Degree competences to which the subject contributes

Transversal:
1. SELF-DIRECTED LEARNING. Detecting gaps in one’s knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one’s knowledge.

Teaching methodology

This course will consist of explanation lectures and sessions for problem solving. The explanation lectures will be used by the teacher to expose and comment with the students the theoretical concepts and equations. The lectures devoted to problem solving will require the student to participate actively and the teacher will provide orientation and support to solve the practical cases.

Learning objectives of the subject

The objective of the course is that the student learns how to apply in an organized and systematic way the fundamentals that determine the fluid transport inside pipes. With such competences the student must be able to set out and/or resolve a liquid or gas flow system through a pipe net with different complexity. In particular, the student must:
- Identify the type of flow under study and its physical characteristics.
- Understand the equations that govern the pipe flow.
- Solve mathematically permanent incompressible pipe flow.
- Solve transient flow. Predict the water hammer.
- Solve mathematically permanent compressible pipe flow.
## Study load

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
<th>Hours large group:</th>
<th>0h</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group:</td>
<td>45h</td>
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<td>40.00%</td>
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<tr>
<td>Hours small group:</td>
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<td></td>
<td>0.00%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>0h</td>
<td></td>
<td>0.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>67h 30m</td>
<td></td>
<td>60.00%</td>
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</tbody>
</table>

### Content

- **Fluid Mechanics Review**
  - **Learning time:** 15h
  - Theory classes: 3h
  - Practical classes: 3h
  - Self study: 9h

- **Incompressible Pipe Flow**
  - **Learning time:** 22h 30m
  - Theory classes: 4h 30m
  - Practical classes: 4h 30m
  - Self study: 13h 30m

- **Transient Flow. Water Hammer**
  - **Learning time:** 37h 30m
  - Theory classes: 7h 30m
  - Practical classes: 7h 30m
  - Self study: 22h 30m

- **Compressible Pipe Flow**
  - **Learning time:** 37h 30m
  - Theory classes: 7h 30m
  - Practical classes: 7h 30m
  - Self study: 22h 30m
### Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLUTION OF WRITING EXERCISES LESSON 1</td>
<td>6h</td>
<td>6h</td>
</tr>
<tr>
<td>SOLUTION OF WRITING EXERCISES LESSON 2</td>
<td>9h</td>
<td>9h</td>
</tr>
<tr>
<td>SOLUTION OF WRITING EXERCISES LESSON 3</td>
<td>10h</td>
<td>10h</td>
</tr>
<tr>
<td>SOLUTION OF WRITING EXERCISES LESSON 4</td>
<td>10h</td>
<td>10h</td>
</tr>
<tr>
<td>COMPUTATIONAL SIMULATION CASE 1</td>
<td>5h</td>
<td></td>
</tr>
<tr>
<td>COMPUTATIONAL SIMULATION CASE 2</td>
<td>5h</td>
<td></td>
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<tr>
<td>ATTENDANCE AND PARTICIPATION AT THE CLASSROOM</td>
<td>22h 30m</td>
<td></td>
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</table>

### Qualification system

Final mark = 0.25*final exam mark + 0.25*solved exercises mark + 0.25*team work mark +0.25*classroom involvement mark

### Regulations for carrying out activities

To pass, it is compulsory to obtain a result above zero in at least three of the four partial marks.
Bibliography

Basic:


Complementary:


Others resources:
