



## FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	Biomecánica del daño// Injury Biomechanics
Código	DIM-M2S-514
Impartido en	Máster Universitario en Ingeniería Industrial + Máster en Ingeniería para la Movilidad y Seguridad [Segundo Curso]
Cuatrimestre	Semestral
Créditos	3,0 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
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## DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura
<b>Aportación al perfil profesional de la titulación</b>
Injury biomechanics is the part of biomechanics that analyzes how external energy can damage tissue and characterizes the mechanical threshold to prevent injuries. Students will receive basic contents about anatomy and most frequent injuries occurring in relevant scenarios (i.e. vehicle collisions), complemented by the introduction to the biomechanical experiments that set the bases for existing injury criteria. The course will also cover some of the most advanced research in the protection of road users.
<b>Prerequisitos</b>
Knowledge of basic courses of materials science and strength of materials.

Competencias - Objetivos
<b>Resultados de Aprendizaje</b>
The student will learn the basis of the development of existing injury criteria and the characteristics of the



datasets in which they are based. This knowledge will allow him to develop a critical approach to how these criteria are currently used in the automotive industry.

## **BLOQUES TEMÁTICOS Y CONTENIDOS**

### **Contenidos – Bloques Temáticos**

1. Introduction to injury prevention
2. Introduction to human anatomy and anatomical terms
  - Review of anatomy of main body regions: head, spine, thorax, abdomen, upper extremity and lower extremity
3. Injury scales.
  - Injury scales, focus on AIS
4. Crash surrogates and related biomechanical experiments: volunteers, animals, Post Mortem Human Surrogates and human body models
5. Injury criteria
  - Statistical methods
  - Development of injury criteria
  - Examples of most relevant injury criteria used in automotive industry
6. Review of body regions and related injuries and biomechanical data
7. Challenges in injury biomechanics
  - Age effects
  - Sex effects
  - Anthropometry effects

## **METODOLOGÍA DOCENTE**

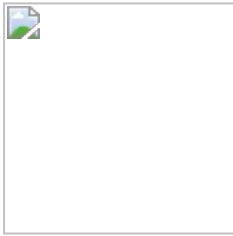
### **Aspectos metodológicos generales de la asignatura**

#### **85% in-person class teaching**

Seminars discussing the content of the course

Article reviews

#### **15% laboratory activities**



Several bone samples will be exposed to tensile tests up to fracture. Students will have to develop an injury criterion for the fracture of bone, considering potential confounding factors

## **EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN**

Standard evaluation at the end of the term:

- 25% Lab project
- 15% Homework (provide dummy based measurements and asking for estimations of the risk of injury for different body regions)
- 10% Quiz/quizzes on reading materials provided by the instructor
- 10% Summary of one paper from 2020 AAAM Conference
- 40% Critique of a relevant published paper
- Attendance: minimum 85% to be allowed to be graded in January.

Additional evaluation during July (Retake):

- 20% Lab project
- 80% Critique of a relevant published paper

## **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

Scientific papers provided by the instructor