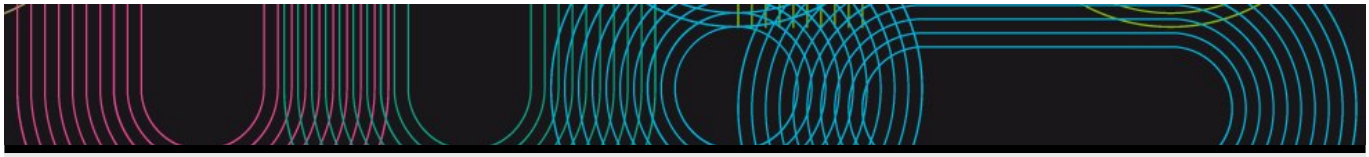

IDENTIFYING DATA				
Application Technologies				
Subject	Application Technologies			
Code	V05M145V01105			
Study programme	Máster Universitario en Ingeniería de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Mandatory	1st	1st
Teaching language	English			
Department				
Coordinator	Fernández Vilas, Ana			
Lecturers	Fernández Vilas, Ana			
E-mail	avilas@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	Students will obtain a global picture of the main technological resources to design telematics applications. Basic problems like distributed computing, interoperability and services discovering will be addressed. These concepts will be study in the framework of the cloud computing paradigm.			

Training and Learning Results	
Code	
A5	CB5 Students must have learning skills to allow themselves to continue studying in largely self-directed or autonomous way
B1	CG1 Ability to project, calculate and design products, processes and facilities in telecommunication engineering areas.
B4	CG4 Capacity for mathematical modeling, calculation and simulation in technological centers and engineering companies, particularly in research, development and innovation tasks in all areas related to Telecommunication Engineering and associated multidisciplinary fields.
B8	CG8 Ability to apply acquired knowledge and to solve problems in new or unfamiliar environments within broader and multidiscipline contexts, being able to integrate knowledge.
B12	CG12 Skills for lifelong, self-directed and autonomous learning.
C4	CE4 Ability to design and plan networks for transporting, broadcasting and distribution of multimedia signals.
C8	CE8 Ability to understand and know how to apply the operation and organization of the Internet, new generation Internet technologies and protocols, component models, middleware and services.
C9	CE9 Ability to solve convergence, interoperability and design of heterogeneous networks with local, access and trunk networks; as well as the integration of telephonic, data, television and interactive services.

Expected results from this subject	
Expected results from this subject	Training and Learning Results
Know and apply the different communication techniques for communication and distributed computing	A5 B1 B4 B12 C4
Know and apply the techniques for data sharing to enable interoperability among systems and/or services	A5 B1 B8 B12 C4 C9

Know and apply how to specify and discover software services to be integrated in complex telematic solutions	A5 B1 B4 B8 B12 C4 C9
Know and apply virtualization concepts : cloud computing and content distribution networks.	A5 B1 B12 C4 C8

Contents

Topic	
1. Cloud computing: overview	a. Service models (IaaS, PaaS, SaaS) and deployment models b. Reference architectures for cloud applications: virtualization
2. Cloud Computing: AWS	a. Commercial platforms: AWS b. Data Storage
3. Synchronization in distributed systems	a. Modeling & main problems b. Physical clocks c. Logical time & logical clocks d. Global state
4. Taking decisions in distributed systems	a. Mutual exclusion b. Elections c. Group communication d. Consensus
5. Replication and management of groups.	a. System model for replicated objects b. The role of group communication c. Fault-tolerant systems d. The case of high availability: Gossip
6. Distributed Storage & MapReduce	a. Type of data b. Data storage distributed solutions c. Distributed storage systems d. MapReduce programming model e. The Hadoop environment
7. Parallel Computing	a. Technological basis b. Types of parallelism c. Parallel programming d. Big data frameworks e. Parallel performance analysis

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practical	13	26	39
Lecturing	20	29	49
Laboratory practice	2	30	32
Essay questions exam	2	0	2
Objective questions exam	1	0	1
Laboratory practice	2	0	2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Laboratory practical	Students will design and develop small prototypes and software solutions to reinforce the theoretical concepts explained in master sessions.
Lecturing	Teachers will combine both concepts explanation and toy examples resolution. Resolution of small situations at class will foster debates, especially if it is done in groups.

Personalized assistance

Methodologies	Description

Lecturing	Teachers will combine both concepts explanation and toy examples resolution. Resolution of small situations at class will foster debates, especially if it is done in groups. Student aid will be provided during office hours by appointment, as well as on-line (email) (see https://moovi.uvigo.gal/user/profile.php?id=11773). An on-line discussion forum will be set up for the course, through the usual e-learning platform
Laboratory practical	Students will design and develop small prototypes and software solutions to reinforce the theoretical concepts explained in master sessions. Student aid will be provided during office hours by appointment, as well as on-line (email) (see https://moovi.uvigo.gal/user/profile.php?id=11773). An on-line discussion forum will be set up for the course, through the usual e-learning platform.

Assessment

	Description	Qualification		Training and Learning Results	
Laboratory practice	Laboratory practice I	25	A5	B1	C4
				B8	C8
				B12	
Essay questions exam	Essay questions exam	40	A5	B1	C4
				B4	C8
				B8	C9
				B12	
Objective questions exam	Objective questions exam	10	A5	B1	C4
				B4	C8
				B8	C9
				B12	
Laboratory practice	Laboratory practice II	25		B1	C4
				B8	C8
				B12	

Other comments on the Evaluation

Students can follow up continuous assessment or global assessment. This selection should be done when at the deadline of the first assingment. Once a student selects "continuous evaluation" (having done the first intermediate practical assignment) his/her mark will never be "not taken".

Final mark will be calculated using the weighted arithmetic mean of all the assessment rates.

The **written exam** will take place when and where the official calendar specifies.

Practical assignments:

1- Continuous assessment: 2 intermediate assignments (deadlines will be detailed in the document that will be published the first day of the semester).

2- Global assessment: 1 assignment (deadlines will be detailed in the document that will be published the first day of the semester).

The scheme for the estraordinary call and end of studies call is exactly the same as the single evaluation.

If any kindof plagiarism is detected, the final mark will be "failed (0)". This fact will be reported to the academic authorities.

Sources of information

Basic Bibliography

George Colouris, Jean Dollimore, Tim Kindberg, Gordon Blair, **Distributed systems: Concepts and design**, Ed. Pearson, 2012

Dan C. Marinescu, **Cloud Computing: Theory & Practice**, Elsevier, 2013

Jimmy Lin , Chris Dyer, Graeme Hirst, **Data-Intensive Text Processing with MapReduce (Synthesis Lectures on Human Language Technologies)**, Morgan and Claypool Publishers, 2010

Victor Eijkhout, Edmond Chow, Robert van de Geijn, **Introduction to High Performance Scientific Computing**, Lulu, 2014

Trobec, R., Slivnik, B., Bulić, P., Robič, B., **Introduction to Parallel Computing From Algorithms to Programming on State-of-the-Art Platforms**, Springer, 2018

Complementary Bibliography

Rajkumar Buyya, James Broberg, Andrzej Goscinski, **Cloud computing: principles and paradigms**, Wiley, 2014

George Reese, **Cloud Application Architectures: Building Applications and Infrastructure in the Cloud**, O'Reilly Media, 2009

Barrie Sosinsky, **Cloud Computing Bible**, John Wiley & Sons, 2010

Kai Hwang, Geoffrey C. Fox andJack J. Dongarra, **Distributed and Cloud Computing**, Elsevier., 2012

Recommendations