UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2021/22
Subject (*)	Computing as a Service		Code	614502004
Study programme	Mestrado Universitario en Enxeñaría Informática (plan 2012)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Obligatory	6
Language	SpanishGalician			
Teaching method	Hybrid			
Prerequisites				
Department	Ciencias da Computación e Tecnoloxías da InformaciónComputaciónEnxeñaría de ComputadoresMatemáticas			
Coordinador	López Taboada, Guillermo	E-mail	guillermo.lopez.taboada@udc.es	
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Web	moodle.udc.es			
General description	The main objective of this subject is to introduce the student to a new paradigm of distributed computing, Cloud Computing (Cloud Computing), and provide an overview of its possibilities for use in the business world. Cloud Computing systems allow an organization's computing resources to be outsourced to a third-party provider, allowing fast, transparent, secure and cheap provisioning and release of these resources through the Internet. This flexibility in computer management, together with the pay-per-use model available in public clouds, allow companies to rapidly deploy computer applications on systems that adapt their resources efficiently based on the natural life cycle of the business, with the consequent cost savings and productivity improvements. However, its use also represents an important challenge for companies, which must know the advantages and disadvantages of this technology before deciding to opt for its adoption, since this implies significant changes that affect their business model. On the other hand, the virtualization-based technologies used in public clouds can also be applied in the private computing centers of companies to achieve more efficient management, adding many of the features that public clouds provide while the Sensitive information remains under the control of the organization. Through the activities planned in this subject, the student will know the basic concepts and problems associated with Cloud Computing from a business point of view, they will be provided with information on success stories in their use in business environments and, to get a good understanding of technology , will carry out practices on public Clouds, deploying and using virtualized infrastructures and platforms and executing distributed applications developed applying a new programming model: the Map / Reduce model, a model that is supported by the main Cloud service providers.			

Contingency plan	1. Modifications to the contents - No changes will be made. 2. Methodologies *Teaching methodologies that are maintained - All. 3. Mechanisms for personalized attention to students - Email: Daily. Of use to make consultations, request virtual meetings to resolve doubts and follow up on supervised work. - Moodle: According to the needs of the students. They have "thematic forums associated with the modules" of the subject, to formulate the necessary queries. There are also ?specific activity forums? to develop the ?Directed Discussions?, through which the development of theoretical content of the subject is put into practice. ? Teams: 1 weekly session in a large group for the advancement of the theoretical contents and the tutored works in the time slot assigned to the subject in the faculty class calendar. From 1 to 2 weekly sessions (or more as the students demand) in a small group (up to 6 people), for follow-up and support in carrying out the "supervised work". This dynamic allows for standardized monitoring adjusted to the learning needs of the students to carry out the work of the subject. 4. Modifications in the evaluation - No changes will be made. 5. Modifications to the bibliography or webgraphy - No changes will be made.

Study programme competences / results	
Code	Study programme competences / results
A5	Capacidade de comprender e saber aplicar o funcionamento e organización da internet, as tecnoloxías e protocolos de redes de nova xeración, os modelos de compoñentes, sóftware intermediario e servizos.
A9	Capacidade para deseñar e avaliar sistemas operativos e servidores, e aplicacións e sistemas baseados en computación distribuída.
A10	Capacidade para comprender e poder aplicar coñecementos avanzados de computación de altas prestacións e métodos numéricos ou computacionais a problemas de enxeñaría.
B1	Capacidade de resolución de problemas.
B5	Habilidades de xestión da información.
B9	Capacidade para xerar novas ideas (creatividade).
B10	Capacidade para proxectar, calcular e deseñar produtos, procesos e instalacións en todos os ámbitos da enxeñaría informática
B13	Capacidade para o modelado matemático, cálculo e simulación en centros tecnolóxicos e de enxeñaría de empresa, particularmente en tarefas de investigación, desenvolvemento e innovación en todos os ámbitos relacionados coa Enxeñaría en Informática
B14	Capacidade para a elaboración, planificación estratéxica, dirección, coordinación e xestión técnica e económica de proxectos en todos os ámbitos da Enxeñaría en Informática seguindo criterios de calidade e ambientais
B16	Capacidade para a posta en marcha, dirección e xestión de procesos de fabricación de equipos informáticos, con garantía da seguridade para as persoas e bens, a calidade final dos produtos e a súa homologación
B17	Capacidade para a aplicación dos coñecementos adquiridos e de resolver problemas en contornas novas ou pouco coñecidos dentro de contextos máis amplos e multidisciplinares, sendo capaces de integrar estes coñecementos
B18	Capacidade para comprender e aplicar a responsabilidade ética, a lexislación e a deontología profesional da actividade da profesión de Enxeñeiro en Informática
B19	Capacidade para aplicar os principios da economía e da xestión de recursos humanos e proxectos, así como a lexislación, regulación e normalización da informática
B21	Posuír e comprender coñecementos que acheguen unha base ou oportunidade de ser orixinais no desenvolvemento e/ou aplicación de ideas, a miúdo nun contexto de investigación

B22	Que os estudantes saiban aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en contornas novas ou pouco coñecidos dentro de contextos máis amplos (ou multidisciplinares) relacionados coa súa área de estudo
B23	Que os estudantes sexan capaces de integrar coñecementos e enfrontarse á complexidade de formular xuízos a partir dunha información que, sendo incompleta ou limitada, inclúa reflexións sobre as responsabilidades sociais e éticas vinculadas á aplicación dos seus coñecementos e xuízos
B25	Que os estudantes posúan as habilidades de aprendizaxe que lles permitan continuar estudando dun modo que haberá de ser en gran medida autodirixido ou autónomo
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C7	Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade

