunication systems.

10.- Be able to simulate the most significant telecommunication system parts.

Bibliography

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