Syllabus
2023 - 2024

TECHNICAL SHEET OF THE SUBJECT

Data of the subject	
Subject name	Desarrollo de aplicaciones y servicios
Subject code	DTC-IMAT-322
Mainprogram	Grado en Ingeniería Matemática e Inteligencia Artificial
Involved programs	Grado en Ingeniería Matemática e Inteligencia Artificial [Third year]
Credits	6,0 ECTS
Type	Obligatoria (Grado)
Department	Department of Telematics and Computer Sciencies
Coordinator	Álvaro Ruiz Calzada

Teacher Information	
Teacher	
Name	Álvaro Ruiz Calzada
Department	Department of Telematics and Computer Sciencies
EMail	arcalzada@icai.comillas.edu
Profesores de laboratorio	
Teacher	
Name	Alberto Peraleda de la Llave
Department	Department of Telematics and Computer Sciencies
EMail	aperaleda@icai.comillas.edu

SPECIFIC DATA OF THE SUBJECT

Contextualization of the subject

Contribution to the professional profile of the degree

In this subject, the Software itinerary started in 1st Programming is reinforced and focuses on the development of Web applications.

Prerequisites

Python programming.

Competencies - Objectives

Competences

GENERALES

CG04	Conocimientos básicos sobre el uso y programación de los ordenadores, sistemas operativos, bases de datos y programas informáticos con aplicación en ingeniería.
CG05	Conocimiento de la estructura, organización, funcionamiento e interconexión de los sistemas informáticos, los fundamentos de su programación, y su aplicación para la resolución de problemas propios de la ingeniería
CG07	Capacidad para integrarse en equipos de trabajo y colaborar de forma activa con otras personas, áreas y organizaciones en la consecución de los objetivos ligados a las actividades de extracción de valor de los datos e inteligencia artificial.
ESPECÍFICAS	
CE16	Capacidad para diseñar e implementar aplicaciones web que permitan publicar e intercambiar los resultados obtenidos por los modelos analíticos realizados mediante varias interfaces y servicios de comunicación
CE18	Conocimiento de tecnologías habilitadoras de la transformación digital para el desarrollo de soluciones innovadoras en las organizaciones.
CE37	Capacidad para presentar y defender un proyecto en el ámbito de los conocimientos y tecnologías específicas de la titulación, de naturaleza profesional, en el que se sinteticen e integren otras competencias adquiridas en las enseñanzas.

Learning outcomes	
RA1	Conocer el proceso de ingeniería implícito al desarrollo de soluciones software
RA2	Dominar las técnicas de modelado de software UML existentes para las etapas de análisis y diseño de aplicaciones
RA3	Dominar las técnicas de modelado de software UML existentes para las etapas de análisis y diseño de aplicaciones
RA4	Desarrollar aplicaciones web que permitan visualizar los resultados de los modelos analíticos
RA5	Desarrollar aplicaciones web que permitan visualizar los resultados de los modelos analíticos
RA6	Desarrollar la lógica de negocio de las aplicaciones web desde el lado del servidor
RA7	Dominar los elementos de programación web (sesiones y cookies) proporcionados por el protocolo HTTP
RA8	Conocer los frameworks más utiizados en el desarrollo de aplicaciones web (front-end y back-end)
RA9	Desarrollar servicios que proporcionen datos provenientes de resultados de modelos para ser consumidos por terceras aplicaciones
RA10	Desplegar aplicaciones en entornos locales y en la nube utilizando las características que facilita en entorno Cloud

THEMATIC BLOCKS AND CONTENTS

Contents - Thematic Blocks

1. Web Architecture

a. Internet

b. Client/Server Architecture
c. HTTP Protocol
d. URL and URI
e. System Development.
2. Web Technology: Client
a. HTML
b. CSS
c. JS
d. Framework: React
3. Web Technology: Server
a. REST API
b. Framework: Django
c. Model-View-Template
d. Object-Relational Pattern
4. Agile Development
a. Agile Methodologies: Scrum
b. Continuous Integration
c. Deployment.

TEACHING METHODOLOGY

General methodological aspects of the subject

In-class Methodology: Activities

The training activities will take place during the 4 hours of class per week, which will be distributed sequentially as follows:
 	
• 2 hours of theory + 2 hours of individual and collaborative practice
 	
These sessions will consist of:
 	
