DESCRIPTIVE CONTENT OF THE SUBJECT

GENERAL INFORMATION

Name:	**Circuits for electronic instrumentation**
ECTS credits:	**6**
Semester:	**1st**
Type:	**Compulsory**
Module:	**Telecommunication Technologies**
Department:	**Electronic Engineering and Automatic**
Area of knowledge:	**Electronic Technology**
Language:	**English**

Pre-requisites (if necessary)

There are no pre-requisites for this subject

ACTIVITIES AND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES

Activities/Methodologies	ECTS Cr.	Attend. (hours)	Private work (hours)	Competences (codes)
Lectures and tutorials:	3	30	45	TET1,TET3-TSC5, TET5
Lab work:	3	30	45	TET1,TET4-TSC5, TSC3
TOTAL	6	60	90	

LEARNING RESULTS

Results 1	Getting the skills in order to design analog integrated circuits for data acquisition applications.
Results 2	Knowledge the operation principle of main types of sensors and their applications.
Results 3	Develop the ability to handle software tools to design integrated circuits and the acquisition of physical signals
Results 4	Development of ability to solve typical problems given in the lectures.
Results 5	Design measuring systems with sensors.

ASSESMENT METHOD			
Aspect	**Criteria**	**Instrument**	**Importance**
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 out of 10 in order to pass.			

PART I: FUNDAMENTALS OF ANALOG INTEGRATED CIRCUITS

Chapter 1. Introduction
Definitions. Technical evolution of IC. Integration Scales. Manufacturing processes of IC. Signals and variables. Measuring systems. Static/dynamic characteristics. CAD Tools.

Chapter 2. Amplification stages
Introduction. Review of BJTs and MOSFETs. Amplification stages based on BJT transistors: common emitter (with and without RE), common collector and common base. Amplification stages based on MOSFET transistors: common source, common gate and common drain. Current sources: current mirrors, cascode source and current multipliers

Chapter 3. Differential amplifier
Introduction. The BJT and MOSFET differential amplifier. DC and AC response. Differential mode gain. Common mode gain. Common-mode rejection ratio (CMRR). Input and output resistance in common mode. Input and output resistance in differential mode.

Chapter 4. Operational amplifiers.
Introduction. Parts of a simple operational amplifier: differential stage, amplification stage, DC power supply stage and output stage. Study of the OTA Miller amplifier. Real response of a operational amplifier. Instrumentation amplifiers. Logarithmic amplifiers.

PART II: SENSORS AND MEASURE SYSTEMS

Chapter 5. Temperature measuring
Introduction. Silicon sensors. RTDs. Thermocouples. Applications

Chapter 6. Resistive sensors
Introduction. Potentiometer transducer. Strain gauges. Light dependent resistor. Applications

Chapter 7. Capacitive sensors
Introduction. Parallel-plate capacitor. Silicon capacitive sensors. Capacitive proximity sensors. Applications

Chapter 8. Magnetic sensors
Introduction. Fundamentals of Hall Effect. Hall linear sensors. Hall switches. Applications

DESCRIPTIVE CONTENT OF THE SUBJECT

GENERAL INFORMATION	
Name:	**Complex digital systems design**
ECTS credits:	**6**
Semester:	**1st**
Type:	**Compulsory**
Module:	**Telecommunication technologies**
Department:	**Electronic engineering and Automatic**
Area of knowledge:	**Electronic Technology**
Language:	**English**

Pre-requisites (if necessary)
There are no pre-requisites for this subject

ACTIVITIES AND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES				
Activities/Methodologies	**ECTS Cr.**	**Attend. (hours)**	**Private work (hours)**	**Competences** (codes)
Lectures and tutorials:	3	30	45	TET2, TET3-TSC5
Lab work:	3	30	45	TET2, TSC3-TSC5
TOTAL	6,0	60	90	

LEARNING RESULTS	
Results 1	Having an overview of PLDs.
Results 2	Know how to use PLDs data sheets from manufacturers.
Results 3	Know the process and design tools with PLDs and FPGAs.
Results 4	Modelling digital circuits with ABEL and VHDL.
Results 5	Understanding the resources limitations of PLDs and FPGAs and know to select a device.
Results 6	Use CAD tools manufacturers to design complex digital circuits and systems with PLDs and FPGAs.

ASSESMENT METHOD			
Aspect	**Criteria**	**Instrument**	**Importance**
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 out of 10 in order to pass.			

