UNIVERSIDAD DE CASTILLA - LA MANCHA
GUÍA DOCENTE

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: 2023-24

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	Office hours will be published at "secretaria virtual"

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

Telematics is one of the working areas 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

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.

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.

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.

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.

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.

Knowledge of new routing protocols in wired and mobile networks.

Skills in the search of bibliographical sources to autonomously complete the knowledge in the field of telematic networks.

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** Infraestructures
- **Unit 1.3** Service operators

Unit 2: Communication network management
- **Unit 2.1** Reliable networks
- **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** VLAN and Spanning-Tree
- **Unit 5.2** MPLS and BGP
- **Unit 5.3** Instalation and Configuration of a IPS and a SIEM
- **Unit 5.4** Network management with SNMP

ADDITIONAL COMMENTS, REMARKS

Software: Packet Tracer, GNS3, Debian

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 G01 G02 G12	0.68	17	N	-	Lectures to explain the learning outcomes
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E06 E07 E08 G01 G02 G08 G11 G12	0.28	7	N	-	Demos and exercises during the class
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	E06 E07 E08 G01 G02 G08 G11 G12 G14 G15	0.72	18	N	-	Laboratory sessions
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	Reports will be presented in pdf format including comments to the questions specified in the statement. Moreover, result files will also be uploaded. In each one of the statements, specific requirements will be expound. If plagiarism is detected, the student will have a mark equal to 0 points.
Writing of reports or projects [OFF-SITE]	Self-study	E06 E07 E08 G01 G02 G08 G11 G12 G14 G15	0.4	10	Y	N	Problems, practical cases or project defense. During the course, some activities will be proposed. The answer to these activities will be presented in pdf format. If plagiarism is detected, the student will have a mark equal to 0 points.
Individual tutoring sessions [ON-SITE]		E06 E07 E08 G01 G02 G08 G11 G12 G14 G15	0.04	1	N	-	Session for doubts and task review
Final test [ON-SITE]	Assessment tests	E06 E07 E08 G01 G02 G08	0.08	2	Y	N	Course exam If plagiarism is detected, the student will have a

					mark equal to 0 points.
Study and Exam Preparation [OFF-SITE]	G11 G12 G14 G15 E06 E07 E08 G01 G02 G08 G11 G12 G14 G15	3	75	N	- Autonomous study
	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 and writing reports about the practical sessions
Final test	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

      To pass the course, a mark of 5 point or higher is required

    Non-continuous evaluation:

      Those described in the 'evaluation system' table

Specifications for the resit/retake exam:

Activities will be retaken individually with another realization.

Final test will be retaken with another test.

To pass the course, a mark of 5 point or higher is required

Specifications for the second resit / retake exam:

Final test will be retaken with another test.

If the student passed the laboratory sessions in advance, the evaluation criteria will be 40% laboratory sessions and 60% writing test. In other case, activities will be retaken individually with another realization and the evaluation criteria will be 40% laboratory sessions and 60% writing test

To pass the course, a mark of 5 point or higher is required

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
Final test [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][]	75
General comments about the planning: Course calendar will be published at the begining of the course	
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
Final 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	City	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	