Degree competences to which the subject contributes

Specific:
1. GrETA/GrEVA - An overall understanding of air navigation systems and the complexity of air traffic

Teaching methodology

In the theoretical classes teachers will explain concepts, methods and results, showing them with some examples to facilitate understanding.
The sessions in the classrooms the teacher guide the student in applying theoretical concepts to workgroup.

Learning objectives of the subject

Know the organization of the air transport system and air navigation system, their rules and the institutions that regulate these systems, and the elements of the air navigation and their relationship with the airport.
Particularly, to understand the air space structure, the instrumental navigation techniques, the procedures used by airplanes in the controlled air space, the navigations aids and their relationship with the airport both from standpoint of design and operation.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
<th>Hours large group:</th>
<th>31h</th>
<th>27.56%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>14h</td>
<td>12.44%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>67h 30m</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
## Content

<table>
<thead>
<tr>
<th>1. Introduction to air navigation</th>
<th>Learning time: 10h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 0h</td>
</tr>
<tr>
<td></td>
<td>Self study : 8h</td>
</tr>
</tbody>
</table>

**Description:**
- 1.1 Definitions
- 1.2 History
- 1.3 Air navigation techniques

<table>
<thead>
<tr>
<th>2. Flight basic instruments</th>
<th>Learning time: 11h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 3h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study : 6h</td>
</tr>
</tbody>
</table>

**Description:**
- 2.1 Anemometer, altimeter and vertical speed indicator
- 2.2 Attitude indicator, artificial horizon and direction indicator
- 2.3 Others

<table>
<thead>
<tr>
<th>3. Institutional framework</th>
<th>Learning time: 9h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 0h</td>
</tr>
<tr>
<td></td>
<td>Self study : 7h</td>
</tr>
</tbody>
</table>

**Description:**
- 3.1 Basic regulation
- 3.2 National agencies
- 3.3 International agencies
## 4. Air navigation systems

**Learning time:** 18h 30m  
Theory classes: 7h  
Practical classes: 4h  
Self study: 7h 30m

### Description:
- 4.1 Visual flight
- 4.2 Instrumental flight with VORD/DME
- 4.3 Instrumental flight with NDB
- 4.4 Instrumental flight with ILS
- 4.5 Onboard Systems (ACAS, GPWS)
- 4.6 Autonomous systems (INS)

## 5. Airspace

**Learning time:** 16h  
Theory classes: 4h  
Practical classes: 0h  
Self study: 12h

### Description:
- 5.1 Division of the airspace
- 5.2 Classification of the airspace

## 6. Navigational charts, flight plans and weather service

**Learning time:** 11h  
Theory classes: 3h  
Practical classes: 2h  
Self study: 6h

### Description:
- 6.1 Navigational charts
- 6.2 Flight plans
- 6.3 Weather service
### 7. Air navigation services

**Learning time:** 10h  
Theory classes: 2h  
Practical classes: 0h  
Self study: 8h

**Description:**  
7.1 Air Traffic Control service (ATC)  
7.2 Flight Information Service (FIS)  
7.3 Advisory Service  
7.4 g service

### 8. Special activities in airspace

**Learning time:** 14h  
Theory classes: 4h  
Practical classes: 2h  
Self study: 8h

**Description:**  
8.1 UAV

### 9. Airport infrastructures

**Learning time:** 13h  
Theory classes: 4h  
Practical classes: 4h  
Self study: 5h

**Description:**  
9.1 Construction of airport infrastructure  
9.2 Examples of airport infrastructure
# Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Theory classes</strong></td>
<td><strong>81h 30m</strong></td>
</tr>
<tr>
<td>Theory classes</td>
<td>28h</td>
</tr>
<tr>
<td>Self study</td>
<td>53h 30m</td>
</tr>
<tr>
<td><strong>2. Fundamental flight practice sessions</strong></td>
<td><strong>24h</strong></td>
</tr>
<tr>
<td>Practical classes</td>
<td>12h</td>
</tr>
<tr>
<td>Self study</td>
<td>12h</td>
</tr>
<tr>
<td><strong>3. Airport infrastructure practise session</strong></td>
<td><strong>1h 30m</strong></td>
</tr>
<tr>
<td>Theory classes</td>
<td>1h 30m</td>
</tr>
<tr>
<td><strong>4. Final exam</strong></td>
<td><strong>1h 30m</strong></td>
</tr>
<tr>
<td>Theory classes</td>
<td>1h 30m</td>
</tr>
</tbody>
</table>

## Qualification system

The final mark is the sum of the following qualifications:

\[
\text{Final Mark} = 0,3 \text{ NA2} + 0,3 \text{ NA3} + 0,4 \text{ NA4}
\]

NA2: Activity 2  
NA3: Activity 3  
NA4: Activity 4 (Final exam)

In case of being unable to pass the activities 2 or 3, the student will have a second opportunity for the day of the final exam.

## Regulations for carrying out activities

Except the exam, the teacher is available to be consulted and it's possible to discuss the activities with the other students. A forum in ATENEA is enable to discuss and share information between the students or to ask for help from other students.
220008 - Airspace, Air Navigation and Infrastructure

Bibliography

Basic:


Complementary:


Others resources:

Hyperlink

www.eurocontrol.int
  Eurocontrol

www.icao.int
  International Civil Aviation Organization

www.aena.es
  Aeropuertos Españoles y Navegación Aérea

www.ignss.org
  International Global Navigation Satellite System Society

www.esa.int
  European Space Agency