Learning outcomes			
Learning outcomes	Study programme competences / results		
Coñecer e utilizar os servizos que ofrecen clouds públicos como Amazon EC2, Google Apps ou Microsoft Azure para a configuración de infraestructuras virtuais e o implantamento de aplicacións.	AJ5	BJ1 BJ10 BC1 BC2	CJ6
Coñecer os casos de uso mais habituais na integración de tecnoloxías Cloud en contornas empresariais.	AJ5 AJ9	BJ1 BJ9 BJ14 BJ16 BJ17	CJ6
Coñecer as tecnoloxías, aspectos legais e problematicas relacionados coa xestión da seguridade e a privacidade no uso de clouds públicos.	AJ5 AJ9	BJ18 BJ19 BC3	
Coñecer e utilizar o modelo de programación Map/Reduce para desenvolver aplicacións distribuidas e despregalas sobre infraestructuras de cloud públicas.	AJ9 AJ10	BJ1 BJ13 BC1	
Habilidade para a procura, selección e manexo de recursos (bibliografía, software, etc.) relacionados coa computación Cloud.		BJ5 BC5	CJ7 CJ8

Contents	
Topic	Sub-topic
1. Introduction	General concepts Virtualization technologies Service models: SaaS, PaaS, IaaS Deployment models Study cases Challenges and opportunities
2. Service Models	Infraestructura como Servicio (IaaS) Caso de uso: Amazon Web Services Plataforma como Servicio (PaaS) Caso de uso: Microsoft Azure
3. Application development	Map/Reduce programming model
4. Cloud in business	Privacy and data protection. Legal aspects.

5. Open cloud platforms	Introduction to open cloud platforms Compartmental study Use case: OpenNebula

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A5 A9 A10 B10 B14 B18 B19 C6 C7 C8	21	0	21
ICT practicals	A5 A10 B1 B13 B16 B17 B22	21	63	84
Supervised projects	B5 B9 B21 B22 B23 B25 C6	0	30	30
Objective test	A10 B1 B17	3	9	12
Personalized attention		3	0	3
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	Taught by a professor. Classes include theoretical contents, as well as seminars.
ICT practicals	Problem solving and practical cases.
Supervised projects	Semi-autonomous work on larger practical cases, under the professors' guidance.
Objective test	Exam

Personalized attention	
Methodologies	Description
ICT practicals Supervised projects	Personalized attention during the practices will serve to guide and check the work that students are doing according to the instructions provided to them, depending on the specific practice in question. In order to carry out the supervised work, the teachers will provide the necessary initial indications, bibliography for consultation and will monitor the progress that the student is making to offer the relevant guidelines in each case, so as to ensure the quality of the work according to the criteria. which are indicated. All the teachers of the subject will also propose a schedule of tutorials in which the students will be able to solve any doubt related to the development of the same. Students will be recommended to attend tutorials as a key part of learning support.

Assessment			
Methodologies	Competencies / Results	Description	**Qualification**
Guest lecture / keynote speech	A5 A9 A10 B10 B14 B18 B19 C6 C7 C8	Ao longo do cuadrimestre realizaranse probas obxectivas para avaliar os contidos teóricos tratados nas sesións maxistrais.	15
ICT practicals	A5 A10 B1 B13 B16 B17 B22	It is mandatory to pass (mark equals or above 50%) all ICT practicals of the subject.	65
Supervised projects	B5 B9 B21 B22 B23 B25 C6	Os traballos tutelados serán opcionais e sobre algún tema a convenir entre o alumno e o profesor.	20
Objective test	A10 B1 B17	In case a student can not be evaluated using continuous evaluation during keynote speeches, it is possible to make a objective test (15%) for each exam call.	0

Assessment comments
With the compulsory work that the student has to carry out (objective tests and compulsory practices) up to 80% of the total mark of the subject can be obtained. The remaining 20% can be achieved by performing optional supervised work. For the second opportunity (July call) the same evaluation criteria will be applied. Students will have the opportunity to take an objective test on the contents covered in the master sessions and there will be a second date of delivery of the practices and supervised work. Students with part-time enrollment will be able to follow the subject without problems, as the performance of the assessable practices does not require attendance and the assessment of the theoretical contents can be done with a single attendance to perform the objective test on the date indicated in the exam calendar. FRAUD In the event that any fraud is detected in the evaluable tests, the sanctioning measures provided for in the University regulations will be applied.

Sources of information	
Basic	John Rothon (2011, 2º ed). Cloud Computing Explained: Implementation Handbook for Enterprises. Recursive Press.Luís Joyanes Aguilar (2013). Computación en la Nube: Estrategías de Cloud Computing en las Empresas. Ed. MarcomboTom White (2011, 2º ed). Hadoop: The Definitive Guide. MapReduce for the Cloud. O?Reilly.Gionvanni Toraldo (2012). OpenNebula 3 Cloud Computing. eBook.
Complementary	Mathew Portnoy (2012). Virtualization Essentials. Wiley.Mathew Portnoy (2012). Virtualization Essentials. Wiley.

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
The strategic Planning of Information Systems/614502001 Quality, Information Security and Computing Audit/614502003 Design of Information Systems/614502007 Business Intelligence/614502009 Information Retrieval and the Semantic Web/614502010 Final Project/614502012
Other comments

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.