Course guide
320163 - TCSE - Control Technology for Electromechanical Systems

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: 2023  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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h
### (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
Theory classes: 30h
Self study: 20h

**(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
Laboratory classes: 30h
Self study: 50h

**(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 assitance to activities A2, A3 and A4

**BIBLIOGRAPHY**
**Basic:**