



# COMILLAS

UNIVERSIDAD PONTIFICIA

ICAI

ICADE

CIHS

**Syllabus**  
**2024 - 2025**

## TECHNICAL SHEET OF THE SUBJECT

Data of the subject	
Subject name	Developing Communication and Network Oriented Applications
Subject code	DTC-GITT-325
Main program	<a href="#">Bachelor's Degree in Engineering in Telecommunication Technologies</a>
Level	Reglada Grado Europeo
Quarter	Semestral
Credits	6,0 ECTS
Type	Obligatoria (Grado)
Department	Department of Telematics and Computer Sciences
Coordinator	Óscar Sanz Sebastián

Teacher Information	
Teacher	
Name	Atilano Ramiro Fernández-Pacheco Sánchez-Migallón
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## SPECIFIC DATA OF THE SUBJECT

Contextualization of the subject
<b>Contribution to the professional profile of the degree</b>
<p>The main objective of the course is to provide the student with the ability to develop web applications using the Java programming language.</p> <p>Achieving these objectives involves knowing the basic client-side programming languages, such as HTML, CSS and Javascript. In addition, the student must master design criteria for the optimal implementation of the business logic layer.</p> <p>At the end of the course the student will acquire sufficient knowledge to develop database access applications in web environments using TCP/IP protocols.</p>
<b>Prerequisites</b>
None.

Competencies - Objectives	
<b>Competences</b>	
<b>GENERALES</b>	
	Capacidad para redactar, desarrollar y firmar proyectos en el ámbito de la ingeniería de telecomunicación que tengan por



<b>CG01</b>	objeto, de acuerdo con los conocimientos adquiridos según lo establecido en el apartado 5 de esta Orden (CIN/352/2009), la concepción y el desarrollo o la explotación de redes, servicios y aplicaciones de telecomunicación y electrónica.
<b>CG04</b>	Capacidad de resolver problemas con iniciativa, toma de decisiones, creatividad, y de comunicar y transmitir conocimientos, habilidades y destrezas, comprendiendo la responsabilidad ética y profesional de la actividad del ingeniero técnico de telecomunicación.
<b>ESPECÍFICAS</b>	
<b>CETM04</b>	Capacidad de describir, programar, validar y optimizar protocolos e interfaces de comunicación en los diferentes niveles de una arquitectura de redes.
<b>CETM07</b>	Capacidad de programación de servicios y aplicaciones telemáticas, en red y distribuidas.

## Learning outcomes

<b>RA1</b>	Realizar aplicaciones de escritorio avanzadas basadas en Java SE. Concurrencia. Almacenamiento en Base de datos.
<b>RA2</b>	Diseñar y programar páginas web empleando tecnología del lado del cliente. Implementar interfaces web mediante HTML y CSS. Desarrollar páginas web amigables con funcionalidad Javascript.
<b>RA3</b>	Diseñar e implementar aplicaciones web empleando tecnología del lado del servidor. Realizar programas basados en JSP y Servlet entendiendo la diferencia entre ambos. Diseñar y programar soluciones web basadas en el patrón MVC basadas en Servlets y JSP. Conocer y saber aplicar los lenguajes EL y JSTL.
<b>RA4</b>	Comprender el funcionamiento del protocolo HTTP. Conocer las diferencias existentes entre peticiones GET y POST. Gestionar información persistente en el lado del cliente: cookies. Conocer técnicas y principios que permitan mejorar el rendimiento de una aplicación web en el lado del cliente y servidor.
<b>RA5</b>	Mejorar la funcionalidad de una aplicación web. Diferenciar los tres contextos que existen en el lado del servidor: request, session y application. Saber utilizar cuando corresponda los elementos que permiten gestionar el flujo de navegación en el servidor: forward vs redirect. Realizar desarrollos basados en peticiones asíncronas basadas en XML y JSON. Conocer y utilizar frameworks y librerías de ayuda al desarrollo de aplicaciones web en el lado del cliente y servidor.
<b>RA6</b>	Optimizar el rendimiento de una aplicación web. Conocer que elementos afectan al rendimiento y las soluciones que existen para minimizar los tiempos de respuesta.
<b>RA7</b>	Conocer y saber resolver los tipos de ataques web más conocidos. Saber en qué consisten los ataques Form Tampering, SQL Injection, XSS y CSRF. Conocer los principios básicos de la metodología OWASP
<b>RA8</b>	Diseñar e implementar soluciones móviles web. Desarrollar aplicaciones web teniendo en cuenta los dispositivos móviles. Conocer las soluciones existentes para el desarrollo de aplicaciones móviles nativas.
<b>RA3</b>	Diseñar e implementar aplicaciones web empleando tecnología del lado del servidor. Realizar programas basados en JSP y Servlet entendiendo la diferencia entre ambos. Diseñar y programar soluciones web basadas en el patrón MVC basadas en Servlets y JSP. Conocer y saber aplicar los lenguajes EL y JSTL.



