



FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	Optativa Complementaria. Telemetry and data acquisition
Código	DIM-M2S-613
Impartido en	Máster Universitario en Ingeniería Industrial + Máster in Motorsport, Mobility and Safety [Segundo Curso] Master in Motorsport, Mobility and Safety [Primer Curso]
Créditos	3,0 ECTS
Carácter	Obligatoria
Departamento / Área	Departamento de Ingeniería Mecánica

Datos del profesorado

DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura

Aportación al perfil profesional de la titulación

Students will learn how to gather, process, and analyze data from vehicles in real-time to enhance performance and diagnostics. The course covers essential topics such as sensor technology, data logging, signal processing, and wireless communication, emphasizing the importance of precise data for vehicle monitoring and tuning. Students will explore various acquisition systems, learn to configure telemetry for different environments, and interpret data to make informed adjustments in competitive scenarios. Practical labs and case studies will provide hands-on experience with telemetry tools, preparing students to utilize data-driven strategies for optimizing vehicle performance and reliability.

Prerrequisitos

Bachelor's Degree in Engineering

Competencias - Objetivos

Competencias

Competences:

- **C1.** Ability to apply knowledge of vehicle measurement technologies.
- **C2.** Be capable of selecting and configuring appropriate measurement inputs according to system requirements.
- **C3.** Develop the capacity to implement real-time data transmission solutions in vehicles.
- **C4.** Integrate and manage CAN Bus communication systems in vehicles, the most common standard in the automotive industry.
- **C5.** Competence in using software for data analysis. Analyze and process data using specialized software for competition and automotive environments.
- **C6.** Collaborate effectively with engineers and technicians from various disciplines to design complete data acquisition systems.
- **C7.** Develop skills to diagnose and fix failures in complex measurement and data transmission systems.
- **C8.** Competence in integrating electronics and sensors into vehicles. Implement sensors and electronic units in the design of



automotive instrumentation systems.

- **C9.** Develop the capacity to manage projects from design to implementation of telemetry and data acquisition systems.
- **C10.** Collaborate with other professionals on multidisciplinary telemetry and data acquisition projects, contributing and combining technical skills.
- **C11.** Ability to adapt to new technologies and tools in the automotive field.
- **C12.** Digital competence. Master advanced digital tools for data analysis, information acquisition, and telemetry system configuration.
- **C13.** Autonomous learning. Develop continuous learning capabilities to stay up-to-date with the latest trends and advancements in measurement and telemetry technologies.

Resultados de Aprendizaje

Knowledge:

- **K1.** Understand the main quantities to be measured in a vehicle, as well as their principles of selection and operation.
- **K2.** Understand the different data acquisition technologies in the automotive industry.
- **K3.** Become familiar with the operation and characteristics of the CAN Bus communication system.
- **K4.** Master various techniques for real-time data transmission in telemetry systems.
- **K5.** Understand the different electronic components used in vehicle instrumentation (CAN modules, ECUs, displays, etc.).
- **K6.** Design and implement complete data acquisition systems for vehicles.
- **K7.** Understand the methodologies for proper sensor installation and calibration.
- **K8.** Understand the fundamentals of data analysis applied to motorsports.
- **K9.** Understand the standards and communication protocols in modern vehicles.

Skills:

- **S1.** Skill in interpreting and selecting measurement inputs properly.
- **S2.** Skill in programming and configuring data acquisition units.
- **S3.** Ability to manage CAN Bus networks in vehicles.
- **S4.** Skill in analyzing data using specific software.
- **S5.** Ability to diagnose and troubleshoot telemetry systems.
- **S6.** Skill in designing and executing real-time telemetry systems.
- **S7.** Ability to integrate different electronic modules and control units into a data acquisition system.
- **S8.** Skill in interpreting results and adjusting data acquisition settings in competitions.
- **S9.** Ability to work in teams on automotive instrumentation project development.

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos

- **Magnitudes:** Measurement technologies for the most common quantities in vehicles (pressures, temperatures, accelerations, etc.).
- **Measurement Inputs:** Types of measurement inputs and selection methodology.



- **Electronics:** Data acquisition units, CAN modules, displays, ECUs, etc.
- **CAN Bus Communications:** Detailed study of the most widely used communication system in automobiles.
- **Telemetry Systems:** Technologies for real-time data transmission.
- **Methodologies for the Design and Implementation of Complete Vehicle Instrumentation.**
- **Data Analysis Software:** Basic concepts of data analysis using specific competition software.

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

In order to achieve the acquisition of the proposed competencies, the course will be developed with a focus on student activity as a priority factor. This means that both in-person and remote sessions will encourage the active involvement of students in learning activities

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

- Multiple-choice exam at the end of the semester
- Depending on the characteristics of the group, group work could be used as a grading criterion

Calificaciones

- The grade will be based on the score obtained in the test or the group work, if applicable.
- A grade above 5 over 10 is required to pass the course.

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

- Discrete-Time Signal Processing - Alan-V Oppenheim, Ronald-W Schafer - ISBN 1-29202-572-7
- Analysis Techniques for Racecar Data Acquisition - Jorge Segers - ISBN 0-76806-459-7