

Course guide

300097 - STCDATA - Data Management and Digital Transformation in Industrial Process Automation

Last modified: 04/07/2026

Unit in charge: Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: **Degree:** MASTER'S DEGREE IN ARTIFICIAL INTELLIGENCE FOR CONNECTED INDUSTRIES (AI4CI) (Syllabus 2025). (Optional subject).

Academic year: 2026 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: José Luis Jabato (ITCL), Lorena Saiz (ITCL)

Others: José Luis Jabato (ITCL), Lorena Saiz (ITCL)

PRIOR SKILLS

Academic training in fields related to engineering, industrial automation, computing, information technology or related disciplines.

Basic knowledge of industrial automation principles and industrial processes may be required. Familiarity with concepts of data management, data analysis and digital transformation. Experience in the field of industrial automation or data management may be an additional requirement.

REQUIREMENTS

Academic training in fields related to engineering, industrial automation, computing, information technology or related disciplines.

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TEACHING METHODOLOGY

Lectures, assignments, autonomous work, project

LEARNING OBJECTIVES OF THE SUBJECT

Explain the different layers that can coexist in IoT architectures in the industrial environment.

Know the main existing hardware solutions for data capture.

Know the main wireless communication technologies that can be found in the industrial IoT.

Know the possible functionalities offered by data integration platforms: ITCL BITAL

STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	36.00
Self study	48,0	64.00

Total learning time: 75 h

CONTENTS

Data Management and Digital Transformation in Industrial Process Automation

Description:

1- Industry 4.0:

Raise awareness of the importance of data, of data analysis.

Main sources of IIoT information:

2- Main data sources existing in industrial facilities. Functions that cover Aspects to take into account in the capture layer:

Programmable controllers.

Specific controllers, IoT probes.

HMI, SCADA, explain the differences and what each one covers

Layers and architectures

3- Describe existing layers and architectures. Expose the elements and functions they cover and the interrelationship between them.

Sensory layer.

Control layer.

IT layer.

Cloud

IT Architecture (Closed Bus, Open Bus, Open Bus+NAT).

Main protocols of each layer:

4- Describe the main protocols of each of the layers, characteristics, advantages / disadvantages.

Analog/digital signals.

Manufacturer-specific protocols: S7, FINS, MELSEC, METTLER TOLEDO, MARCHESSINE.

Industrial standard protocols: PROFINET/PROFIBUS, MODBUS RTU/TCP, OPC UA.-DA

MQTT, REST API...

Industrial IoT Gateways:

5- Explain the current state of some of the main commercial HW for protocol capture and adaptation, differences, advantages and disadvantages. VNODE, IBH, EWON, SIEMENS IoT2040

New wireless communication technologies

6- Expose the main LPWA technologies, architectures, differences. Advantages and disadvantages. LORA, SIGFOX, NB IoT

Full-or-part-time: 75h

Theory classes: 27h

Self study : 48h

GRADING SYSTEM

Continuous monitoring and exam.