240AR058 - Robust Control

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 707 - ESAI - Department of Automatic Control
Academic year: 2019
Degree: MASTER’S DEGREE IN AUTOMATIC CONTROL AND ROBOTICS (Syllabus 2012). (Teaching unit Optional)
ECTS credits: 4.5
Teaching languages: English

Teaching staff
Coordinator: RAMON COSTA CASTELLÓ
Others: RAMON COSTA CASTELLÓ, VICENÇ PUIG CAYUELA

Prior skills

Degree competences to which the subject contributes

Specific:
1. The student will be able to analyze and design linear systems (single and multiple variables, external and internal representation) and nonlinear systems. This includes their stability, controller design and evaluation of closed-loop response.
2. The student will be able to use analysis tools and computer-aided design of control systems in the tasks usual analysis, simulation and controller design.

General:
3. Ability to lead, plan and monitor multidisciplinary teams.
4. Have adequate mathematical skills, analytical, scientific, instrumental, technological, and management information.

Learning objectives of the subject

Study load

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
<th>Hours large group: 40h 30m</th>
<th>36.00%</th>
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</thead>
<tbody>
<tr>
<td>Self study:</td>
<td>72h</td>
<td>64.00%</td>
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## Content

<table>
<thead>
<tr>
<th>Concept</th>
<th>Learning time: 22h 30m</th>
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<tbody>
<tr>
<td><strong>Robust control concepts</strong></td>
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<tr>
<td><strong>Description:</strong> Internal model principle.</td>
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<tr>
<td><strong>Related activities:</strong> Lectures and practice sessions</td>
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<td><strong>Specific objectives:</strong> To fix the appropriate controller architecture for a given systems, disturbances and references.</td>
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<tr>
<td><strong>General servo-mechanism problem</strong></td>
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<tr>
<td><strong>Description:</strong> Principle of the internal model. Observer of disruptions</td>
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<tr>
<td><strong>Related activities:</strong> Sessions of theory and problems.</td>
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<tr>
<td><strong>Specific objectives:</strong> Select and design the architecture of the control system from a description of the systems, the references we want to work with and the disturbances taking place.</td>
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<td><strong>Linear matrix inequalities in control</strong></td>
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<td><strong>Related activities:</strong> Lectures and problems.</td>
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<tr>
<td><strong>Specific objectives:</strong> Using LMI to synthesize controllers for simple plants.</td>
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## Linear parameter varying systems

**Learning time:** 30h  
Theory classes: 12h  
Self study: 18h

**Description:**  
Formulation and resolution of main problems in linear systems with varying parameters. Basic theory and examples.

**Related activities:**  
Lectures and practice sessions

**Specific objectives:**  
Modeling and controller design using linear systems with varying parameters.

## Robust identification

**Learning time:** 15h  
Theory classes: 6h  
Self study: 9h

**Description:**  
Obtaining models and uncertainty from experimental data. Model validation.

**Related activities:**  
Lectures and problems.

**Specific objectives:**  
Using robust identification tools.

## Bibliography

**Basic:**

**Complementary:**