SUBJECT SUMMARY

1. Programmable logic devices (PLDs)
    PLDs classification
    PLDs architecture
    CPLDs   "
    FPGAs   "
2. Digital design based on hardware description languages (HDL)
    HDL-based methodologies
    Design process
    Design tools
3. Hardware description languages: ABEL
    Source file structure
    Statements, operators, equations, extensions point.
    Tables, sequential circuits, state machines, test vectors, examples
4. Hardware description languages: VHDL
    Data types, operators
    Source file structure
    Ports, entities, architectures
    Description methods
    Combinational and sequential circuits
    State machines. Test environments
    VHDL design methodology
5. Design with CPLDs
    Synthesis
    Pin assignment
    Synthesis examples

Time model
6. Design with FPGAs
    XC4000 family architecture
    FPGA-oriented design
    Design process with Xilinx tools
Design constraints
7. Lab work:
    ABEL design and assembly with SPLD
    VHDL design and assembly with FPGA

	DESCRIPTIVE CONTENT OF THE SUBJECT

GENERAL INFORMATION

GENERAL INFORMATION	
Name:	IP based networks
ECTS credits:	6
Semester:	2nd
Type:	Compulsory
Module:	Telecommunication technologies
Department:	Telecommunication engineering
Area of knowledge:	Computer network Engineering
Language:	Spanish (English support)

Pre-requisites (if necessary)
There are no pre-requisites for this subject

ACTIVITIES AND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES

Activities/Methodologies	ECTS Cr.	Classroom work (hours)	Private work (hours)	Competences (codes)
Lectures and tutorials:	3	30	45	ITM3-ITM4-ITM5
Lab work:	3	30	45	ITM3-ITM4-ITM5
TOTAL	6,0	60	90	

LEARNING RESULTS

Results 1	Know the different architectures and requirements of IP networks.
Results 2	Understanding security aspects and internet applications, data encapsulation (networking) and network scalability.
Results 3	Ability to assess current protocols and acquisition of competence to design future protocols, the operation and organization of Internet.
Results 4	Solving convergence, interoperability and design of heterogeneous networks with local, access and backbone networks (LAN, WAN, Wireless networks, MANET, Mobility IP).
Results 5	Analyze, describe and administrate the operation of medium sized computer networks with routing and switching. They can plan, build up and administer networks.
Results 6	Configure routers and switches in extensive networks.
Results 7	Development of the ability to solve typical problems given in the lectures.
Results 8	Ability to solve problems during lab work (in groups).

ASSESMENT METHOD			
Aspect	**Criteria**	**Instrument**	**Importance**
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 out of 10 in order to pass.			

SUBJECT SUMMARY

Architecture of communication networks, functional structures of open systems, IP based networks foundations and design of IP based networks. Routing in IP based network and related topics. Mobility in IP and MANETS.
 	
Advanced configuration of network components in LAN and Wide Area Networks. VLAN, WLAN and service administration.
 	
List of topics:
 	
1. Introduction.
    Functional structure of open systems.
    QoS in IP networks.
 	
2. IP Networks.
    Subnetting.
    Routing algorithms.
    Traffic policing.
 	
3. Ethernet based IP networks.
    Frame structure.
    Mac address.
    Transmission of IP packets in Ethernet networks.
    IP packet fragmentation.
 	
4.   Advanced configuration of network component in extensive networks.

VLAN and WLAN administration.
Service administration (NAT, PAT, DHCP).

5. Mobility in IP networks.
    MIPv4 vs MIPv6.
    Mobile IP functionality.

6. Mobile Ad Hoc Networking: MANETs.

7. Multi-hop routing.
    Characteristics and classification.
    Protocols: AODV, OLSR.

DESCRIPTIVE CONTENT OF THE SUBJECT

GENERAL INFORMATION

Name:	Radiocommunications and radiodetermination
ECTS credits:	6
Semester:	1st
Type:	Compulsory
Module:	Telecommunication technologies
Department:	Telecommunication engineering
Area of knowledge:	Communications and signal theory
Language:	English

Pre-requisites (if necessary)

There are no pre-requisites for this subject

ACTIVITIES AND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES

Activities/Methodologies	ECTS Cr.	Attend. (hours)	Private work (hours)	Competences (codes)
Lectures and tutorials:	3.0	30	45	TSC2-TSC3-TSC4
Lab work:	3.0	30	45	TSC2-TSC3-TSC4
TOTAL	6.0	60	90	

Results 1	Undestanding of antennas performance, including the capability for designing a prescribed radiation pattern.
Results 2	Understanding of a comunnication system, taking into account receiver noise in order to obtain a minimum power at reception to assure a good quality of the signal (link-budget)
Results 3	Knowledge about satellite comunication system. Application to GPS
Results 4	Knowledge about radar symten, including the signal's waveform responsible for the accuraty and resolution.
Results 5	Development of ability to solve typical problems given in the lectures.

