# 220263 - Fluid Systems Design

**Coordinating unit:** 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering  
**Teaching unit:** 729 - MF - Department of Fluid Mechanics  
**Academic year:** 2019  
**Degree:** MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Teaching unit Optional)  
**ECTS credits:** 5  
**Teaching languages:** English

## Teaching staff

**Coordinator:** Josep M Bergadà  
**Others:** Robert Castilla  
Gustavo Raush

## Prior skills

Previous knowledge of Fluid Mechanics, Physics, Mathematics and Thermodynamics is required.

## Degree competences to which the subject contributes

**Specific:**
1. Ability to learn and understand the dynamic phenomena and its formulation for their application in the development of each of the stages of conception, design, calculation and simulation of fluid dynamic.  
2. Ability to learn and understand advanced fluid dynamic processes, power transmission and advanced manufacturing for application in industrial facilities based on the product and production volume elements, machines and vehicles.  
3. Ability to learn and understand design tools like CAD / CAM / CAE, CFD numerical simulation and dynamic simulation for design and advanced computing facilities and fluid dynamic systems.  
4. Ability to know the laws, regulations and directives in force whenever assessing the environmental implications, energy, social and ethical professional activity.  
5. Ability to learn and understand the dynamic phenomena and its formulation for application in the development of each of the stages of conception, design and mechanical calculations.  
6. Ability to learn and understand numerical simulation tools for the design, calculation and fabrication of components, systems and mechanical installations.

## Teaching methodology

Theory and problems classes  
computer sessions  
Lab sessions

## Learning objectives of the subject

1. -Students will learn how to deal with fluid mechanics problems involving compressible flow, chock waves, Prandtl Meyer waves and expansion waves.  
2. -Fluid Mechanics problems involving compressible flow will be solved via using CFD, Computational Fluid Mechanics.  
2. - Flow analysis based on PIV Particle Image Velocimetry technology, will be evaluated.
## Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group: 30h</th>
<th>24.00%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours small group: 15h</td>
<td>12.00%</td>
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<tr>
<td></td>
<td>Self study: 80h</td>
<td>64.00%</td>
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</table>

## Content

### (ENG) Bloc 1 - Fluxe compressible

<table>
<thead>
<tr>
<th>Learning time: 41h</th>
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<tbody>
<tr>
<td>Theory classes: 10h</td>
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<tr>
<td>Laboratory classes: 5h</td>
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<tr>
<td>Self study: 26h</td>
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### (ENG) Bloc 2 - Computational Fluid Dynamics

<table>
<thead>
<tr>
<th>Learning time: 42h</th>
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<tbody>
<tr>
<td>Theory classes: 10h</td>
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<tr>
<td>Laboratory classes: 5h</td>
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<tr>
<td>Self study: 27h</td>
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### (ENG) Bloc 3 - Tècniques experimental en fluidodinàmica - Particle Image Velocimetry

<table>
<thead>
<tr>
<th>Learning time: 42h</th>
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<tbody>
<tr>
<td>Theory classes: 10h</td>
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<tr>
<td>Laboratory classes: 5h</td>
</tr>
<tr>
<td>Self study: 27h</td>
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### Planning of activities

| (ENG) TEORÍA | Hours: 30h  
Theory classes: 30h |
|--------------|-------------------|
| (ENG) CLASSES PROBLEMES | Hours: 15h  
Laboratory classes: 15h |
| (ENG) APLICACIÓ NUMÈRICA DE FLUXE COMPRESSIBLE I | Hours: 13h  
Self study: 13h |
| (ENG) APLICACIÓ NUMÈRICA DE FLUXE COMPRESSIBLE II | Hours: 13h  
Self study: 13h |
| (ENG) CFD I | Hours: 13h  
Self study: 13h |
| (ENG) CFD II | Hours: 14h  
Self study: 14h |
| (ENG) PIV I | Hours: 13h  
Self study: 13h |
| (ENG) PIV II | Hours: 14h  
Self study: 14h |

### Qualification system

The qualification will be obtained based on the different assignments which will need to be performed during the subject.
Bibliography

Basic:


