

320163 - TCSE - Control Technology for Electromechanical Systems

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
 Teaching unit: 707 - ESAII - Department of Automatic Control
 Academic year: 2019
 Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
 ECTS credits: 6 Teaching languages: English

Teaching staff

Coordinator: Perez Magrane, Ramon
 Others: Damunt Masip, Jordi
 Masip Alvarez, Albert

Degree competences to which the subject contributes

Specific:

- CE29. (ENG) ELE: Coneixements i capacitats per aprofundir en tecnologies específiques de l'àmbit.
- CE30. (ENG) ELE: Capacitat per participar en la gestió d'empreses i ser coneixedors dels mercats internacionals.
- CE27. ELE: Capability for electrical installations design.

Teaching methodology

Presential sessions

- a) Classroom, master class of theoretical contents and simulated demonstrations, problems are stated and doubts solved.
- b) Laboratory sessions. The students develop practical experiences in the lab.
- c) Evaluation sessions. Individual controls over the matter.

Non-presential work

- d) Individual study and problem solving
- e) Preparation of exercises and projects to deliver

Learning objectives of the subject

The objective of the subject is to train the student to:
 State, understand and express the electromechanic control problem;
 Design the control architecture to be used;
 Select the control technology.

Study load

Total learning time: 150h	Hours large group:	30h	20.00%
	Hours small group:	30h	20.00%
	Self study:	90h	60.00%

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Content

<p>(ENG) Tema 1: Tecnologia de control</p>	<p>Learning time: 30h Theory classes: 10h Self study : 20h</p>
<p>Description: Properties and applications of Multivariable Control Structures; coupled systems; static and dynamic decouplers.</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> - Disturbances and non-linearities of processes. - Multivariable control structures - Coupled systems. - Static and dynamic decouplers - Application on a real system: Twin Rotor MIMO System 	
<p>(ENG) Tema 2: Control de màquina</p>	<p>Learning time: 60h Theory classes: 10h Laboratory classes: 15h Self study : 35h</p>
<p>Description: The control strategies applied to the electrical machine</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> - Introduction to electric drives and rotary systems - The cascade control and symmetrical optimum method - The electrical generator in wind turbines and its control 	
<p>(ENG) Tema 3: Wind turbine control</p>	<p>Learning time: 60h Theory classes: 10h Laboratory classes: 15h Self study : 35h</p>
<p>Description: The control knowledge is applied to a wind-turbine.</p> <p>Related activities: A1, A2, A3 i A4</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> -Wind turbine description and classification. -Wind turbine modelling. -Control problem statement. -Control design. 	



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Planning of activities

(ENG) CLASSE MAGISTRAL	Hours: 50h Theory classes: 30h Self study: 20h
<p>Description: Classroom, master class of theoretical contents and simulated demonstrations, problems are stated and doubts solved.</p> <p>Support materials: Presentations and bibliography</p>	
(ENG) TREBALL LABORATORI	Hours: 80h Laboratory classes: 30h Self study: 50h
<p>Description: Laboratory sessions. The students develop practical experiences in the lab.</p> <p>Support materials: Work description and software.</p> <p>Specific objectives: Deepen in the two applications (wind-turbines and motors)</p>	
(ENG) PROVA PARCIAL	Hours: 2h Theory classes: 2h
<p>Description: Writing test of the first bimester including laboratory</p> <p>Support materials: Formulary</p> <p>Descriptions of the assignments due and their relation to the assessment: Exam</p> <p>Specific objectives: To evaluate the individual achievement of the objectives</p>	
(ENG) FINAL TEST	Hours: 2h Theory classes: 2h
<p>Description: Writing test of the whole course including laboratory</p> <p>Support materials: Formulary</p> <p>Descriptions of the assignments due and their relation to the assessment: Exam</p>	

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Specific objectives:

To evaluate the individual achievement of the objectives

Qualification system

Exam Control Technology: 20%
Exam Wind Turbine: 20%
Exam Electric Machines: 20%
Laboratory Wind Turbine: 20%
Laboratory Electric Machines: 20%

Regulations for carrying out activities

Compulsory assistance to activities A2, A3 and A4

Bibliography

Basic:

Seborg, D.E.; Edgar, T.F.; Mellichamp, D.A. Process dynamics and control. 2nd ed. Hoboken: John Wiley & Sons, 2004. ISBN 9780471000778.

Rodríguez, J.L.; Arnalte, S.; Burgos, J.C. Sistemas eólicos de producción de energía eléctrica. Alcorcón: Rueda, 2003. ISBN 8472071391.