300420 - ATM-OA - Sesar: Single European Sky ATM Research

Coordinating unit: 300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: 701 - AC - Department of Computer Architecture
Academic year: 2018
Degree: BACHELOR'S DEGREE IN AIR NAVIGATION ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING (Syllabus 2015). (Teaching unit Optional)
BACHELOR'S DEGREE IN AIRPORT ENGINEERING (Syllabus 2010). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: English

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

Prior skills
English

Degree competences to which the subject contributes

Specific:
1. CE 9 AERO. Comprender la globalidad del sistema de navegación aérea y la complejidad del tráfico aéreo.
   (CIN/308/2009, BOE 18.2.2009)

Transversal:
2. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.
3. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.

Teaching methodology
Exposition classes and activities

Learning objectives of the subject
At the end of the course the student should be able to:
- Explain the meaning of 4D trajectories, network operations, SWIM, CDM and traffic synchronization.
- Identify novelties and contributions in research articles on ATM.
- Use/develop evaluation tools to measure the efficiency of the air space.
- Determine, from SESAR official documents, the advantages and inconveniences of the different research contributions.
- Synthesize in a research paper some novel ideas on air traffic management, apply methods to test the ideas and present the results.
### Study load

| Total learning time: 150h | Hours large group: 26h 17.33% | Hours small group: 26h 17.33% | Guided activities: 14h 9.33% | Self study: 84h 56.00% |
## Content

<table>
<thead>
<tr>
<th>(ENG) Introduction to research</th>
<th>Learning time: 9h</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 1h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 2h</td>
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<tr>
<td></td>
<td>Guided activities: 1h</td>
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<tr>
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<td>Self study : 5h</td>
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**Related activities:**
(ENG) A0, A1

<table>
<thead>
<tr>
<th>(ENG) Organization of SESAR JU</th>
<th>Learning time: 3h 30m</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 1h</td>
</tr>
<tr>
<td></td>
<td>Self study : 2h 30m</td>
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</table>

**Description:**
(ENG) Institutions involved in the Joint Undertaking. Budget. Projects. Stakeholders

**Related activities:**
(ENG) A0, E1

<table>
<thead>
<tr>
<th>(ENG) Current and future air traffic</th>
<th>Learning time: 24h 30m</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study : 14h 30m</td>
</tr>
</tbody>
</table>

**Description:**

**Related activities:**
(ENG) A0, A2, A3, E1

<table>
<thead>
<tr>
<th>(ENG) Complexity theory</th>
<th>Learning time: 13h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
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<tr>
<td></td>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 1h</td>
</tr>
<tr>
<td></td>
<td>Self study : 8h 30m</td>
</tr>
</tbody>
</table>

**Description:**

**Related activities:**
(ENG) A0, A4, E1
<table>
<thead>
<tr>
<th><strong>(ENG) Functional Airspace Blocks</strong></th>
<th><strong>Learning time:</strong> 24h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td>(ENG) Dynamic sectorization</td>
<td>Laboratory classes: 4h</td>
</tr>
<tr>
<td><strong>Related activities:</strong></td>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td>(ENG) A0, A5, E2</td>
<td>Self study: 14h 30m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>(ENG) Business Trajectory Management</strong></th>
<th><strong>Learning time:</strong> 19h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 1h</td>
</tr>
<tr>
<td><strong>Related activities:</strong></td>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td>(ENG) A0, A6, E2</td>
<td>Self study: 12h 30m</td>
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<table>
<thead>
<tr>
<th><strong>(ENG) Flight synchronization</strong></th>
<th><strong>Learning time:</strong> 21h 30m</th>
</tr>
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<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 3h</td>
</tr>
<tr>
<td>(ENG) Contracts for trajectory execution. Controlled Time of Arrivals/Over. Multiples TCA/TCOs</td>
<td>Laboratory classes: 4h</td>
</tr>
<tr>
<td><strong>Related activities:</strong></td>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td>(ENG) A0, A6, E2</td>
<td>Self study: 12h 30m</td>
</tr>
</tbody>
</table>
### (ENG) Ground flight information systems

**Description:**
(ENG) Aeronautic datalinks: air/air, air/ground, ground/ground. Information systems. Tools for collaborative decision.

**Related activities:**
(ENG) A0, E1

**Learning time:** 8h 30m  
Theory classes: 6h  
Self study: 2h 30m

### (ENG) Conflict Automation

**Description:**

**Related activities:**
(ENG) A0, A6, E2

**Learning time:** 22h 30m  
Theory classes: 4h  
Laboratory classes: 4h  
Guided activities: 2h  
Self study: 12h 30m
### Planning of activities

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Support materials</th>
<th>Descriptions of the assignments due and their relation to the assessment</th>
<th>Specific objectives</th>
</tr>
</thead>
</table>
| **A0** | **Hours:** 26h  
Theory classes: 26h | Slides            | none                                                                   | Theory             |
| **A1** | **Hours:** 8h  
Laboratory classes: 2h  
Guided activities: 1h  
Self study: 5h | Atenea            | D1 (5%)                                                               | Practic knowledge |
| **A2** | **Hours:** 9h  
Laboratory classes: 2h  
Guided activities: 1h  
Self study: 6h | Atenea            | D2 (5%)                                                               | Data processing    |
### A3

**Description:**
Airspace performance indicators

**Support materials:**
Same as A2

**Descriptions of the assignments due and their relation to the assessment:**
D3 (5%)

**Specific objectives:**
Data processing and validation

**Hours:** 9h  
Laboratory classes: 2h  
Guided activities: 1h  
Self study: 6h

### A4

**Description:**
Network Simulations

**Support materials:**
Same as A2 plus processing tool

**Descriptions of the assignments due and their relation to the assessment:**
D4 (5%)

**Specific objectives:**
Learning of processing tool

**Hours:** 9h  
Laboratory classes: 2h  
Guided activities: 1h  
Self study: 6h

### A5

**Description:**
Practice of dynamic sectoring

**Support materials:**
Atenea

**Descriptions of the assignments due and their relation to the assessment:**
D5 (15%)

**Specific objectives:**
Practics and Theoretical knowledge. CE9

**Hours:** 21h  
Laboratory classes: 6h  
Guided activities: 3h  
Self study: 12h
### A6

**Description:**
- Project on future ATM

**Support materials:**
- Atenea

**Descriptions of the assignments due and their relation to the assessment:**
- D6 (25%)

**Specific objectives:**
- Practic and theoretic knowledge. CE9.

**Hours:** 48h  
- Laboratory classes: 12h  
- Guided activities: 6h  
- Self study: 30h

### E1

**Description:**
- Exam 1

**Support materials:**
- Bibliography

**Descriptions of the assignments due and their relation to the assessment:**
- C1 (20%)

**Specific objectives:**
- Validation of acquired knowledge

**Hours:** 10h  
- Self study: 10h

### E2

**Description:**
- Exam 2

**Support materials:**
- Bibliography

**Descriptions of the assignments due and their relation to the assessment:**
- C2 (20%)

**Specific objectives:**
- Validation of acquired knowledge

**Hours:** 10h  
- Self study: 10h

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### Qualification system

Weighted mean within activities

### Regulations for carrying out activities

Individual
### Bibliography

**Basic:**