IDENTIFYING DATA
Architectures and Services

Subject	Architectures and Services
Code	V05G301V01310
Study programme	Degree in Telecommunications Technologies Engineering

Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	3rd	2nd

Teaching language	Spanish
Department	
Coordinator	Mikic Fonte, Fernando Ariel
Lecturers	Caeiro Rodríguez, Manuel Mikic Fonte, Fernando Ariel
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General description	This course focuses on the architectonic solutions for the design of distributed systems. More specifically, the course is oriented to scenarios based on services (service-oriented architectures) and the deployment of SOA and RESTful solutions by means of Web Services Technologies. Taking the Web Services as our techonological layout, the course focuses on the description, discovery and invocation of services in SOA and ReSTful. Finally, the course introduces models for services composition in SOA and RESTful (again using Web Services as deployment technology). This subject will be taught in Spanish and Galician.

Competencies

Code	
B3	CG3: The knowledge of basic subjects and technologies that enables the student to learn new methods and technologies, as well as to give him great versatility to confront and adapt to new situations
B4	CG4: The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity.
B6	CG6: The aptitude to manage mandatory specifications, procedures and laws.
C29	CE29/TEL3 The ability to build, operate and manage computer services using planning, sizing and analytical tools
C32	CE32/TEL6 The ability to design networks and service architectures.
D2	CT2 Understanding Engineering within a framework of sustainable development.
D3	CT3 Awareness of the need for long-life training and continuous quality improvement, showing a flexible, open and ethical attitude toward different opinions and situations, particularly on non-discrimination based on sex, race or religion, as well as respect for fundamental rights, accessibility, etc.

Learning outcomes

Expected results from this subject	Training and Learning Results		
To know the main architectures for telematic services of medium & high complexity.	B3 B6	C29 C32	D2 D3
To Understand the concept of middleware as a supporting element for services, and to know the main models used today.	B3	C29 C32	
To understand the importance and utility of web services for the development of telematic services.	B6	C29 C32	
To know the main technologies to build complex services by combining other services.	B6	C29 C32	
To master the basic concepts and technologies associated with the management of services and their security.	B3	C29 C32	

To Acquire skills to build complex telematic services.	B4	D2 D3

Contents

Topic	
Introduction	⬜ Distributed Systems. ⬜ Client-server Model: RPC. ⬜ Message Middlewares. ⬜ Web Services and SaaS. ⬜ SOA : Roles, operations, layers.
Web Services	⬜ Simple SOA with REST. ⬜ API Styles for Web Services. ⬜ RPC, messages and resources APIs. ⬜ Stack of Web Services technologies.
Technological Basis	⬜ Review of XML. ⬜ SOAP Protocol & Messages. ⬜ WSDL: Description of Services. ⬜ Services Discovery.
Designing Services	⬜ Design of Web Services. ⬜ Web Service LifeCycle. ⬜ Implementation Axis2.
RESTful Web Services	⬜ Introduction to REST: Principles and objectives. ⬜ Description of services with WADL. ⬜ Introduction to Node.js. ⬜ Implementation of Web API. ⬜ Introduction to NoSQL data bases.
Services Development	⬜ Microservices basics. ⬜ Microservices development. ⬜ Containers of services: Docker. ⬜ Containers orchestration: Kubernetes.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	16	48	64
Practices through ICT	12	12	24
Problem solving	3	6	9
Project based learning	6	40	46
Presentation	1	2	3
Laboratory practice	2	0	2
Objective questions exam	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
Lecturing	Classes that will combine the exhibition of the concepts and small exercises. These will be resolved by the teacher or by the students individually and/or in groups. The aim is to boost the debate and reinforce the acquisition of skills. COMPETENCES: CG3, CE29, CE32
Practices through ICT	Practice sessions will be devoted to the development of small prototypes that allow to materialise the fundamental concepts of the course. COMPETENCES: CG4, CG6
Problem solving	The professor will pose small challenges that will be resolved collectively so that the students can discuss abouth the underlying concepts and the different options. COMPETENCES: CG3, CG4.
Project based learning	The students, in groups, will develop a software system with specific requirements. The follow-up of the project will be carried out during the C sessions. COMPETENCES: CE29, CE32, CT2, CT3
Presentation	Each workgroup will justify in a presentation the adopted solution for the course project and its performance. COMPETENCES: CG4, CT2, CT3

Personalized assistance

Methodologies	Description

| | Project based learning | The students, organized in groups, develop a project that addresses the design and implementation of a distributed service-oriented architecture. Personalized attention related to these projects will take place in the sessions type C in the course. In each session of personalized attention, groups would discuss with the teacher the following questions concerning the progress of the project: What work has been addressed since the previous meeting? What problems have been found? What problems have not been solved? and What is the planning of future work? |

