300322 - PA - Aircraft Propulsion

Coordinating unit: 300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering  
Teaching unit: 300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering  
Academic year: 2013  
Degree: BACHELOR'S DEGREE IN AIR NAVIGATION ENGINEERING (Syllabus 2010). (Teaching unit Optional) BACHELOR'S DEGREE IN AIRPORT ENGINEERING (Syllabus 2010). (Teaching unit Optional)  
ECTS credits: 6

Teaching staff

Coordinator: Definit a la infoweb de l'assignatura.  
Others: Definit a la infoweb de l'assignatura.

Learning objectives of the subject

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours medium group:</th>
<th>53h</th>
<th>35.33%</th>
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<tbody>
<tr>
<td></td>
<td>Hours small group:</td>
<td>13h</td>
<td>8.67%</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>84h</td>
<td>56.00%</td>
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</tbody>
</table>
## Content

<table>
<thead>
<tr>
<th>Introduction to Aeronautical Propulsion Systems</th>
<th>Learning time: 11h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Theory classes: 5h</td>
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<tr>
<td></td>
<td>Self study: 6h</td>
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</table>

Introduction to Aeronautical Propulsion Systems

Aeronautical propulsion system types, basic working principles, uses and limitations.

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<thead>
<tr>
<th>Performances and thermodynamical cycle</th>
<th>Learning time: 22h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Theory classes: 5h</td>
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<tr>
<td></td>
<td>Practical classes: 5h</td>
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<td></td>
<td>Self study: 12h</td>
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Performances and thermodynamical cycle

Gas turbine engine performance parameters. Fundamentals of aerothermodynamics, the ideal gas generator, sources of losses, component efficiencies and impact on engine performances.

<table>
<thead>
<tr>
<th>Components</th>
<th>Learning time: 53h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Theory classes: 10h</td>
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<tr>
<td></td>
<td>Practical classes: 10h</td>
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<tr>
<td></td>
<td>Laboratory classes: 3h</td>
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<tr>
<td></td>
<td>Self study: 30h</td>
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</tbody>
</table>

Components

Description, analysis, design overview and implementation details of ducting (intake/diffuser, nozzle, mixer), turbomachinery (compressor, fan, turbine) and heating components (combustion chamber, afterburner, heat exchangers)

<table>
<thead>
<tr>
<th>Subsystems</th>
<th>Learning time: 33h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Theory classes: 10h</td>
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<tr>
<td></td>
<td>Practical classes: 5h</td>
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<tr>
<td></td>
<td>Self study: 18h</td>
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</tbody>
</table>

Subsystems

Accessory components and systems: structural (shafts/spools, casing, bearings...), thermal (bleeds, cooling system), fuel, lubrication, ignition and start, monitoring...
### Applications

**Learning time:** 24h  
- Theory classes: 5h  
- Practical classes: 2h  
- Laboratory classes: 3h  
- Self study: 14h

**Description:**  
Details of implementation for the application of the gas generator to turbojet, turbofan, turboprop, turboshaft...

### Maintenance and handling

**Learning time:** 7h  
- Theory classes: 3h  
- Self study: 4h

**Description:**  
Introduction to engine operation, handling and maintenance.
### Planning of activities

#### THEORETICAL FUNDAMENTALS OF AERONAUTICAL PROPULSION

**Hours:** 68h  
Theory classes: 14h  
Practical classes: 12h  
Self study: 42h

**Description:**  
Theory lectures, problem statement and numerical resolution of practical exercises.

#### PRACTICAL FUNDAMENTALS OF AERONAUTICAL PROPULSION

**Hours:** 82h  
Theory classes: 24h  
Practical classes: 10h  
Laboratory classes: 6h  
Self study: 42h

**Description:**  
Theory lectures, practical descriptions and components and subsystems dissection.

**Support materials:**  
Slides, class notes, basic and advanced bibliography.

**Descriptions of the assignments due and their relation to the assessment:**  
Occasional delivery of practical session reports and oral presentations preparation.

**Specific objectives:**  
Acquisition of a series of practical knowledge related to aeronautical propulsion.

### Bibliography

**Basic:**

**Complementary:**