• Explanatory and participative master classes:
  ◦ 2-hour theory sessions.
  ◦ The teacher will present the theoretical contents, combining lectures with live coding of small illustrative examples. The codes
  ◦ generated in the classroom will be available to the students.
• Practical exercises and problem solving:
  ◦ Students can ask questions about the concepts learned in both the theory sessions and the practical work or in the project development.
  ◦ Interactive dynamics will be created for solving doubts among the entire class through collaborative programming examples by the teacher and the students.
• Practical sessions using software:
  ◦ The subject's practical exercises will be evaluated according to the following criteria/aspects:
  ◦ Aspects to consider:
  ▪ Code quality: The structure and organization of the code, its efficiency and optimization, as well as its sustainability and readability, will be assessed.
  ▪ Documentation: Each pair must maintain updated documentation of the development process, including the initial design, the changes made, and the
	CG04, CG05, CG07, CE16, CE18, CE37

challenges encountered. This documentation will be required at the end of the course for review.
    - Equity in collaboration: It is important that both members of the pair actively participate in the development of the video game. It is recommended to establish collaborative and equitable work mechanisms to ensure the participation and learning of all members.
    - Feedback between pairs: Constructive feedback between pairs is encouraged, which will allow sharing knowledge, solving problems together, and improving the quality of the developed video games.
- Continuous performance evaluation activities:
    - Tests will be conducted, complementary practices to the weekly ones will be developed, and gamified challenges will be presented.
    - Self-assessment test on the topic: the student identifies if they have mastered the theoretical concepts.
    - Class participation.
- Tutoring for doubt resolution: this activity will be carried out implicitly during the rest of the described activities.

Non-Presential Methodology: Activities

- Practical exercises and problem-solving:
    - The student will receive periodic tasks to be completed between face-to-face sessions. These tasks will reflect the knowledge acquired by the student between sessions.
    - These exercises must be submitted for evaluation before the date specified by the teacher. Subsequently, the solution will be uploaded to the teaching platform.
- Practical sessions with software use: This includes work outside the classroom, both in individual exercises and in the individual and paired development of the final project.
    - At the end of a theoretical session, the student will work outside the classroom in the subsequent practical session. This practice will test the student's knowledge of what was learned in the theoretical session. The student must come to the practical session with 80% of it developed. This will vary depending on the complexity of the practice.
    - Once the final project begins, the student must progressively and equitably develop the project with their partner outside the classroom.
        - The criteria indicated in the face-to-face methodology will be assessed.
        - It will be necessary to demonstrate the collaboration of peers in the final project (version control or similar).
    - The use of third-party tools or code will be negatively evaluated unless the student can justify understanding it.
- Personal study: The main objective of non-face-to-face work is to understand and comprehend the theoretical concepts of the subject, as well as to be able to apply this knowledge to solve different types of problems. After each theoretical explanation, the teacher will upload all developed code to the website, and the student must review it and pose "What if" questions to better assimilate theoretical concepts. The way to study the subject will be as follows:
    - Study the explained concepts with paper and pencil, without the need to work with the computer. The student must be able to analyze, design, and solve problems in an abstract way without the computer.
    - They will analyze the code provided by the teacher to consolidate theoretical concepts.
    - Finally, they must be able to program the exercises done by the teacher from scratch: without copying and pasting or looking at the provided code.

CG04, CG05, CG07, CE16, CE18, CE37

COMILLAS
UNIVERSIDAD PONTIFICIA
ICAI ICADE CIHS

Syllabus
2023 - 2024

SUMMARY STUDENT WORKING HOURS

CLASSROOM HOURS				
Clases magistrales expositivas y participativas	Sesiones prácticas con uso de software	Tutorías para resolución de dudas	Ejercicios prácticos y resolución de problemas	Actividades de evaluación continua del rendimiento
40.00	16.00	5.00	4.00	2.00
NON-PRESENTIAL HOURS				
Sesiones prácticas con uso de software	Ejercicios prácticos y resolución de problemas	Estudio personal	Proyectos	
32.00	5.00	20.00	56.00	
ECTS CREDITS: 6,0 (180,00 hours)				

EVALUATION AND CRITERIA

Evaluation activities	Evaluation criteria	Weight

• **Exams:**
Intersemester test.
Final exam.
	• **Midterm Exam (15%):**
	  ◦ **Its goal is to assess the students' progress up to that point and provide them with early feedback on their performance.**
	  ◦ **The knowledge learned up to that date in the subject (Paradigms, Concepts and use of OOP, use of API, knowledge of Unity) will be evaluated.**
	• **Final Exam (55%):**
	  ◦ **The entirety of the subject's content will be assessed, including the topics covered in the midterm exam.**
		70 %

Final project • **to be submitted in pairs at the end of the course.**	Final project at the end of the course. • The quality of the project will be evaluated according to the specifications. • Documentation and presentation of the application will also be taken into account.	15 %
Practical sessions: • Collaborative challenges • Remote work • Practice exercises	The attitude, participation, and completion of the weekly practices and challenges set in collaborative and individual sessions.	15 %

Ratings

Theory

• Partial exam: 15%

• Final exam: 55%

Practice

• Deliverable practices: 15%

• Final project: 15%

Extraordinary exam:

• 70% to be weighted with the practical part.

BIBLIOGRAPHY AND RESOURCES

Basic Bibliography

- Material provided by the teacher.
- APIs of the different technologies studied.

In compliance with current regulations on the **protection of personal data**, we would like to inform you that you may consult the aspects related to privacy and data that you have accepted on your registration form by entering this website and clicking on "download"
https://servicios.upcomillas.es/sedeelectronica/inicio.aspx?csv=02E4557CAA66F4A81663AD10CED66792