Course guides
230657 - CTA - Control Theory and Applications

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.
Degree: MASTER’S DEGREE IN ELECTRONIC ENGINEERING (Syllabus 2013). (Optional subject).
MASTER’S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Optional subject).
MASTER’S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Optional subject).

Academic year: 2019  ECTS Credits: 5.0  Languages: English

LECTURER
Coordinating lecturer: DOMINGO BIEL, FRANCESC GUINJOAN
Others: ALBERTO POVEDA, EDUARD ALARCÓN

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
1. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
2. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

TEACHING METHODOLOGY
- Lectures- Laboratory classes- Exercises- Other activities- Extended answer test (Final Exam)

LEARNING OBJECTIVES OF THE SUBJECT

Learning objectives of the subject:The aim of this course is to introduce the students in time-domain and frequency-domain methods used to analyse and design linear control systems in both continuous and discrete-time fields.

Learning results of the subject:- Ability to understand the basic concepts related to feedback system in both continuous-time and discrete-time fields.- Ability to apply the root locus technique and the Routh stability criteria for the analysis of control systems.- Ability to design the proper controllers to verify some control specifications in both time-domain and frequency domain.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Self study</td>
<td>86</td>
<td>68.80</td>
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<tr>
<td>Hours large group</td>
<td>39</td>
<td>31.20</td>
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</tbody>
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Total learning time: 125 h
**CONTENTS**

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<th>Section</th>
<th>Description</th>
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<tr>
<td><strong>1. Introduction to linear control systems</strong></td>
<td>- Basic components of a control system, reference, control, output and disturbance signals. - Control system goals. - Continuous-time control and discrete-time control. - Dynamic systems classification: linear and nonlinear systems, time-varying and time-invariant systems. - Transfer function of linear systems.</td>
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<td><strong>3. Continuous-time control systems design</strong></td>
<td>- Control design through root locus. - First and second-order controllers. - PID controllers. - Implementation issues of PID controllers.</td>
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<tr>
<td><strong>5. Frequency-domain control design</strong></td>
<td>- Frequency-domain specifications: relative stability margins and bandwidth of a control system. - Lead-lag and phase-lag compensations.</td>
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**ACTIVITIES**

**LECTURES**
**EXERCISES**

**Description:**
Exercises to strengthen the theoretical knowledge.

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**OTHER ACTIVITIES**

**Description:**
Numerical simulation homework

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**EXTENDED ANSWER TEST (FINAL EXAM)**

**Description:**
Final examination.

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**GRADING SYSTEM**

Mid course exam (50%) Final exam (50%)

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**BIBLIOGRAPHY**

**Basic:**

**Complementary:**