UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: NETWORK DESIGN AND PLANNING
Code: 310906
Type: CORE COURSE
ECTS credits: 6
Degree: 2349 - MASTER DEGREE PROGRAMME IN TELECOMMUNICATION ENGINEERING
Academic year: 2019-20
Center: 308 - SCHOOL POLYTECHNIC OF CUENCA
Group(s): 30
Year: 1
Duration: First semester
Main language: Spanish
Second language:
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **JUAN JOSE DE DIOS DE DIOS** - Group(s): **30**

Building/Office	Department	Phone number	Email	Office hours
E. Politécnica Cuenca (2.18)	INGENIERÍA ELÉCTRICA, ELECTRÓNICA, AUTOMÁTICA Y COMUNICACIONES	926053898	juanjose.dedios@uclm.es	Se indicará al principio del semestre.

Lecturer: **MARCOS DAVID FERNANDEZ BERLANGA** - Group(s): **30**

Building/Office	Department	Phone number	Email	Office hours
E. Politécnica Cuenca (2.15)	INGENIERÍA ELÉCTRICA, ELECTRÓNICA, AUTOMÁTICA Y COMUNICACIONES	926053935	marcos.fernandez@uclm.es	Se indicará al principio del semestre.

2. Pre-Requisites

No pre-requisites established.

A basic knowledge is recommended about communication networks architecture and TCP/IP protocol stack, as well as attending simultaneously the course on 'Network Management and Operations' during the same term.

3. Justification in the curriculum, relation to other subjects and to the profession

Telematics is one of the professional branches of the telecommunications engineer.

This course set strong foundations and is also complemented with the courses on 'Network Management and Operations', and 'Integration of Networks, Services and Applications'.

4. Degree competences achieved in this course

Course competences

Code	Description
E04	The ability to design and measure transport networks, and also distribute and broadcast multimedia signals.
E06	The ability to build, design, implement, manage, operate, run and maintain networks, services and content.
E07	The ability to carry out planning, decision-making, and packaging of network, services and applications while considering service quality, direct and operational costs, plans for implementation, supervision, security processes, scaling and maintenance, as well as managing and ensuring quality in the development process.
E08	The ability to understand and know how to apply the operation and organisation of the Internet, the latest-generation Internet technology and protocols, component models, intermediary software and services.
E09	The ability to solve convergence, interoperability and design of heterogeneous networks with local networks, access and bandwidth such as the integration of telephone, data, television and interactive services.
G01	The ability to conceptualise, calculate and design products, processes and facilities in all fields of Telecommunications Engineering.
G02	The ability to lead the creation and installation of telecommunication systems while complying with current regulations ensuring quality service.
G04	The ability to perform mathematical modelling, calculations and simulations in technology centres and engineering companies, particularly in tasks involving research, development and innovation in all areas related to Telecommunications Engineering and related multidisciplinary fields.
G08	The ability to apply acquired knowledge and solve problems in new or unknown settings within wide and multidisciplinary environments while being capable of integrating knowledge.
G11	The ability to know how to communicate their conclusions and the latest supporting knowledge or data to both specialised and non-specialised audiences clearly and free from ambiguity.
G12	The ability to have the learning skills which allow them to continue studying in a largely self-directed or autonomous way.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Adequate defence of the solutions provided in the different phases of design, planning and implementation of telematic networks.

Design and dimensioning of access and transport networks, broadcasting, and distribution of multimedia content.

Design and dimensioning of local area networks.
Skills in the search of bibliographical sources to autonomously complete the knowledge in the field of telematic networks.
Active participation in making decisions in the different ways of addressing a problem or issue.
Planning, decision making and packaging of networks, services and applications considering service quality, direct and operating costs, implementation plan, supervision, security procedures, scaling and maintenance.
Teamwork in a cooperative way.
Correct communication orally and in writing of the solutions to the problems raised.
Configuration of quality of service parameters to model the generated traffic and its specific requirements.
Understanding of technical documentation in English and mastery of specific vocabulary in this language.
Analysis and synthesis of technical documentation.
Knowledge of the models of advanced queuing systems most used in communication networks and their application to the dimensioning of networks and interconnection devices.
Knowledge and adequate application of the standards and regulations used in communication networks.
Knowledge and application of the general concepts related to the quality of service in communication networks.

