



## Teaching Guide

| Identifying Data    |                                                                                                                                                                                                                                                                                                                                               |        |                                               |         | 2018/19 |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------------------------------------------|---------|---------|
| Subject (*)         | Computer Infrastructure Engineering                                                                                                                                                                                                                                                                                                           | Code   | 614G01059                                     |         |         |
| Study programme     | Grao en Enxeñaría Informática                                                                                                                                                                                                                                                                                                                 |        |                                               |         |         |
| Descriptors         |                                                                                                                                                                                                                                                                                                                                               |        |                                               |         |         |
| Cycle               | Period                                                                                                                                                                                                                                                                                                                                        | Year   | Type                                          | Credits |         |
| Graduate            | 1st four-month period                                                                                                                                                                                                                                                                                                                         | Fourth | Obligatory                                    | 6       |         |
| Language            | Galician                                                                                                                                                                                                                                                                                                                                      |        |                                               |         |         |
| Teaching method     | Face-to-face                                                                                                                                                                                                                                                                                                                                  |        |                                               |         |         |
| Prerequisites       |                                                                                                                                                                                                                                                                                                                                               |        |                                               |         |         |
| Department          | Enxeñaría de Computadores                                                                                                                                                                                                                                                                                                                     |        |                                               |         |         |
| Coordinador         | Gonzalez Gomez, Patricia                                                                                                                                                                                                                                                                                                                      | E-mail | patricia.gonzalez@udc.es                      |         |         |
| Lecturers           | Gonzalez Gomez, Patricia<br>Pardo Martínez, Xoán Carlos                                                                                                                                                                                                                                                                                       | E-mail | patricia.gonzalez@udc.es<br>xoan.pardo@udc.es |         |         |
| Web                 |                                                                                                                                                                                                                                                                                                                                               |        |                                               |         |         |
| General description | Esta materia supón unha continuación á materia de Xestión de Infraestructuras, orientada ao estudo de solucións tolerantes a fallas e de alta dispoñibilidade en centros de datos (DC), así como unha introducción ao uso de tecnoloxías de virtualización nos DC e a súa utilización no despregamento de servizos na nube (cloud computing). |        |                                               |         |         |

## Study programme competences

| Code | Study programme competences                                                                                                                                                     |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A36  | Capacidade para comprender, aplicar e xestionar a garantía e a seguridade dos sistemas informáticos.                                                                            |
| A37  | Capacidade para analizar, avaliar, seleccionar e configurar plataformas hardware para o desenvolvemento e execución de aplicacións e servizos informáticos.                     |
| B1   | Capacidade de resolución de problemas                                                                                                                                           |
| B3   | Capacidade de análise e síntese                                                                                                                                                 |
| C3   | Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida. |
| C6   | Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben afrontarse.                                                |

## Learning outcomes

| Learning outcomes                                                                                 | Study programme competences |    |    |
|---------------------------------------------------------------------------------------------------|-----------------------------|----|----|
| Know the software and hardware systems that allow the implementation of fault tolerant solutions  | A36                         | B1 | C3 |
|                                                                                                   | A37                         | B3 | C6 |
| Know how to plan the deployment, migration and start-up of computer infrastructures               | A36                         | B1 | C3 |
|                                                                                                   | A37                         | B3 |    |
| Know the operation of the techniques of monitoring and administration of computer infrastructures | A36                         | B1 | C3 |
|                                                                                                   | A37                         |    | C6 |
| Know how to properly dimension the IT infrastructures according to the design requirements        | A37                         | B1 | C3 |
|                                                                                                   |                             |    | C6 |

## Contents

| Topic                                                 | Sub-topic                                                                                                                                                      |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module I: High Availability Data Center Architectures | 1.- Introduction to High Availability (HA)<br>2.- Architecture of a Data Center<br>3.- Servers of a Data Center for HA<br>4.- Clusters of a Data Center for HA |



|                                               |                                                                                                                         |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Module II: Virtualization and Cloud Computing | 1.- Virtualization technologies<br>2. Virtualization of the Data Center<br>3.- Computing in the Cloud (Cloud Computing) |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|

| Planning                       |              |                      |                               |             |
|--------------------------------|--------------|----------------------|-------------------------------|-------------|
| Methodologies / tests          | Competencies | Ordinary class hours | Student?s personal work hours | Total hours |
| Laboratory practice            | B1 C3        | 14                   | 42                            | 56          |
| Objective test                 | A36 A37      | 3                    | 0                             | 3           |
| Supervised projects            | A37 B3 C6    | 6                    | 18                            | 24          |
| Guest lecture / keynote speech | A36 A37 C6   | 21                   | 42                            | 63          |
| Personalized attention         |              | 4                    | 0                             | 4           |