## THEMATIC BLOCKS AND CONTENTS

### Contents - Thematic Blocks

Topic 1: Introduction to the web in the industry

1. Software life cycle
2. Programming paradigms
3. Distributed systems
4. Frontend Ecosystem
5. Backend Ecosystem
6. Software architectures
7. Trends

Topic 2: HTTP

1. Introduction World Wide Web
2. What is the HTTP protocol?
3. Evolution of the HTTP protocol
4. HTTP Status Code

Topic 3: HTML

1. Introduction
2. What is a web document?
3. Html
4. Structure of a web document
5. Content
6. Layout
7. Interaction
8. Security

Topic 4: CSS

1. CSS Selectors
2. CSS Pseudo-classes
3. Pseudo-elements
4. CSS Measurement Units
5. Content
6. Layout
7. Security
8. Responsive Web Design
9. CSS Frameworks
10. Web Components
11. CSS preprocessors

Topic 5: JAVASCRIPT

1. Introduction
2. Core Language



3. Javascript & Web Browser
4. Web Forms
5. References

## Topic 6: SPRING BOOT

1. Spring Framework
2. Spring Boot
3. My first application
4. Spring Scaffolding of a project
5. Jakarta EE Specifications
6. SpringCore
7. Spring Web
8. Concurrency Models
9. Error Handling
10. Consuming HTTP Endpoints
11. Bean Validation
12. Setting
13. Logging
14. Scheduling
15. Actuator
16. Spring Security
17. Thymeleaf

## 7: Testing

1. Introduction
2. Testing pyramid
3. Functional tests
4. Non-functional tests
5. Test naming
6. Unit tests
7. Integration Test

## 8: Introduction to data persistence

1. Database Types
2. Relational databases
3. Non-relational databases
4. SQL

## 9: Relational databases

1. Introduction
2. Standards
3. Concepts
4. Mapping Objects
5. Repositories
6. Consultations
7. Transactionality



8. Testing

10: Security

1. Secure application development
2. Types of attacks
3. Hacking Challenges

11: Deployment of business applications

1. Package Docker solution
2. Continuous Integration
3. Deployment to Cloud Azure provider

## TEACHING METHODOLOGY

### General methodological aspects of the subject

Con el fin de conseguir el desarrollo de competencias propuesto, la materia se desarrollará teniendo en cuenta la actividad del alumno como factor prioritario. Ello implicará que tanto las sesiones presenciales como las no presenciales promoverán la implicación activa de los alumnos en las actividades de aprendizaje.

### In-class Methodology: Activities

**Lecture:** The teacher develops the topic that the students have previously read, explaining it on the blackboard. Once the theoretical concepts have been developed, they are applied to a real case. For this purpose, the teacher and/or the students themselves propose an everyday problem to which they try to find a solution with the participation of the students. Then, the teacher codifies this program in the computer with the participation of the students. This program coded by the teacher is provided to the students through the web of the subject.

CG04, CETM04, CETM07

**Group debates:** tests and resolution of exercises: In these sessions, doubts arising from the readings carried out by the students of the topics or content proposed by the teacher will be resolved. Group discussions and tests will also be carried out to facilitate understanding. In addition, the small exercises proposed by the teacher will be solved.

CG01, CG04, CETM04,  
CETM07

**Laboratory sessions:** Throughout the course, students will carry out individual practices on each of the topics presented. In the laboratory the development of the practice will be completed and any pertinent doubts will be resolved.

CG01, CG04, CETM04,  
CETM07

**Tutorials:** They will be carried out in groups and individually to resolve the doubts posed to the students after working on the different topics. They will also be used to guide the student in their learning process.