6. Units / Contents

Unit 1: Integration of services
- **Unit 1.1** Multimedia contents and applications
- **Unit 1.2** Multimedia, interactive and broadcasting services
- **Unit 1.3** Multimedia transport protocols
- **Unit 1.4** Classification of traffic
- **Unit 1.5** Quality of Service
- **Unit 1.6** Network performance

Unit 2: Dimensioning techniques
- **Unit 2.1** Traffic modelling
- **Unit 2.2** Queueing theory
- **Unit 2.3** Dimensioning
- **Unit 2.4** Optimization

Unit 3: Network planning
- **Unit 3.1** Setting information and base line
- **Unit 3.2** Design models
- **Unit 3.3** Planning methodology
- **Unit 3.4** Multilayer network planning

Unit 4: Laboratory
- **Unit 4.1** Quality of Service
- **Unit 4.2** Dimensioning devices and networks
- **Unit 4.3** Planning a network

ADDITIONAL COMMENTS, REMARKS

Software: Cisco Packet Tracer, Riverbed Modeler, NetSim, Java Modelling Tools (JMT)

Hardware: Routers & Switches

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	R	Description
Class Attendance (theory) [ON-SITE]	Lectures	E06 E07 E08 E09 G01 G02 G04 G12	0.68	17	N	-	-	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E06 E07 E08 E09 G01 G02 G04 G08 G11 G12	0.28	7	N	-	-	
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	E06 E07 E08 E09 G01 G02 G04 G08 G11 G12	0.72	18	N	-	-	
Practicum and practical activities report writing or preparation [OFF-SITE]	Practical or hands-on activities	E06 E07 E08 E09 G01 G02 G04 G08 G11 G12	0.8	20	Y	N	Y	
Writing of reports or projects [OFF-SITE]	Self-study	E06 E07 E08 E09 G01 G02 G04 G08 G11 G12	0.4	10	Y	N	Y	
Individual tutoring sessions [ON-SITE]		E06 E07 E08 E09 G01 G02 G04 G08 G11 G12	0.04	1	N	-	-	
Progress test [ON-SITE]	Assessment tests	E06 E07 E08 E09 G01 G02 G04 G08 G11 G12	0.08	2	Y	N	Y	
Study and Exam Preparation [OFF-SITE]		E06 E07 E08 E09 G01 G02 G04 G08 G11 G12	3	75	N	-	-	
		Total:	**6**	**150**				
		Total credits of in-class work: 1.8						**Total class time hours: 45**
		Total credits of out of class work: 4.2						**Total hours of out of class work: 105**

As: Assessable training activity
Com: Training activity of compulsory overcoming
R: Rescheduling training activity

8. Evaluation criteria and Grading System

	Grading System		
Evaluation System	**Face-to-Face**	**Self-Study Student**	**Description**
Progress Tests	50.00%	0.00%	Final written tests about theory and/or problem solving to check the comprehension of concepts and procedures.
Laboratory sessions	40.00%	0.00%	Practical tests to assess the handling of instruments and measurement procedures and/or assessment of the laboratory reports.
Assessment of problem solving and/or case studies	10.00%	0.00%	Problems, practical cases, jobs or projects, carried out individually or in groups; oral presentation in public could be demanded.
Total:	**100.00%**	**0.00%**	

Evaluation criteria for the final exam:

Weights established in 'Grading System' will be applied.

Specifications for the resit/retake exam:

'Progress tests' could be retaken through an exam in the official stated date. The way to reassess the rest of the retaking activities will be specified in 'Campus Virtual' after closing the regular assessment period. The same weights as in the ordinary period will be applied.

Specifications for the second resit / retake exam:

Practical activities must have been passed in the last assessment period. The rest of the formative activities will be assessed through an exam in the offcial stated date. Weights will be 40% laboratory and 60% exam.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	**hours**
Writing of reports or projects [AUTÓNOMA][Self-study]	10
Individual tutoring sessions [PRESENCIAL][]	1
Progress test [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][]	75

General comments about the planning: Units will be taught consecutively along the real calendar of the term in which the course is placed.

Unit 1 (de 4): Integration of services

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	7
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1

Unit 2 (de 4): Dimensioning techniques

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	6
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4

Unit 3 (de 4): Network planning

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2

Unit 4 (de 4): Laboratory

Activities	**Hours**
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	18
Practicum and practical activities report writing or preparation [AUTÓNOMA][Practical or hands-on activities]	20

Global activity

Activities	**hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	17
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	7
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	18
Practicum and practical activities report writing or preparation [AUTÓNOMA][Practical or hands-on activities]	20
Writing of reports or projects [AUTÓNOMA][Self-study]	10
Individual tutoring sessions [PRESENCIAL][]	1
Progress test [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][]	75
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Gerald R. Ash	Traffic Engineering and QoS Optimization of Integrated Voice & Data Networks	Kaufmann		978-0-12-370625-6	2007	
Hummel, Shaun	Cisco design fundamentals: multilayered network design and security for network engineers	Cisco Press		978-1-50883-352-9	2015	
J. McCabe	Network Analysis, Architecture, and Design. 3rd. ed.	Kaufmann			2007	
Kun I. Park	QoS in packet networks	Springer			2005	

Oppenheimer, Priscilla	Top-down network design, 3rd ed.	Cisco Press	978-1-58720-283-4	2011
Teare, Diane	Designing for Cisco internetwork solutions (DESGN): authoriz	Cisco Press	978-1-58705-272-9	2008