



## IDENTIFYING DATA

### Architectures and Services

Subject	Architectures and Services		
Code	V05G300V01645		
Study programme	Degree in Telecommunications Technologies Engineering		
Descriptors	ECTS Credits	Choose	Year
	6	Optional	3rd
Teaching language	Spanish		
Department			
Coordinator	Fernández Vilas, Ana		
Lecturers	Castro Jul, Fátima Fernández Vilas, Ana		
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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 SOA solutions by means of Web Services Technologies (WS-*). Taking the WS-* stack as our technological layout, the course looks through the description, discovery and invocation of services in an SOA. Finally, The course introduces models for services composition in SOA (again using Web Services as deployment technology).		

## 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	<ul style="list-style-type: none"><li>□ Distributed Systems.</li><li>□ Client-server Model: RPC.</li><li>□ Message Middlewares.</li><li>□ Web Services and SaaS.</li><li>□ SOA : Roles, operations, layers.</li></ul>
Web Services	<ul style="list-style-type: none"><li>□ Simple SOA with REST.</li><li>□ API Styles for Web Services.</li><li>□ RPC, messages and resources APIs.</li><li>□ Stack of Web Services technologies.</li></ul>
Technological Basis	<ul style="list-style-type: none"><li>□ Review of XML.</li><li>□ SOAP Protocol &amp; Messages.</li><li>□ WSDL: Description of Services.</li><li>□ Services Discovery.</li></ul>
Designing Services	<ul style="list-style-type: none"><li>□ Design of Web Services.</li><li>□ Web Service LifeCycle.</li><li>□ Implementation Axis2.</li></ul>
Composing Services	<ul style="list-style-type: none"><li>□ Model of composition</li><li>□ Orchestration and choreography</li><li>□ Orchestration with WS-BPEL</li><li>□ Description of choreography: WS-CDL</li></ul>
Addressing services	<ul style="list-style-type: none"><li>□ Introduction to WS-Addressing.</li><li>□ Routing SOAP messages</li><li>□ Notification services.</li></ul>

## Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	19	38	57
Practice in computer rooms	10	20	30
Troubleshooting and / or exercises	3	6	9
Projects	2	22	24
Presentations / exhibitions	2	8	10
Practical tests, real task execution and / or simulated.	4	8	12
Long answer tests and development	2	6	8

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

## Methodologies

	Description
Master Session	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 in the class and reinforce the acquisition of skills. COMPETENCES: CG3, CE29, CE32
Practice in computer rooms	During all the course, the lab sessions will be devoted to the development of small prototypes that allow to materialise the fundamental concepts of the course. COMPETENCES: CG4, CG6
Troubleshooting and / or exercises	In the laboratory or in the classroom, the professor will pose small challenges that will be resolved collectively so that the students can discuss about the underlying concepts and the different options. COMPETENCES: CG3, CG4.
Projects	The students, in groups, will develop a software system whose requirements will be established in the 9th week of the teaching period. The follow-up of the project will be carried out during the workshops. COMPETENCES: CE29, CE32, CT2, CT3
Presentations / exhibitions	Each workgroup will justify in a oral presentation the adopted solution for the course project. The presentation will take place the last week of the teaching period. COMPETENCES: CG4, CT2, CT3

## Personalized attention

### Methodologies Description

Projects	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?
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Assessment		Qualification	Training and Learning Results
	Description		
Projects	Each workgroup will deliver a preliminary design (week 9) and the implementation of the course project during the penultimate week of the teaching period. The delivery will consist of the design, implementation and documentation. After delivering the project, a practical test will be performed (last week of the course) on the project implemented by each of the groups .	20	B4 C32 D2 B6 D3
Presentations / exhibitions	Each workgroup will justify in an oral presentation the solution adopted in his project. The presentation will take place the last week of the teaching period with the professors of the course.	10	B4 D2 D3
Practical tests, real task execution and / or simulated.	One individual practical tests will be made in Week 5 of the teaching period. Each student will carry out an exercise to demonstrate competence in the use of course technologies in a practical setting .	10	B6 C29
Long answer tests and development	Individual writing test will take place in the date indicated in the official calendar of exams. Books, class notes and other material will not be allowed during the exam.	60	B3 C29 C32

### Other comments on the Evaluation

Students can follow up a continuous assessment model or decide to do a final exam. This selection should be done by 5<sup>th</sup> week. 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 geometric mean formula with two partial results: (i) written exam (60%) and (ii) practical assignments (40%).

- The written exam will take place when and where the official calendar specifies.
- Practical assignments:
  1. **Continuous assessment:** 1 intermediate assignment on 5th week (10%) and the course project: design (week 9, 5%) and implementation (week 13, 25%).
  2. **Final assessment:** Project Design and implementation on week 13

Extraordinary assessment scheme is exactly the same as the final assessment.

### 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

#### 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

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## **Recommendations**

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### **Subjects that are recommended to be taken simultaneously**

Distributed and Concurrent Programming/V05G300V01641

Information Systems/V05G300V01644

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

Internet Services/V05G300V01501

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