CG04

### Non-Presential Methodology: Activities

**Personal study:**



- Study and preparation of the topics or concepts that are going to be presented by the teacher.
- Individual and personal study by the student of the concepts already presented in the expository lessons.

CG01, CG04, CETM07

**Practical cases:** Preparation and beginning of the development of the laboratory practices proposed weekly by the teacher.

CG04, CETM04, CETM07

**Final Project:** Development of the final course practice on which the entire course will be worked incrementally. Partial deliveries will be made to the teacher.

## SUMMARY STUDENT WORKING HOURS

CLASSROOM HOURS		
Clase magistral y presentaciones generales	Resolución de problemas de carácter práctico o aplicado	Prácticas de laboratorio
30.00	15.00	15.00
NON-PRESENTIAL HOURS		
Estudio de conceptos teóricos fuera del horario de clase por parte del alumno	Prácticas de laboratorio	Prácticas de diseño y desarrollo de un proyecto
35.00	45.00	40.00
<b>ECTS CREDITS: 6,0 (180,00 hours)</b>		

## EVALUATION AND CRITERIA

Evaluation activities	Evaluation criteria	Weight
Exams: <ul style="list-style-type: none"> <li>• Midterm exam (15%)</li> <li>• Final exam (55%)</li> </ul>	<ul style="list-style-type: none"> <li>• Understanding of concepts through open tests, focused on practical cases.</li> <li>• Application of the concepts acquired in the form of software development.</li> <li>• Presentation and written communication.</li> </ul>	70
Continuous performance evaluation: <ul style="list-style-type: none"> <li>• Final incremental project developed by students.</li> </ul>	<ul style="list-style-type: none"> <li>• Development of a final project for the subject.</li> </ul>	15
Evaluation of experimental work: <ul style="list-style-type: none"> <li>• Evaluation tests of experimental work. Participation in the laboratory. Individual or group laboratory practice reports</li> </ul>	<ul style="list-style-type: none"> <li>• Application of concepts to the development of cases (small thematic programs) on the new concepts raised.</li> <li>• Performing tests in the laboratory to verify skill in a real development environment.</li> </ul>	15



## Ratings

The grade in the ordinary call for the subject will be obtained as:

- 55% of the final exam grade.
- 15% will be the grade for the intersemester test.
- 15% will be the performance in the laboratory.
- 15% for the final practice.

Note: To take the average, students must have at least 5 points out of 10 in the final exam of the subject.

The qualification in the extraordinary call:

- 55% of the final exam grade.
- 15% will be the grade for the intersemester test.
- 15% will be the performance in the laboratory.
- 15% for the final practice.

## BIBLIOGRAPHY AND RESOURCES

### Basic Bibliography

- <https://developer.mozilla.org/es/docs/Web/HTTP>
- <https://openwebinars.net/blog/que-es-el-modelo-osi/>
- <https://developer.mozilla.org/enUS/docs/Web/HTML>
- [https://www.w3schools.com/html/html\\_layout.asp](https://www.w3schools.com/html/html_layout.asp)
- [https://www.w3schools.com/html/html\\_forms.asp](https://www.w3schools.com/html/html_forms.asp)
- <https://html5sec.org/>
- [https://developer.mozilla.org/enUS/docs/Web/CSS/Class\\_selectors](https://developer.mozilla.org/enUS/docs/Web/CSS/Class_selectors)
- <https://caniuse.com/>
- <https://www.ecma-international.org/publications/standards/Ecma-262.htm>
- <https://developer.mozilla.org/en-US/docs/Web/JavaScript/Guide>
- <https://www.oreilly.com/library/view/javascript-the-definitive/9781491952016/>
- <https://eloquentjavascript.net/>
- <https://js.do/>
- <https://12factor.net>
- <https://spring.io/cloud>
- <https://docs.spring.io/springboot/docs/current/reference/htmlsingle/>
- <https://landscape.cncf.io>
- <https://github.com/cncf/landscape/blob/master/README.md>

### Complementary Bibliography

- Deepak Alur, Dan Malks, John Crupi. "Core J2EE Patterns: Best Practices and Design Strategies (2nd Edition)". Prentice Hall. 2003.
- Eric Jendrock, Ian Evans. "The Java EE 6 Tutorial: Basic Concepts (4th Edition)". Java Series. 2010.
- Web oficial de Java EE: <http://docs.oracle.com/javaee/6/tutorial/doc/>



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