ASSESMENT METHOD			
Aspect	**Criteria**	**Instrument**	**Importance**
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 in order to pass			

SUBJECT SUMMARY

1 Antennas
    Antenna fundamentals. Some basic antenna parameters:
        Radiation Pattern; Directivity and Gain; Radiation resistence, effective area.
    Basic antennas
    Antenna Arrays
    Array Pattern Synthesis
    Horn and aperture antennas
2 Link Budget
    Path loss
    Noise in communication systems: Noise figure and Noise temperature of an antenna and an amplifier.
    Attenuation by rain and other phenomena.
    Interferences and fading in communication systems
3 Satellite Communications: An example of microwave system
    Satellite orbits: LEO, MEO,GEO, HEO
    Satellite path free-space loss
    Rain fading: ITU Rain Attenuation model for satellite paths
4 Navigation systems:GPS
    Description of GPS systems
    Common uses of GPS
5 Radar Systems
    The radar range equation
    Radar measurements: Resolution and Accuracy
    False Alarm Rate and Probability of Detection
    Radar signals

Pulse compression techniques

GENERAL INFORMATION	
Name:	**Communications Systems and Circuits**
ECTS credits:	**6**
Semester:	**1st**
Type:	**Compulsory**
Module:	**Telecommunication technologies**
Department:	**Telecommunication engineering**
Area of knowledge:	**Communications and signal theory**
Language:	**English**

Pre-requisites (if necessary)
There are no pre-requisites for this subject

ACTIVITIES AND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES				
Activities/Methodologies	**ECTS Cr.**	**Attend. (hours)**	**Private work (hours)**	**Competences** (codes)
Lectures and tutorials:	3.0	30	45	TET3-TSC5, TSC3
Lab work:	3.0	30	45	TET3-TSC5, TSC3
TOTAL	6.0	60	90	

LEARNING RESULTS	
Results 1	Introducing to the methods, elements, description and calculation of communications systems.
Results 2	Understanding the principles of wired, line transmission and satellite systems in fixed and mobile communications.
Results 3	Development of ability for designing electronic component and communications systems both analog and digital.
Results 4	Acknowledgement of designing of low noise amplifiers and amplifiers with a maximum or specific gain.
Results 5	Development of ability to solve typical problems handed out in the lectures.

ASSESMENT METHOD			
Aspect	**Criteria**	**Instrument**	**Importance**
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 out of 10 in order to pass.			

SUBJECT SUMMARY

1. Introduction to the communication system
   Block diagram
   Classification
   Channel characteristics

2. Transmitter and receiver
   Characteristics, parameters and classification
   Noise
   High frequency models

3. Frequency mixer
   Description
   Applications

4. Oscillator, PLL and frequency synthesizer
   Oscillator. Examples. VCO. Oscillators based on crystal.
   Phase locked loop. Applications.
   Direct synthesis of frequency. Frequency synthesis using PLL's.

5. S parameters in microwave networks
   S parameters: Definition
   S parameters in biports microwave networks: Attenuators, isolators...
   S parameters in multiports microwave networks: Directional couplers, power divider, isolators ...

6. Design of microwave amplifiers and oscillators
    Characteristics of microwave transistors
    Gain and stability
    Single-stage Transistor amplifier design
        Design for maximum Gain
        Design for specified Gain
        Low noise amplifier design
    Oscillator Design

7. Digital modulator and demodulator
    ASK. Transmitter and receiver.
    FSK. Transmitter and receiver.
    PSK. Transmitter and receiver. QPSK

8. Lab work: Implementation and characterization of communications systems

DESCRIPTIVE CONTENT OF THE SUBJECT

GENERAL INFORMATION	
Name:	Network and service technologies.
ECTS credits:	6
Semester:	1st
Type:	Compulsory
Module:	Telecommunication technologies
Department:	Telecommunication engineering
Area of knowledge:	Computer network engineering
Language:	English

Pre-requisites (if necessary)
There are no pre-requisites for this subject

ACTIVITIES AND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES				
Activities/Methodologies	ECTS Cr.	Attend. (hours)	Private work (hours)	Competences (codes)
Lectures and tutorials:	3	30	45	ITM1, ITM2,ITM5
Lab work:	3	30	45	ITM1, ITM2,ITM5
TOTAL	6	60	90	

LEARNING RESULTS	
Results 1	Knowledge about the principles of communication network planning and configuration
Results 2	Knowledge about the principles of communication network management.
Results 3	Introducing to some technologies of transport network.
Results 4	Knowledge about the principles of communication network design.
Results 5	Knowledge about the technologies of services and telematic applications.

