19602 - TISAA - Test and Instrumentation Systems in Aerospace Applications

Coordinating unit: 300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering
Academic year: 2018
Degree: MASTER'S DEGREE IN AEROSPACE SCIENCE AND TECHNOLOGY (Syllabus 2015). (Teaching unit Optional)
MASTER'S DEGREE IN AEROSPACE SCIENCE AND TECHNOLOGY (Syllabus 2009). (Teaching unit Optional)
DOCTORAL DEGREE IN AEROSPACE SCIENCE AND TECHNOLOGY (Syllabus 2007). (Teaching unit Optional)
ECTS credits: 5 Teaching languages: English

Teaching staff
Coordinator: Defined at the infoweb
Others: Defined at the infoweb

Prior skills
1. Basic Circuit Analysis
2. Laplace transform, circuits in Laplace space, zeros, poles analysis.
3. Fourier Transform, frequency analysis.

Learning objectives of the subject
When finishing this matter, students should be able to:
1. Design, implement and verify data acquisition systems
2. Specify, select, and test circuits, subsystems and instruments to measure physical quantities.
3. Design and perform experiments on circuits, electronic measurement systems and instruments, and assess the results.
4. Implement automatic test and virtual instrumentation systems.
5. Process data of acquisition or sensors systems.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group: 45h</th>
<th>36.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Hours small group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>80h</td>
<td>64.00%</td>
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## Content

<table>
<thead>
<tr>
<th>Measurement Fundamentals</th>
<th>Learning time: 32h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 16h</td>
</tr>
<tr>
<td></td>
<td>Self study: 16h</td>
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</table>

**Description:**
Understanding instrumentation systems specifications and performance (Instruments seen as a black box)

**Specific objectives:**
- Measurement Basics
- Errors & Uncertainty
- Accuracy & Calibration
- Interfacing instrumentation systems
- Data Acquisition Rate

<table>
<thead>
<tr>
<th>Automatic Test Equipment</th>
<th>Learning time: 16h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 8h</td>
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<tr>
<td></td>
<td>Self study: 8h</td>
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</tbody>
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**Description:**
Understanding how to combine several (many) instrumentation systems to build a test system for an aerospace application, being able to choose among the several options existing currently in the market.

**Specific objectives:**
- I/O Devices
- Instrumentation Buses
- Test Software

<table>
<thead>
<tr>
<th>Instrumentation Systems Design</th>
<th>Learning time: 16h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 8h</td>
</tr>
<tr>
<td></td>
<td>Self study: 8h</td>
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</tbody>
</table>

**Description:**
Understanding what is inside instrumentation systems black box

**Specific objectives:**
- Instrumentation systems building blocks
- Noise
- Interference
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**Project-Laboratory**

<table>
<thead>
<tr>
<th>Learning time: 61h</th>
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<tbody>
<tr>
<td>Theory classes: 13h</td>
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<tr>
<td>Self study: 48h</td>
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</table>

**Description:**
Design and implementation of a test system controlling several instrumentation systems to measure physical quantities.

**Specific objectives:**
Building and automated test environment (Labview), automated control of instruments (using GPIB) and data-acquisition systems, measurements and uncertainties analysis.

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**Bibliography**

**Basic:**