GUÍA DOCENTE
2019 - 2020

FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	Sistemas de retención y seguridad integrados
Código	DIM-M2S-519
Impartido en	Máster Universitario en Ingeniería Industrial + Máster en Ingeniería para la Movilidad y Seguridad [Segundo Curso]
Cuatrimestre	Semestral
Créditos	4,5 ECTS
Carácter	Obligatoria
Departamento / Área	Departamento de Ingeniería Mecánica
Responsable	Francisco José López Valdés

Datos del profesorado	
Profesor	
Nombre	Francisco José López Valdés
Departamento / Área	Departamento de Ingeniería Mecánica
Despacho	Alberto Aguilera 25 [D-317]
Correo electrónico	fjlvaldes@comillas.edu

DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura

Aportación al perfil profesional de la titulación

The course will review the main concepts associated to restraint systems, including the basic mechanics behind their development and current developments integrating pre-crash features.

New restraint concepts will be discussed and illustrated with examples.

Prerequisitos

Knowledge of basic courses of materials science, strength of materials and injury biomechanics.

Competencias - Objetivos

BLOQUES TEMÁTICOS Y CONTENIDOS

Contenidos – Bloques Temáticos

1. Definition of active and passive safety. Integrated safety.
    - Haddon/Safe Systems approach to injury prevention
    - Injury prevention effectiveness of seat belts and airbags
    - Relationship to autonomous/automated vehicles
2. Desirable kinematics of the adult occupant attending to its biomechanical characteristics
    - Horsch, Adomeit papers
3. Seat belt and airbags: introduction, types, components, regulation, desired performance.
    - Front seat vs. Rear seat
    - Standards and regulation (ECE-R16)
    - Types of airbags: passenger/occupant, curtain, knee, …
4. The THOR dummy and the Hybrid III
    - Chest instrumentation
    - Associated injury criteria related to restraint systems performance
5. Application of human body models to the development of restraint systems
    - THUMS and other human body models
    - Challenges in the use of human body models in the design of restraint systems
6. Advanced restraint systems and pre-crash activation
    - Combined activation of restraint and pre-crash systems
    - The use of human body models in the development and optimization of restraint systems.
7. Influence of occupant position and characteristics in restraint performance
    - Out of position
    - Optimization of position of anchoring systems
    - Challenges in protecting extreme size/age occupants
8. Child restraint systems and the particularities of pediatric passengers
9. Other passive safety systems: helmets, infrastructure

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

69% In-person class teaching

Seminars discussing the content of the course

Article reviews

11% Testing lab

20% Computational lab (Ls-Dyna)

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

Standard evaluation at the end of the term:

- 15% class quizzes
- 25% lab project
- 30% simulation study
- 30% paper critique

Additional evaluation during July (Retake):

- 25% lab project
- 35% simulation study
- 40% paper critique

BIBLIOGRAFÍA Y RECURSOS

Bibliografía Básica

Yoganandan N, Nahum AM, Melvin JW, Accidental Injury. Biomechanics and Prevention. 3rd edition. Springer, 2015.

Arregui C, Luzón J, López-Valdés FJ, Del Pozo de Dios E, Seguí-Gómez M, Fundamentos de Biomecánica en las Lesiones por Accidente de Tráfico 2ª edición, ETRASA Madrid, 2010 ISBN: 978-84-92625-40-6