ASSESMENT METHOD			
Aspect	**Criteria**	**Instrument**	**Importance**
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 out of 10 in order to pass.			

SUBJECT SUMMARY

1. Introduction to computer networks.
   Local area networks.
   TCP/IP networks.
   Routing protocols in TCP/IP networks.

2. Configuration of IP networks.
   Network planning.
   Configuration of network components.

3. Network management.
   Management architectures.
   SNMP.
   Management techniques and tools.

4. Transport networks.
   IP over WDM.
   Gigabit Ethernet.
   MPLS. Traffic engineering.

5. Design and dimensioning communications networks
   Modeling and simulation of IP networks.

6. Technogies of telematic applications.

Web service.
J2EE applications.

Lab work:

Planning, cabling, testing, troubleshooting and configuring a LAN.
Network management with SNMP.
Modeling and simulation of IP networks with NS2.
Web services design.

GENERAL INFORMATION	
Name:	**Multimedia Advanced Services**
ECTS credits:	**6**
Semester:	**2nd**
Type:	**Compulsory**
Module:	**Telecommunication technologies**
Department:	**Telecommunication Engineering**
Area of knowledge:	**Computer network Engineering**
Language:	**Spanish (English support)**

Pre-requisites (if necessary)
There are no pre-requisites for this subject

ACTIVITIESAND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES				
Activities/Methodologies	**ECTS Cr.**	**Attend. (hours)**	**Private work (hours)**	**Competences** (codes)
Lectures and tutorials:	3	30	45	ITM1,ITM3, ITM4,ITM5
Lab work:	3	30	45	ITM1,ITM3, ITM4,ITM5
TOTAL	6,0	60	90	

LEARNING RESULTS	
Results 1	Ability to design and dimensioning networks of transport, broadcast and distribution of multimedia content.
Results 2	Ability to plan, decision making, and packaging of networks, services and applications considering the quality of service, direct costs and operating plan implementation, monitoring, safety procedures, escalation and maintenance.
Results 3	Ability to understand and know how to apply the operation and organization of the Internet, Internet technologies and protocols for next generation models of components, middleware and services.
Results 4	Ability to integrate services such as telephony, television and interactive services.

ASSESMENT METHOD			
Aspect	**Criteria**	**Instrument**	**Importance**
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 out of 10 in order to pass.			

SUBJECT SUMMARY
1. Introduction. Review of IP based networks, IPv6, Quality of Service (QoS). 2. Multimedia transmission protocols, RTP, RTCP, RTSP. 3. Multimedia session protocols, SDP, SIP, H.323. 4. Multimedia applications, Voice over IP VoIP, videoconference. 5. Internet television protocol, IPTV. DVB.   Lab work: QoS network configurations, multimedia application configurations (e.g. VoIP, videoconference),

GENERAL INFORMATION

Name:	**Optical technologies**
ECTS credits:	**4**
Semester:	**2nd**
Type:	**Compulsory**
Module:	**Telecommunication technologies**
Department:	**Telecommunication engineering**
Area of knowledge:	**Communications and signal theory**
Language:	**Spanish (English support)**

Pre-requisites (if necessary)

There are no pre-requisites for this subject

ACTIVITIES AND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES

Activities/Methodologies	ECTS Cr.	Attend. (hours)	Private work (hours)	Competences (codes)
Lectures and tutorials:	2.0	20	30	TSC6-TET4, TSC3
Lab work:	2.0	20	30	TSC6-TET4, TSC3
TOTAL	4.0	40	60	

LEARNING RESULTS

Results 1	Introducing to the methods, elements, the description and calculation of optical systems.
Results 2	Understanding of photonic systems, photonic crystals and new optical fibers.
Results 3	Knowledge about the principles of light-guidance in photonic systems especially in specialty and photonic crystal fibers.
Results 4	Development of ability to solve typical problems given in the lectures.

ASSESMENT METHOD			
Aspect	**Criteria**	**Instrument**	**Importance**
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 out of 10 in order to pass.			

