Last update: 24-05-2016

340606 - SENS-R2O10 - Sensors and Mems

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering

Teaching unit: 710 - EEL - Department of Electronic Engineering

Academic year: 2016

Degree: MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012). (Teaching unit Compulsory)

ECTS credits: 5 Teaching languages: Catalan, Spanish, English

Teaching staff

Coordinator: Jordi Prat Tasias

Prior skills

Basic knowledge of circuit theory, basic electronics, basics of programming and digital electronics.

Degree competences to which the subject contributes

Specific:

1. CEV08 - Ability to select sensors and preparation for the design of measurement systems.

2. CEV09 -Ability to design and test instrumentation systems, and make their integration and programming using devices of measurement and data acquisition
3. CG03 - Ability to combine various electronic functional blocks for a complex system.

Teaching methodology

This subject uses a teaching methodology based on lectures, individual assignments, exercises and laboratory experimentation.

Learning objectives of the subject

Know and use different types of sensors used in industrial and research applications.

Study load

Total learning time: 125h	Hours large group:	22h 30m	18.00%
	Hours medium group:	0h	0.00%
	Hours small group:	22h 30m	18.00%
	Guided activities:	0h	0.00%
	Self study:	80h	64.00%

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Content

Electrònic Instrumentation Introduction

Learning time: 6h
Theory classes: 2h
Self study : 4h

Description:
Brief description of the historical evolution of the devices used to perform measurements of different types, and how electronics and microelectronics revolutionizes the ability to perform measurements.

Sensors and Microsensors

Learning time: 10h
Theory classes: 4h
Self study : 6h

Description:
Despcripción of the capabilities and limitations of the sensors and microsensors

Specific objectives:

Sensors for measuring deformation, temperature and displacement

Learning time: 37h 30m
Theory classes: 12h 30m
Self study : 25h

Description:
Description of several sensors for measuring deformation, temperature and displacement

Smart Sensors Systems. IEEE1451 and OGC proposals for sensors integration

Learning time: 6h
Theory classes: 2h
Self study : 4h

Description:
Description of the international standardization proposals like IEEE 1451 and OGC, in the processes of sensors integration.

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Introduction to instrumentation systems	Learning time: 8h Theory classes: 2h Self study : 6h
Description: Introduction to data acquisition boards	

Planning of activities

Projects about sensor integration in data acquisicion systems	Hours: 14h 30m Self study: 10h Laboratory classes: 4h 30m
Description: During the course students will build different measurement and calibration projects with commercial sensors and acquisition systems to implement real measurement systems.	

Laboratory experimentation. Study of an LVDT sensor. Implementation the conditioning circuit of the sensor.	Hours: 43h Self study: 25h Laboratory classes: 18h

Qualification system

The student will be evaluated independently on the theoretical part (55%), with two written tests and a theoretical work. The practical part (45%) is evaluated including labs and a mini-project.

Regulations for carrying out activities

The student has to attend all theoretical and practical lectures and delivering all the exercises.

Bibliography

Basic:

Gardner, Julian W; Varadan, Vijay K; Awadelkarim, Osama O. Microsensors, MEMS, and smart devices. Chichester [etc.]: John Wiley & Sons, 2001. ISBN 047186109X.

Pérez García, Miguel Ángel. Instrumentación electrónica. 2a ed. Madrid: Thomson, 2004. ISBN 9788497321662.

Pallás Areny, Ramón. Sensores y acondicionadores de señal. 4a ed. Barcelona [etc.]: Marcombo Boixareu, 2003. ISBN 8426713440.

Shariat Panahi, Shahram; Río Fernández, Joaquín del; Sarriá Gandul, David; Manuel Lázaro, Antonio. LabVIEW: programación para sistemas de instrumentación. Madrid: Ibergarceta Publicaciones, 2011. ISBN 9788492812684.