Last update: 16-03-2018

820130 - TCEE - Control Techniques

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering

Teaching unit: 709 - EE - Department of Electrical Engineering

Academic year: 2017

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
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ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Matas Alcala, Jose

Degree competences to which the subject contributes

Specific:

1. Understand automatic regulation and control techniques and their application to industrial automation.

Transversal:

4. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

Teaching methodology

The course uses master classes by 30%, individual work by 60%, work in groups (cooperative or not) by 10%.

Learning objectives of the subject

To study the control of feedback systems, while introducing input-output relationships in the electromechanical systems, along with the time-domain response.

Study load

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

(ENG) Item 1: Feedback systems.

Learning time: 23h 20m

Theory classes: 7h
Self study : 16h 20m

Description:
The concepts of feedback systems and transfer fucntion are introduced, along with the use of block diagrams for the representation of systems.

Specific objectives:
Feedback system concept.
Transfer function concept.
System representation by block diagrams.

(ENG) Item 2: Linear systems time domain analysis.

Learning time: 25h 20m

Theory classes: 7h
Laboratory classes: 2h
Self study : 16h 20m

Description:
Time response of first and second order systems is studied, also the case of multiple-input systems.

Specific objectives:
Time response of first order systems.
Time response of second order systems.
Multiple-input systems.

(ENG) Item 3: Frequency response. Stability.

Learning time: 25h 20m

Theory classes: 7h
Laboratory classes: 2h
Self study : 16h 20m

Description:
Frequency-domain techniques for the analysis of linear systems are introduced. Bode plots. Polar plot. Stability.

Specific objectives:
Isochronous transfer function.
Bode diagramas. Polar diagram.
Stability.

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(ENG) Item 5: Time domain behaviour.	Learning time: 25h 20m Theory classes: 7h Laboratory classes: 2h Self study : 16h 20m

Description:
Feedback systems error. PID controllers. Tuning methods. Lead, lag and lag-lead compensators.

(ENG) Item 6: The root-locus technique.	Learning time: 25h 20m Theory classes: 7h Laboratory classes: 2h Self study : 16h 20m

Description:
The root-locus technique for linear systems is introduced.

Specific objectives:
The root-locus.
Application to stability.
Application to the design of controllers.

Qualification system

The evaluation will be conducted through the assessment by the teacher, with the following weights assigned to evaluated activities:
Partial exam: 25%, Specific work: 20% Laboratory practice: 20% Final exam: 35%.
This subject will not have a re-evaluation exam.

Regulations for carrying out activities

The attendance to the laboratory sessions is mandatory.

Bibliography

Basic:

Ogata, Katsuhiko. Ingeniería de control moderna. 5a ed. Madrid [etc.]: Pearson Educación, cop. 2010. ISBN 9788483226605.

Kuo, Benjamin C. Sistemas de control automático. México: Prentice Hall Hispanoamericana, 1996. ISBN 9688807230.

Complementary:

Ogata, Katsuhiko. Problemas de ingeniería de control utilizando MATLAB. Madrid: Prentice Hall Iberia, 1999. ISBN 8483220466.