SUBJECT SUMMARY

1. Overview about Photonics.

2. Electromagnetic fields and waves.
   Maxwell's wave equation
   Fresnel reflection

3. Gauss Beam
   Beam profile transformation
   Beam waist / quality
   Anisotropic media
   Electromagnetics modes in optical systems

4. Basic photonic devices in optical communication systems
   Light matter interaction phenomena
   Optical sources. Semiconductor lasers
   Detectors and receivers in optical communications (photo detectors, noise, preamplifiers, sensivity)
   Semiconductor Laser Amplifiers (SLA)
   Amplifiers with Erbium Doped Fibers (EDFA)

5. Passive photonic technologies for optical networks
   Polarization (States of polarization, Jones-/ Mueller matrices, Birefringence, Polarizing elements)
   Interferometer (Types of interferometer, Signal modulation)

Optical couplers
Isolators, Attenuators
Circulators
Optical filters: Fabry-Perot filter y Bragg difraction gratings
Optical multiplexors/demultiplexors and optical switches

6. Diffractive optics
Slit, grid
Fourier optics
Diffractive optical elements (HOE, DOE)

7. Specialty fibers (optional)
New materials for special applications
Multimode fibers (Profiles, light propagation/rays, mode dispersion, numerical aperture and coupling efficiency, fiber bundles)
Attenuation and dispersion in optical fibers.
Special effects in silica (optical damage, non-linearities)
Sistemas DWDM

8. Photonic crystals
Introduction, Motivation
Design (defects, voids, 1-D and 2-D structures, Air-core)
Light propagation in PC and PCF (fibers)
Manufacturing of PC and PCF, made from silica or polymers
Applications

9. Lab work: Characterization of optical and fiber optic systems

DESCRIPTIVE CONTENT OF THE SUBJECT

GENERAL INFORMATION		
Name:	**Signal processing for communications**	
ECTS credits:	**4**	
Semester:	**2nd**	
Type:		**Compulsory**
Module:		**Telecommunication technologies**
Department:		**Telecommunication engineering**
Area of knowledge:		**Communications and signal theory**
Language:		**Spanish (English support)**

Pre-requisites (if necessary)
There are no pre-requisites for this subject

ACTIVITIES AND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES				
Activities/Methodologies	**ECTS Cr.**	**Attend. (hours)**	**Private work (hours)**	**Competences** (codes)
Lectures and tutorials:	2.0	20	30	TSC1
Lab work:	2.0	20	30	TSC1
TOTAL	4.0	40	60	

LEARNING RESULTS	
Results 1	Introducing to description, elements, methods and applications of spread spectrum (SS) techniques. Synchronization. Applications: CDMA and multipath channels.
Results 2	Introducing to single-multi carrier. Introducing to description, elements, methods and applications of orthogonal frequency division multiplexing (OFDM) applied to communication/audio/video systems: Wireless LAN (802.11a, 802.11g), WiMAX, digital audio broadcasting (DAB) and digital video broadcasting (DVB).
Results 3	Introducing to description, elements and methods of channel codification
Results 4	Development of ability to solve typical problems given in the lectures

ASSESMENT METHOD			
Aspect	Criteria	Instrument	Importance
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 out of 10 in order to pass.			

SUBJECT SUMMARY

1. Introduction about Spread Spectrum techniques
    Direct sequence Spread Spectrum
    Frequency hopping Spread Spectrum
    Narrowband-broadband interference
    Pseudo-Noise sequences
    Multipath interferences
    Synchronization
    CDMA techniques: DS-CDMA (Maximum-length sequence, Gold codes, Walsh-Hadamard codes and Orthogonal variable spreading factor codes)

2. Introduction about single-multi carrier systems
    Fundamentals
    Advantages and drawbacks

3. Introduction about Orthogonal Frequency Division Multiplexing (OFDM)
    Advantages and drawbacks
    OFDM modulation and demodulation
    Orthogonality concept
    Serial/parallel transmission
    IFFT/FFT applied to a OFDM system
    Interval guard and cyclix prefix
    Applications: Wireless LAN (802.11a, 802.11g), WiMAX, digital audio broadcasting (DAB) and digital video broadcasting (DVB)

4. Fundamentals about channel codification

5. Lab work: Analysis of different techniques explained in lectures

DESCRIPTIVE CONTENT OF THE SUBJECT

GENERAL INFORMATION	
Name:	Integration project
ECTS credits:	4
Semester:	2nd
Type:	Compulsory
Module:	Technological management of Telecommunication projects
Department:	Telecommunication engineering
Area of knowledge:	Communications and signal theory
Language:	Spanish (English support)

