



Course guide

320163 - TCSE - Control Technology for Electromechanical Systems

Last modified: 02/04/2024

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** English

LECTURER

Coordinating lecturer: 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

Type	Hours	Percentage
Hours small group	30,0	20.00
Self study	90,0	60.00
Hours large group	30,0	20.00

Total learning time: 150 h

CONTENTS

(ENG) Tema 1: Tecnologia de control

Description:

Properties and applications of Multivariable Control Structures; coupled systems; static and dynamic decouplers.

Specific objectives:

- Disturbances and non-linearities of processes.
- Multivariable control structures
- Coupled systems.
- Static and dynamic decouplers
- Application on a real system: Twin Rotor MIMO System

Full-or-part-time: 30h

Theory classes: 10h

Self study : 20h

(ENG) Tema 2: Control de màquina

Description:

The control strategies applied to the electrical machine

Specific objectives:

- Introduction to electric drives and rotary systems
- The cascade control and symmetrical optimum method
- The electrical generator in wind turbines and its control

Full-or-part-time: 60h

Theory classes: 10h

Laboratory classes: 15h

Self study : 35h

(ENG) Tema 3: Wind turbine control

Description:

The control knowledge is applied to a wind-turbine.

Specific objectives:

- Wind turbine description and classification.
- Wind turbine modelling.
- Control problem statement.
- Control design.

Related activities:

A1, A2, A3 i A4

Full-or-part-time: 60h

Theory classes: 10h

Laboratory classes: 15h

Self study : 35h

ACTIVITIES

(ENG) CLASSE MAGISTRAL

Description:

Classroom, master class of theoretical contents and simulated demonstrations, problems are stated and doubts solved.

Material:

Presentations and bibliography

Full-or-part-time: 50h

Self study: 20h

Theory classes: 30h

(ENG) TREBALL LABORATORI

Description:

Laboratory sessions. The students develop practical experiences in the lab.

Specific objectives:

Deepen in the two applications (wind-turbines and motors)

Material:

Work description and software.

Full-or-part-time: 80h

Self study: 50h

Laboratory classes: 30h

(ENG) PROVA PARCIAL

Description:

Writing test of the first bimester including laboratory

Specific objectives:

To evaluate the individual achievement of the objectives

Material:

Formulary

Delivery:

Exam

Full-or-part-time: 2h

Theory classes: 2h



(ENG) FINAL TEST

Description:

Writing test of the whole course including laboratory

Specific objectives:

To evaluate the individual achievement of the objectives

Material:

Formulary

Delivery:

Exam

Full-or-part-time: 2h

Theory classes: 2h

GRADING SYSTEM

Exam Control Technology: 20%

Exam Wind Turbine: 20%

Exam Electric Machines: 20%

Laboratory Wind Turbine: 20%

Laboratory Electric Machines: 20%

EXAMINATION RULES.

Compulsory assistance to activities A2, A3 and A4

BIBLIOGRAPHY

Basic:

- Seborg, Dale E. [et al.]. Process dynamics and control [on line]. 4th ed. Hoboken, NJ: Wiley, 2017 [Consultation: 25/06/2024]. Available on :

<https://web-p-ebscohost-com.recursos.biblioteca.upc.edu/ehost/ebookviewer/ebook?sid=e60b0ee7-b56f-4f9e-9cd2-f53d9a527780%40redis&vid=0&format=EB>. ISBN 9781119285915.

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