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: 2017
Degree: BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: Carlos David Pérez Segarra
Others: Assensi Oliva Llena
        Jesús Castro González

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>
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<tbody>
<tr>
<td></td>
<td>Hours medium group: 7h</td>
<td>4.67%</td>
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<tr>
<td></td>
<td>Hours small group: 7h</td>
<td>4.67%</td>
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<td>Self study: 90h</td>
<td>60.00%</td>
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## Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Learning time:</th>
<th>Description</th>
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<tbody>
<tr>
<td>1. Introduction. Heat transfer by conduction in solids</td>
<td>40h</td>
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<tr>
<td></td>
<td>Theory classes: 17h</td>
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<tr>
<td></td>
<td>Practical classes: 3h</td>
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<td></td>
<td>Self study: 20h</td>
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<td>2. Heat transfer by radiation</td>
<td>22h</td>
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<td></td>
<td>Theory classes: 8h</td>
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<td></td>
<td>Practical classes: 2h</td>
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<td>Self study: 12h</td>
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<tr>
<td>3. Convection phenomena. Gas dynamics.</td>
<td>38h</td>
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<td></td>
<td>Theory classes: 16h</td>
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<tr>
<td></td>
<td>Practical classes: 2h</td>
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<td></td>
<td>Self study: 20h</td>
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<td>4. Combined problems</td>
<td>50h</td>
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<td></td>
<td>Theory classes: 5h</td>
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<td>Laboratory classes: 7h</td>
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<td></td>
<td>Self study: 38h</td>
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### Planning of activities

| **THEORY SESSIONS** | **Hours:** 65h  
Theory classes: 25h  
Self study: 40h |
|---------------------|---------------|
| **EXERCISES SESSIONS** | **Hours:** 68h  
Theory classes: 14h  
Practical classes: 7h  
Laboratory classes: 7h  
Self study: 40h |
| **PROJECT** | **Hours:** 10h  
Self study: 10h |

### Qualification system

First mid-term exam accounts for 35% of the final mark.  
Second mid-term exam accounts for 25% of the final mark.  
Final exam accounts for 40% of the final mark.

There is the possibility of increasing the final mark of the exams by presenting and defending 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