220026 - Gas Dynamics and Heat and Mass Transfer

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 724 - MMT - Department of Heat Engines
Academic year: 2018
Degree: BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 6

Teaching staff
Coordinator: Carlos David Pérez Segarra
Others: Assensi Oliva Llena
Xavi Trias

Opening hours
Timetable: The specific timetable is personally agreed on with the student according to his/her availability.

Prior skills
Basic knowledge of previous courses: mathematics (specially differential and integral calculus), physics, mechanics of continuous media, fluid mechanics, thermodynamics.

Degree competences to which the subject contributes
Specific:
1. GrETA/GrEVA - An adequate understanding of the following, as applied to engineering: concepts and laws that govern the processes of energy transfer, the movement of fluids, the mechanisms of heat transfer and phase transition, and their role in analysis of the main aerospace propulsion systems.

Teaching methodology
The language use in the lectures is principally Catalan. Spanish is also used.

Learning objectives of the subject

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 46h</th>
<th>30.67%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 7h</td>
<td>4.67%</td>
</tr>
<tr>
<td></td>
<td>Hours small group: 7h</td>
<td>4.67%</td>
</tr>
<tr>
<td></td>
<td>Self study: 90h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
## Content

| 1. Introduction. Heat transfer by conduction in solids | **Learning time:** 40h  
Theory classes: 17h  
Practical classes: 3h  
Self study: 20h |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td></td>
</tr>
</tbody>
</table>

| 2. Heat transfer by radiation | **Learning time:** 22h  
Theory classes: 8h  
Practical classes: 2h  
Self study: 12h |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td></td>
</tr>
</tbody>
</table>

| 3. Convection phenomena. Gas dynamics. | **Learning time:** 38h  
Theory classes: 16h  
Practical classes: 2h  
Self study: 20h |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td></td>
</tr>
</tbody>
</table>

| 4. Combined problems | **Learning time:** 50h  
Theory classes: 5h  
Laboratory classes: 7h  
Self study: 38h |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td></td>
</tr>
</tbody>
</table>
220026 - Gas Dynamics and Heat and Mass Transfer

Planning of activities

<table>
<thead>
<tr>
<th>THEOREY SESSIONS</th>
<th>Hours: 65h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 25h</td>
</tr>
<tr>
<td></td>
<td>Self study: 40h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXERCISES SESSIONS</th>
<th>Hours: 68h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 14h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 7h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 7h</td>
</tr>
<tr>
<td></td>
<td>Self study: 40h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>Hours: 10h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self study: 10h</td>
</tr>
</tbody>
</table>

Qualification system

First mid-term exam accounts for 40% of the final mark.
Control tests account for 10% of the final mark.
Final exam accounts for 50% of the final mark.

There is the possibility of increasing the final mark of the exams by presenting and defending optional numerical simulation projects developed during the course and under the guidance of the lecturers. In that case, a minimum final mark of 4.5 is required.

The result of the first mid-term exam could be recovered/improved in the final exam. The mark obtained due to the recovering process will replace the initial mark if, and only if, this mark is higher that the initial mark.

Regulations for carrying out activities

The exams will consist of theory and problems. It is not allowed to use any extra material, except the one delivered by the lecturers. The use of mobile phones, smartwatches or similar devices, together with computers and programmable calculators, is also not allowed.
Bibliography

Basic:


Complementary:


Others resources:

Audiovisual material

Apunts realitzats pel professorat de l’assignatura