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

| Methodologies                  |                                                                                                                                                                                                                                                                                |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Methodologies                  | Description                                                                                                                                                                                                                                                                    |
| Laboratory practice            | Activity that allows students to learn and consolidate the knowledge already acquired through the realization of practical sessions in computers.                                                                                                                              |
| Objective test                 | Test that will be done at the end of the semester, on the contents of the lectures and the laboratory practices.                                                                                                                                                               |
| Supervised projects            | Resolution of a study case of greater difficulty to those made in the practices, studying in greater depth a specific application directly related to the contents of the subject. A report on the work carried out must be submitted, summarizing the main conclusions of it. |
| Guest lecture / keynote speech | Presentation complemented with the use of audiovisual media and the introduction of debate phases with the students. All this in order to transmit knowledge and facilitate learning.                                                                                          |

| Personalized attention                     |                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Methodologies                              | Description                                                                                                                                                                                                                                                                                                                                                                                |
| Laboratory practice<br>Supervised projects | <p>Personalized attention during the laboratories will be used to guide and verify the work that students are doing according to the instructions given to them, depending on the specific lab.</p> <p>All the lecturers will also propose a tutorial schedule in which the students can solve any doubt. The tutorials are recommended as a fundamental part of the learning support.</p> |

| Assessment          |              |                                                                                                                                                                   |               |
|---------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Methodologies       | Competencies | Description                                                                                                                                                       | Qualification |
| Laboratory practice | B1 C3        | As prácticas de laboratorio consistirán en diferentes actividades que se proporán ao longo do cuadrimestre relacionadas cos contidos da materia.                  | 40            |
| Objective test      | A36 A37      | A proba obxectiva realizarase ao final do cuadrimestre e estará formada por preguntas relacionadas co temario desenvolvido nas sesións maxistras e nas prácticas. | 40            |
| Supervised projects | A37 B3 C6    | O traballo tutelado consistirá na resolución de un caso de estudio de maior dificultade aos realizados nas prácticas                                              | 20            |

| Assessment comments |
|---------------------|
|                     |



**FIRST OPPORTUNITY**The subject consists of two clearly differentiated modules. Each module will propose practices (laboratory practices and / or supervised work). To pass the practices it will be mandatory to submit all of them. The final mark will be calculated as the weighted average of the practice marks (laboratory practices and / or supervised work) and the objective test mark. To pass it, it will be necessary to reach at least 40% in each one of the marks and 50% in the average. **SECOND OPPORTUNITY**In the second opportunity, the same assessment criteria will be followed. There will be a second submission date for the practices, and the marks of those parts that have reached a minimum of 40% at the first opportunity will be conserved for the second opportunity. **STUDENTS AT PART TIME**The assessment will be the same as that of full-time students. **FRAUD**In the case of detecting any fraud in the evaluation tests, the sanctioning measures provided for in the university regulations will be applied.

## Sources of information

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Basic</b>         | 1. Kailash Jayaswal (2006). "Administering Data Centers: Servers, Storage, and Voice over IP". Wiley. ISBN: 978-0-471-77183-8<br>2. Sander Van Vugt (2014). "Pro Linux high availability clustering". Apress. ISBN: 978-1484200803<br>3. Germán Pacio (2015). "Data Centers Hoy". Marcombo. ISBN: 978-8-42672-156-34. Luís Joyanes Aguilar (2013). "Computación en la Nube: Estrategias de Cloud Computing en las Empresas". Marcombo. ISBN: 978-8-42671-893-8 |
| <b>Complementary</b> | 1. Hwaiyu Geng (2015). "Data Center Handbook". Wiley. ISBN: 978-1-118-43663-92. Gustavo Santana (2014). "Data Center Virtualization Fundamentals". Cisco Press. ISBN: 978-1-58714-324-3<br>1. Hwaiyu Geng (2015). "Data Center Handbook". Wiley. ISBN: 978-1-118-43663-92. Gustavo Santana (2014). "Data Center Virtualization Fundamentals". Cisco Press. ISBN: 978-1-58714-324-3                                                                             |

## Recommendations

### Subjects that it is recommended to have taken before

Infrastructure Management/614G01025  
Computer Architecture/614G01033

### Subjects that are recommended to be taken simultaneously

### Subjects that continue the syllabus

Administration of Infrastructures and Information Systems/614G01093

### Other comments

For the mention of Information Technology, in which this subject is optional in the 2nd term, it is recommended to attend simultaneously the subject: "Infrastructure Administration and Information Systems - AISI - (614G01216)".

(\*)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.