COMILLAS
UNIVERSIDAD PONTIFICIA
ICAI ICADE CIHS

**GUÍA DOCENTE**
**2022 - 2023**

## FICHA TÉCNICA DE LA ASIGNATURA

| Datos de la asignatura | |
|---|---|
| **Nombre completo** | Simulación Multifísica |
| **Código** | DIM-MII-612 |
| **Impartido en** | Máster Universitario en Ingeniería Industrial [Segundo Curso] |
| **Nivel** | Postgrado Oficial Master |
| **Cuatrimestre** | Semestral |
| **Créditos** | 6,0 ECTS |
| **Carácter** | Obligatoria |
| **Departamento / Área** | Departamento de Ingeniería Mecánica |

| Datos del profesorado | |
|---|---|
| **Profesor** | |
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| **Profesor** | |
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| **Profesor** | |
| **Nombre** | José Rubén Pérez Domínguez |
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## DATOS ESPECÍFICOS DE LA ASIGNATURA

### Contextualización de la asignatura

#### Aportación al perfil profesional de la titulación

After the course students will have a good overview about current simulation capabilities

#### Prerequisitos

Knowledge of basic courses of algebra, fluid dynamics, mechanics of materials and electomagnetic fields

## Competencias - Objetivos

### Resultados de Aprendizaje

This course will be an introduction of the different analysis can be done in the ANSYS workbench environment and the coupling among them.

At the end of the course, students have fundamental skills in all the analyses available in Ansys Workbench environment.

## BLOQUES TEMÁTICOS Y CONTENIDOS

## Contenidos – Bloques Temáticos

1. Introduction to finite elements and workbench environment.  Analysis type and workbench workflow. Materials definition.
2. Static structural analysis of plane cases. Parameters.
3. Static structural analysis of beam and link and shells elements
4. 3D models. Boundary conditions. Mesh generation.
5. 3D models. Postprocess result. Submodelling
6. Load cases and load steps. Pseudo static analysis.
7. Thermal analysis. Coupled thermal-structural analysis
8. Modal and harmonic analysis. Linear buckling analysis
9. Fundamentals of nonlinear analysis. Non-linear materials and geometric non-linearities
10. Fundamentals of contact non-linearities. Types of contact models.
11. Basic of rigid solid dynamics
12. Transient analysis. Implicit integration
13. Transient analysis. Explicit integration
14. Electric field analysis
15. Magnetic field analysis
16. Introduction to CFD
17. Geometry and Meshing
19. Domains, Boundary Conditions and Sources
20. Turbulence models and solver settings
21. Post-processing  (Ansys Fluent and CFD post)

22. Rotating machinery (Domain Interfaces & Moving Zones)

23. Internal Flows

24. External Flows

25. Heat transfer

26. Transient flows

27. Multiphase flows

28. Combustion

29. User defined functions and best practice guidelines

30. Fluid-Structure Interaction (FSI)

## METODOLOGÍA DOCENTE

### Aspectos metodológicos generales de la asignatura

Each session is scheduled as a specific seminar. Practical use of the ANSYS workbench program takes prevalance over theoretical concepts.

## EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

Test

- Session test
- Final test

Homework in group

- Session cases
- Final project

### Calificaciones

Standard evaluation at the end of the term:

30% test

- 40 % session test
- 60 % final test

70 % individual/group works

- 70 % session cases
- 30 % final project

Additional evaluation during July (Retake):

- 40% Test
- 60% individual work

## BIBLIOGRAFÍA Y RECURSOS

### Bibliografía Básica


- Finite Element Simulations with ANSYS Workbench 18. Huei-Huang Lee. ISBN 978-1630571733.
- Engineering Analysis with ANSYS Workbench 18. Guangming Zhang. ISBN-13: 978-1935673385
- Engineering Analysis with ANSYS Software. Tadeusz Stolarski Y. Nakasone S. Yoshimoto. ISBN: 9780081021644