

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.

Degree competences to which the subject contributes

Basic:

- CB6. (ENG) CB6 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.
- CB7. (ENG) CB7 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.
- CB8. (ENG) CB8 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios.
- CB9. (ENG) CB9 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades.
- CB10. (ENG) CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

Specific:

- CE2 MAST. (ENG) CE2: Utilizar las herramientas, dispositivos, y sistemas que permiten realizar el acondicionamiento tanto analógico como digital de señal.
- CE4 MAST. (ENG) CE4: Aplicar el método científico para el estudio de la fenomenología particular del ambiente aeroespacial.

Generic:

- CG2 MAST. (ENG) CG2: Identificar y aplicar los análisis teóricos, experimentales y numéricos fundamentales de uso actual en ingeniería aeroespacial.

Transversal:

- CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.
- CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim

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of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT1b. ENTREPRENEURSHIP AND INNOVATION: Being aware of and understanding the mechanisms on which scientific research is based, as well as the mechanisms and instruments for transferring results among socio-economic agents involved in research, development and innovation processes.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

Teaching methodology

The theoretical knowledge is presented in expository class sessions that are complemented with problem-solving class sessions. Practical knowledge is acquired through the development of a team project at the lab.

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

Total learning time: 125h	Hours large group:	45h	36.00%
	Hours medium group:	0h	0.00%
	Hours small group:	0h	0.00%
	Guided activities:	0h	0.00%
	Self study:	80h	64.00%

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Content

<p>Measurement Fundamentals</p>	<p>Learning time: 32h Theory classes: 16h Self study : 16h</p>
<p>Description: Understanding instrumentation systems specifications and performance (Instruments seen as a black box)</p> <p>Specific objectives: Measurement Basics Errors & Uncertainty Accuracy & Calibration Interfacing instrumentation systems Data Acquisition Rate</p>	
<p>Automatic Test Equipment</p>	<p>Learning time: 16h Theory classes: 8h Self study : 8h</p>
<p>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.</p> <p>Specific objectives: I/O Devices Instrumentation Buses Test Software</p>	
<p>Instrumentation Systems Design</p>	<p>Learning time: 16h Theory classes: 8h Self study : 8h</p>
<p>Description: Understanding what is inside instrumentation systems black box</p> <p>Specific objectives: Instrumentation systems building blocks Noise Interference</p>	

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Project-Laboratory	Learning time: 61h Theory classes: 13h Self study : 48h
<p>Description: Design and implementation of a test system controlling several instrumentation systems to measure physical quantities</p> <p>Specific objectives: Building and automated test environment (Labview), automated control of instruments (using GPIB) and data-acquisition systems, measurements and uncertainties analysis.</p>	

Bibliography

Basic:

Merhav, Shmuel. Aerospace sensor systems and applications. Berlin: Springer-Verlag, cop. 1996. ISBN 0387946055.

Pallás Areny, Ramón; Webster, John G. Sensors and signal conditioning. 2nd ed. New York [etc.]: John Wiley & Sons, cop. 2001. ISBN 9780471332329.