

Guia docent

300103 - STCVRAR - Integració de Tecnologies de Realitat Virtual i Augmentada en Indústries Connectades

Última modificació: 04/07/2026

Unitat responsable: Escola d'Enginyeria de Telecomunicació i Aeroespacial de Castelldefels
Unitat que imparteix: **Titulació:** MÀSTER UNIVERSITARI EN INTEL·LIGÈNCIA ARTIFICIAL PER A INDÚSTRIES CONNECTADES (AI4CI) (Pla 2025). (Assignatura optativa).

Curs: 2026 **Crèdits ECTS:** 3.0 **Idiomes:** Anglès

PROFESSORAT

Professorat responsable: Javier Melús (ITCL), Jaime Andrés Rincón (ITCL), Álvaro Aliste (ITCL)

Altres: Javier Melús (ITCL), Jaime Andrés Rincón (ITCL), Álvaro Aliste (ITCL)

CAPACITATS PRÈVIES

Basic Knowledge of Virtual and Augmented Reality: A basic knowledge of the principles and concepts behind virtual and augmented reality may be required.

Programming Fundamentals: Since technology integration often involves software development, programming skills in relevant languages as C# or C++, as well as understanding the concepts behind object-oriented programming, may be required.

Knowledge of Connectivity Technologies: It may be beneficial to have knowledge of communication technologies like Web Sockets or MQTT, commonly used to connect to IoT devices and digital twins.

REQUISITS

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METODOLOGIES DOCENTS

Lectures, assignments, autonomous work

OBJECTIUS D'APRENTATGE DE L'ASSIGNATURA

The content of the STC is to present novel hardware solutions for virtual, augmented and mixed reality, and showcase different applications of immersive technologies in industrial environments. In particular, the STC will show how digital twins intertwine with immersive technologies, explaining the advantages of immersive Human-Machine-Interfaces (HMIs) over traditional HMIs, and helping to identify situations where to apply immersive technologies to improve use cases in the industrial plant. The STC will also present virtual simulators for education and training.

HORES TOTS DE DEDICACIÓ DE L'ESTUDIANTAT

Tipus	Hores	Percentatge
Hores grup gran	27,0	36.00
Hores aprenentatge autònom	48,0	64.00

Dedicació total: 75 h

CONTINGUTS

Integration of Virtual and Augmented Reality Technologies in Connected Industries

Descripció:

Introduction to Virtual and Augmented Reality Technologies. Understanding the fundamentals of Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (XR). Hardware alternatives and their advantages and disadvantages.

Applications of VR and AR in Connected Industries. Exploring use cases in manufacturing, logistics, healthcare, and other industries. Case studies of successful VR and AR implementations in connected industries.

Identifying potential challenges and solutions in real-world applications. Technical Foundations of VR and AR. Programming for VR and AR development: Unity, Unreal Engine.

Usability considerations in connected industries. Different types of interactions in VR and AR: Controllers, hand-tracking, and voice commands. Design principles for creating immersive and user-friendly interfaces with the particulars of VR and AR. Hands-on exercises in designing interfaces for specific industrial applications.

Integration of VR and AR applications with IoT devices and sensors in connected industries. Communication protocols between VR and AR applications and simulation servers or IoT devices: API Rest, Web Sockets, MQTT, OPC UA.

Fundamentals of digital twins and their levels. Integration and simulation of digital twins inside VR and AR visualizations. Alternating between digital twin simulation and real data feeds inside the same virtual experience.

Dedicació: 75h

Grup gran/Teoria: 27h

Aprenentatge autònom: 48h

SISTEMA DE QUALIFICACIÓ

Qualsevol acte de frau acadèmic, plagis, ús o tinença a l'abast de mitjans no autoritzats en qualsevol activitat d'avaluació comportarà la qualificació de zero (0) en la prova o lliurament afectat. A més, d'acord amb la normativa de la Universitat, la possible derivació dels fets per a l'obertura d'un expedient disciplinari implicarà que l'assignatura quedi en l'estat provisional de "pendent d'avaluació" fins a la resolució de l'expedient. La gestió d'aquestes incidències es desplega d'acord amb el [Marc d'actuació per a la integritat acadèmica en l'avaluació de la UPC](#).

Continuous monitoring and exam.