Pre-requisites (if necessary)
There are no pre-requisites for this subject

ACTIVITIES AND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES				
Activities/Methodologies	ECTS Cr.	Attend. (hours)	Private work (hours)	Competences (codes)
Lectures and tutorials:	2.0	20	30	TSC7, TSC8, ITM6, ITM7
Lab work:	2.0	20	30	TSC7, TSC8, ITM6, ITM7
TOTAL	4.0	40	60	

LEARNING RESULTS	
Results 1	Development of abilities to integrate technologies and systems of telecommunications engineering
Results 2	Ability of working in multidisciplinary groups.
Results 3	Knowledge about new technologies such as bio-engineering, photovoltaic conversion, nanotechnology or telemedicine.
Results 4	Development of abilities to develop, coordinate and manage projects (technically and economically) about new technologies such as bio-engineering, photovoltaic conversion, nanotechnology or telemedicine.
Results 5	Development of ability to design applications related with new technologies.

ASSESMENT METHOD			
Aspect	**Criteria**	**Instrument**	**Importance**
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam and oral presentation.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 out of 10 in order to pass.			

SUBJECT SUMMARY

1. Multidisciplinary and integration of technologies.
 	
 2. New technologies related with telecommunication engineering.
    Bio-engineering
    Photovoltaic conversion
    Nanotechnology
    Telemedicine
 	
 3. Novel applications with integrated technologies
 	
 4. Polarization
 	
 5. Project work: Design and development of an application that requires the integration of technologies.

DESCRIPTIVE CONTENT OF THE SUBJECT

GENERAL INFORMATION

Name:	**Project Management**
ECTS credits:	**6**
Semester:	**2nd**
Type:	**Compulsory**
Module:	**Technology Management for Telecommunication Projects**
Department:	**Telecommunication Engineering**
Area of knowledge:	**Computer network Engineering**
Language:	**Spanish (English support)**

Pre-requisites (if necessary)

There are no pre-requisites for this subject

ACTIVITIES AND ITS DISTRIBUTION IN ECTS CREDITS, METHODOLOGIES, AND LIST OF LEARNT COMPETENCES

Activities/Methodologies	ECTS Cr.	Attend. (hours)	Private work (hours)	Competences (codes)
Lectures and tutorials:	3	30	45	ITM7-TSC8 ITM6-TSC7
Lab work:	3	30	45	ITM7-TSC8 ITM6-TSC7
TOTAL	6,0	60	90	

LEARNING RESULTS

Results 1	Knowledge about the basics of project management.
Results 2	Development of abilities to develop, coordinate and manage projects (technically and economically) about: a) systems, networks, infrastructure and telecommunication services b) common telecommunication infrastructures in buildings or residential areas, including digital home projects c) telecommunication infrastructures in transport and environment with their corresponding power supply facilities and assessment of electromagnetic emissions and electromagnetic compatibility.
Results 3	Development of abilities to integrate technologies and systems of telecommunications engineering.

ASSESMENT METHOD			
Aspect	**Criteria**	**Instrument**	**Importance**
Attendance and participation	-Active participation in lectures and tutorials. - Active participation in lab work. -Attendance to individual tutorial and activities.	Observation.	10%
Subject concepts	-Practical and theoretical assimilation of subject concepts.	Written exam.	50%
Proposed works	-Documentation delivery. The revision for each document includes: - Structure - Quality - Novelty - Clarity of presentation	Revision of the documentation. Oral presentation.	40%
The assessment method must fulfil the RD 1125/2003 of September the 5th in which is established the European system of credits and the assessment system for the academic studies with official character. The mark obtained in the topic "Subject concepts" has to be greater than 4 out of 10 in order to pass.			

SUBJECT SUMMARY

1. Introduction.

  - Definitions.

  - Strategic management. Market analysis, company analysis.

  - Project phases and project lifecycle.

  - Iteraction between phases.

  - Project structuring. Team work and project coordination.

2. Basics of Project management.

  - Project scope management. Goal and objectives definition.

  - Project planning. Scheduling. Pert and Gantt diagrams.

  - Project cost management.

  - Project human resource management. Resource planning.

  - Project communications management.

  - Project risk management.

  - Project reporting

3. Case Studies. Projects about:

  - Systems, networks, infrastructure and telecommunications services.

  - Common telecommunication infrastructures in buildings or residential areas, including digital home projects.

  - Telecommunications infrastructure in transport and environment.