Assessment

	Description	Qualification	Training and Learning Results		
Project based learning	Each workgroup will deliver a preliminary design of the project and later the final implementation of the course project. The delivery will consist of the design, implementation and documentation. After delivering the project, a practical test will be performed on the project implemented by each of the groups. This test may be individual or in group, including modifications of the delivered project.	30	B4 B6	C32	D2 D3
Presentation	Each workgroup will justify in a presentation the solution adopted in the project. They also will give to the teachers an explanation about the project. Questions will be asked to each member of the group individually to verify the involvement of each student in the project.	5	B4		D2 D3
Laboratory practice	There will be a group practice that demonstrates competence in the use of certain subject technologies in a practical environment. After the delivery of the practice, there will be a test of it. This test may be individual or in group, including modifications of the delivered practice.	15	B6	C29	
Objective questions exam	An individual exam will take place in the date indicated in the official calendar of exams. The exam may include the following types of questions: problem solving, short questions to be solved by applying the theoretical concepts explained in class, reasoned justification if one or more statements are true or false, small tests on theoretical and application aspects. Books, class notes and other material will not be allowed during the exam. The number and combination of these questions will be set for each particular exam.	50	B3	C29 C32	

Other comments on the Evaluation

In first call students can follow up a continuous assessment or an exam-only assessment model. Once a student selects ⬚continuous assessment⬚ (joining a group of the practical part) his/her grade will never be ⬚not taken⬚.

Final grade will be the sum of two partial results: (i) exam of the theoretical part (50%) and (ii) practical assignments (50%).

- The exam of the theoretical part will take place when and where the official calendar specifies. No additional material is allowed.
- Practical assignments:

  1. Continuous assessment: Laboratory practice (15%) + presentation (5%) + project: design and final implementation (30%). Grade will be individual.
  2. Exam-only assessment: Delivery of laboratory practice and project.

In second call and end-of-program call scheme is exactly the same as the exam-only assessment (with the possible modifications of practice and/or project that will be specified at the convenient time).

The schedule of the intermediate exams/assignments will be approved in the Comisión Académica de Grado (CAG) and will be available at the beginning of each academic semester.

Plagiarism is regarded as serious dishonest behavior. If any form of plagiarism is detected in any of the tests or exams, the final grade will be FAIL (0), and the incident will be reported to the corresponding academic authorities for prosecution

Sources of information

Basic Bibliography

Michael Papazoglou, **Web Services; SOA: Principles and Technology**, 1, Pearson Education, 2012

Deepal Jayasinghe, Arkham Azeez, **Apache Axis2 Web Services**, 2, Packt Publishing, 2011

Valentin Bojinov, **RESTful Web API Design with Node.js**, 1, Packt Publishing, 2015

Bruno Joseph Dmello, **What You Need To Know About Node.js**, 1, Packt Publishing, 2016

Complementary Bibliography

Steve Graham, Doug Davis, Simeon Simeonov, Glen Daniels, Peter Brittenham, Yuichi Nakamura, Paul Fre, **Building Web Services with Java: Making Sense of XML, SOAP, WSDL, and UDDI**, 1, Sams, 2004

Thomas Erl, **Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services**, 1, Prentice Hall, 2004

Eric Newcomer, **Understanding Web Services: XML, WSDL, SOAP, and UDDI**, 1, Addison-Wesley Professional, 2002

Mark D. Hansen, **SOA Using Java Web Services**, 1, Prentice Hall, 2007

George F. Coulouris, **Distributed Systems: Concepts and Design**, 5, Addison Wesley, 2011

Harvey M. Deitel, Paul J. Deitel, B. DuWaldt, L. K. Trees, **Web Services: A Technical Introduction**, 1, Prentice Hall, 2002

Robert Daigneau, **Service Design Patterns: Fundamental Design Solutions for SOAP/WSDL and RESTful Web Services**, 1, Addison-Wesley Professional, 2011

Nicolai M. Josuttis, **SOA in Practice: The Art of Distributed System Design (Theory in Practice)**, 1, O'Reilly Half, 2007

Binildas To. Christudas, **Service Oriented Architecture with Java: Using SOA and Web Services to build powerful Java applications**, 1, Packt Publishing, 2008

Michael Rosen, **Applied SOA: Service-Oriented Architecture and Design Strategies**, 1, Wiley, 2008

Thomas Erl, **SOA Principles of Service Design**, 1, Prentice Hall, 2007

Thomas Erl, **Service-Oriented Architecture (SOA): Concepts, Technology, and Design**, 1, Prentice Hall, 2005

Basarat Syed, **Beginning Node.js**, 1, Apress Ed., 2014

Recommendations

Subjects that it is recommended to have taken before

Internet Services/V05G300V01501

Contingency plan

Description

Those methodologies used and tests to be carried out in person will respectively be used and carried out online through the Remote Campus and the Faitic platform (without prejudice to other measures that can be adopted to guarantee the accessibility of the students).