FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	Optativa complementaria: Resistencia al Choque / Crashworthiness
Código	DIM-M2S-527
Impartido en	Máster Universitario en Ingeniería Industrial + Máster en Ingeniería para la Movilidad y Seguridad [Segundo Curso] Máster Universitario en Ingeniería Industrial + Máster en Ingeniería para la Movilidad y Seguridad [Segundo Curso] Máster en Ingeniería para la Movilidad y Seguridad/Master of Engineering in Mobility and Safety [Primer Curso]
Nivel	Master
Cuatrimestre	Semestral
Créditos	3,0 ECTS
Carácter	Obligatoria
Departamento / Área	Departamento de Ingeniería Mecánica

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DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura

Aportación al perfil profesional de la titulación

This course will be an introduction to the crashworthiness analysis of motor vehicles, including those characteristics and features that influence the mechanical behavior of the car structures. In addition, the course will provide a summary of existing crashworthiness assessment programs in the regulatory framework (type approval) and in the consumer-testing sector, with special focus on the EuroNCAP program.

Prerequisitos

Knowledge of basic courses of strength of materials, injury biomechanics and restraint systems. Previous knowledge of Ls-Dyna, Ls-Prepost and Oasys Primer is also required.

Competencias - Objetivos

Resultados de Aprendizaje

After completing this course the student will know the difference between type approval and consumer oriented testing programs. The student will be able to understand how rating is used in the assessment of the crashworthiness of vehicles. He/she will be able to perform simple simulations in Ls-Dyna to analyze the performance of vehicle structures and of restraint systems (seat belts and airbags) in a crash.

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos

1. Introduction to crashworthiness.
2. Introduction to the use of the Finite Element Method (FEM) in the analysis of the crashworthiness of the vehicles
3. Type-approval test in Europe
4. Introduction to consumer-testing programs
5. The development of EuroNCAP
    a. The ratings explained
6. EuroNCAP Adult Occupant Protection
7. EuroNCAP Child Occupant Protection
8. EuroNCAP Safety Assist
9. EuroNCAP Vulnerable Road User protection
10. The role of roadside infrastructure

Practice lab:

Laboratory content for the Crashworthiness class will consist of four projects to be developed using Ls-Dyna, Ls-Prepost and Oasys Primer, as follows:

1. Vehicle frontal impact against a rigid wall at 56 km/h to analyze the behavior of the structural components of the chassis
2. Sled frontal impact tests with the THOR crash test dummy in a simplified environment (SENIORS test fixture)

3. Modeling of the seat belt
4. Modeling of the airbag

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

Standard evaluation at the end of the term:

- Crashworthiness project (55%)
- Test about regulatory and consumer testing programs (35%)
- Quiz about road infrastructure (10%)
- Attendance: minimum 85% to be allowed to take the exam.

Additional evaluation during July (Retake):

- Crashworthiness project (55%)
- Test about regulatory and consumer testing programs (35%)
- Quiz about road infrastructure (10%)

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

- *Ls-Dyna*. Manual Volume I and II.
- Handouts to be provided by instructors in class.