GUÍA DOCENTE
2026 - 2027

FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	ADAS and sensor technology
Código	DIM-M2S-611
Impartido en	Máster Universitario en Ingeniería Industrial + Máster in Motorsport, Mobility and Safety [Segundo Curso] Master in Motorsport, Mobility and Safety [Segundo Curso]
Nivel	Master
Cuatrimestre	Semestral
Créditos	3,0 ECTS
Carácter	Obligatoria
Departamento / Área	Departamento de Ingeniería Mecánica
Responsable	Francisco J. López Valdés
Descriptor	Driver assistance systems are electronic aids designed to offer the driver help in specific driving situations. They intend to increase safety and comfort of the passengers. These systems monitor the vehicle environment and either act upon the vehicle to optimize its safe functioning or provide a warning to the driver to prevent unsafe maneuvers.

Datos del profesorado	
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DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura

Aportación al perfil profesional de la titulación

Driver assistance systems are electronic aids designed to offer the driver help in specific driving situations. They intend to increase safety and comfort of the passengers. These systems monitor the vehicle environment and either act upon the vehicle to optimize its safe functioning or provide a warning to the driver to prevent unsafe maneuvers

Prerrequisitos

Principles of vehicle dynamics

Competencias - Objetivos

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos

Part A – Technology: sensors and sensor integration (16 h)

1. Review of technologies and main characteristics:
    1. Ultrasound
    2. Radar: FRR, MRR, SRR
    3. LIDAR
    4. CAMERA
    5. Infrared
2. Sensor integration and conflict management depending on sensor tolerance
3. Overview of actuators
4. Communication protocols and ECUS
    1. Types of ECUS
    2. Types of protocols and bus:
        1. Fieldbus: bus CAN and bus arbitration
        2. Ethernet and car-ethernet: IEEE 802.3; half duplex and full duplex communication
    3. Communication framework
        1. ROS: master-slave; publishers and subscribers; QOS
5. Software development
    1. V model
    2. Requirements (system, software)
    3. High- and low-level coding in ADAS
6. Safety and Cybersecurity
    1. HARA
    2. Failure management
    3. Cybersecurity

Part B – ADAS (8h)

Vehicle integration: technical and design constraints.

1. UPA: parking assistance
2. Hand-free parking
3. Blind spot warning
4. Lane keeping (Traffic sign detection)
5. Assisted Emergency Braking

Field study: Assessment of ADAS across different car models

Part C – ADAS regulation and real-world performance (6h)

1. Automation of cars: global regulations and challenges
2. Real world performance of ADAS

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

Metodología Presencial: Actividades

Laboratory:

Development of a simplified version of an ADAS function:

- Assisted Emergency Braking
- Detection of parking spots
- Mapping of obstacles with ultrasounds

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

- 30% Quiz
- 40% Laboratory project
- 30% Field study

Attendance to a minimum of 85% of the classes will be required to be graded in January.

Additional evaluation during July (Retake):

- 60% Exam
- 40% Field study

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

Rune Elvik, Truls Vaa, Alena Hoye, Michael Sorensen. The Handbook of Road Safety Measures: Second Edition, Emerald Group Publishing, 2009