

**1. General information****Course:** NETWORK MANAGEMENT AND OPERATION**Type:** CORE COURSE**Degree:** 2349 - MASTER DEGREE PROGRAMME IN TELECOMMUNICATION ENGINEERING**Center:** 308 - SCHOOL POLYTECHNIC OF CUENCA**Year:** 1**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 310905**ECTS credits:** 6**Academic year:** 2020-21**Group(s):** 30**Duration:** First semester**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** JOSE ANTONIO BALLESTEROS GARRIDO - Group(s): 30

Building/Office	Department	Phone number	Email	Office hours
E. Politécnica Cuenca (2.16)	INGENIERÍA ELÉCTRICA, ELECTRÓNICA, AUTOMÁTICA Y COMUNICACIONES	926053863	josea.ballesteros@uclm.es	It will be stated at the beginning of the semester.

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

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2. Pre-Requisites

Not established

It is advisable to have basic knowledge about computer networks.

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

Teleomatics is one of the working fields of the telecommunication engineers.

This course is complemented by 'Network Planning and Design' and 'Network integration, Services and Applications'

4. Degree competences achieved in this course**Course competences**

Code	Description
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.
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.
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.
G14	The ability to have knowledge and understanding which provides a basis or opportunity to be original in the development and/or application of ideas, often within a research context.
G15	The ability to integrate knowledge and face the complexities of making assessments based on information which, whether incomplete or limited, includes reflections on the social and ethical responsibilities in the application of their knowledge and judgements.

5. Objectives or Learning Outcomes**Course learning outcomes**

Description

Knowledge of new routing protocols in wired and mobile networks.

Knowledge of new protocols and transport services.

Knowledge and adequate application of the standards and regulations used in communication networks.

Teamwork in a cooperative way.

Correct communication orally and in writing of the solutions to the problems raised.

Understanding of technical documentation in English and mastery of specific vocabulary in this language.

Application of knowledge about the operation and configuration of the different network and transport protocols to make decisions related to the management and planning of networks.

Analysis and synthesis of technical documentation.

Knowledge, application and configuration of management, maintenance and network monitoring protocols.

Knowledge of network security mechanisms and design of network security strategies.

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.

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

6. Units / Contents

Unit 1: Network deployment and operation

Unit 1.1 Network logic structure: local area, IP network, access networks, transport networks

Unit 1.2 Infrastructures

Unit 1.3 Service operators

Unit 2: Communication network management

Unit 2.1 Redundancy and Scalability

Unit 2.2 VLANs and Spanning-Tree

Unit 2.3 Intradomain routing: Advanced OSPF, MPLS/GMPLS

Unit 2.4 Interdomain routing: iBGP, eBGP

Unit 3: Network security

Unit 3.1 Security threats

Unit 3.2 Defense techniques

Unit 3.3 Security plans

Unit 4: Multiservice network administration and maintenance

Unit 4.1 Networking management models

Unit 4.2 SNMP

Unit 4.3 Monitoring

Unit 4.4 End-to-end measures

Unit 4.5 Networking management platforms

Unit 5: Laboratory

Unit 5.1 VLANs and Spanning-Tree

Unit 5.2 BGP and MPLS

Unit 5.3 Network security

Unit 5.4 Network management with SNMP

ADDITIONAL COMMENTS, REMARKS

Software: Packet Tracer

Hardware: Router y Switches

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E06 E07 E08 E09 G01 G02 G12	0.68	17	N	-	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E06 E07 E08 G01 G02 G08 G11 G12	0.28	7	N	-	Problems, practical cases or project defense
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	E06 E07 E08 G01 G02 G08 G11 G12 G14 G15	0.72	18	N	-	
Practicum and practical activities report writing or preparation [OFF-SITE]	Practical or hands-on activities	E06 E07 E08 G01 G02 G08 G11 G12 G14 G15	0.8	20	Y	N	
Writing of reports or projects [OFF-SITE]	Self-study	E06 E07 E08 E09 G01 G02 G08 G11 G12 G14 G15	0.4	10	Y	N	
Individual tutoring sessions [ON-SITE]		E06 E07 E08 E09 G01 G02 G08 G11 G12 G14 G15	0.04	1	N	-	
Progress test [ON-SITE]	Assessment tests	E06 E07 E08 G01 G02 G08 G11 G12 G14 G15	0.08	2	Y	N	
Study and Exam Preparation [OFF-SITE]		E06 E07 E08 E09 G01 G02 G08 G11 G12 G14 G15	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 (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Laboratory sessions	40.00%	40.00%	Practical test to evaluate the instrumentation handling and measurement protocols or writing reports about the practical sessions
Progress Tests	50.00%	50.00%	Writing tests of evaluation or problem solving to evaluate concepts and procedures.
Assessment of problem solving and/or case studies	10.00%	10.00%	Writing problems, practical cases, reports or projects carried out individually or in groups, and maybe its public exposition.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

Those described in the 'evaluation system' table

Non-continuous evaluation:

Those described in the 'evaluation system' table

Specifications for the resit/retake exam:

It is possible to retake the 'progress test'. The criteria for other activities will be published after the final exam. The evaluation criteria will be those described in the 'evaluation system' table.

Specifications for the second resit / retake exam:

If the student passed the laboratory sessions in advance, the evaluation criteria will be 40% laboratory sessions and 60% writing test. In other case, details to resit/retake laboratory sessions will be communicated previously and the evaluation criteria will be 40% laboratory sessions and 60% writing test

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
Unit 1 (de 5): Network deployment and operation	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 2 (de 5): Communication network management	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 3 (de 5): Network security	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 4 (de 5): Multiservice network administration and maintenance	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	7
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Unit 5 (de 5): 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
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
Class Attendance (theory) [PRESENCIAL][Lectures]	17
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Mark Burgess	Principles of Network and System Administration	Wiley			2004	

Mauro, Douglas R.	Essential SNMP	O'Reilly	978-0-596-00840-6	2005
Randy Zhang , Micah Bartell	BGP Design and Implementation	Cisco Press		2003
Sanchez Monge, Antonio	MPLS in the SDN Era	O'Reilly Media	978-1-49190-545-6	2015
Ramos, A.	Seguridad perimetral, monitorización y ataques en redes	Ra-Ma,	978-84-9964-297-0	2014
Kurose, James F.	Computer networking: a top-down approach	Pearson Addison-Wesley	978-0-13-136548-3	2010