

Course guide

340603 - SIAC-R1007 - Advanced Control Systems

Last modified: 17/05/2023

Unit in charge: Vilanova i la Geltrú School of Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012).
(Compulsory subject).

Academic year: 2023 **ECTS Credits:** 5.0 **Languages:** Catalan, English

LECTURER

Coordinating lecturer: PAU MARTI COLOM

Others: PAU MARTI COLOM

PRIOR SKILLS

In construction

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. CC01 - Ability to research, design, develop and characterize advanced control systems that enable the dynamic system behave according to the operational performance requirements.
2. CC02- capacity and analyzing the results of the advanced control system integrated into the automated process, formulating alternatives in design or implementation if the controlled system does not reach the required specification.

Transversal:

3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.
4. 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.

TEACHING METHODOLOGY

Combination of theoretical classes, problem based learning and lab classes

LEARNING OBJECTIVES OF THE SUBJECT

Students will be able to analyse, design and implement advanced control systems

STUDY LOAD

Type	Hours	Percentage
Self study	80,0	64.00
Hours large group	15,0	12.00
Hours small group	30,0	24.00

Total learning time: 125 h

CONTENTS

Introduction

Description:

Introduction

Specific objectives:

In construction

Related activities:

In construction

Full-or-part-time: 2h

Theory classes: 2h

Linear systems

Description:

State space models for linear systems

Specific objectives:

In construction

Related activities:

In construction

Full-or-part-time: 4h

Theory classes: 4h

Non-linear systems

Description:

Non-linear systems

Specific objectives:

In construction

Related activities:

In construction

Full-or-part-time: 4h

Theory classes: 4h



Advanced techniques for controller design

Description:

Advanced techniques for controller design

Specific objectives:

In construction

Related activities:

In construction

Full-or-part-time: 5h

Theory classes: 5h

ACTIVITIES

Systems modeling

Description:

In construction

Specific objectives:

In construction

Material:

In construction

Delivery:

In construction

Full-or-part-time: 4h

Laboratory classes: 4h

Controller design

Description:

Controller design

Material:

In construction

Delivery:

In construction

Full-or-part-time: 6h

Laboratory classes: 6h



Control design feasibility

Description:

Control design feasibility

Specific objectives:

In construction

Material:

En construcción

Delivery:

In construction

Full-or-part-time: 4h

Laboratory classes: 4h

Controller implementation

Description:

Controller implementation

Specific objectives:

In construction

Material:

In construction

Delivery:

In construction

Full-or-part-time: 16h

Laboratory classes: 16h

GRADING SYSTEM

Final mark: 50% Theory + 50% Labs

Theory is evaluated via exams

Labs are as evaluated according to the lab deliveries.

EXAMINATION RULES.

Exams are with computer and with class notes



BIBLIOGRAPHY

Basic:

- Franklin, Gene F; Powell, J. David; Workman, Michael L. Digital control of dynamic systems. 3rd ed. Menlo Park [etc.]: Addison-Wesley, 1998. ISBN 0201820544.
- Aström, Karl J ; Wittenmark, Björn. Computer-controlled systems: theory and design [on line]. 3rd ed. Mineola, NY: Prentice-Hall International, 2011 [Consultation: 13/02/2024]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=1893090>. ISBN 9780486486130.
- Franklin, Gene F. ; Powell, J. David; Emami-Naeini, Abbas. Feedback control of dynamic systems. 7th ed. Upper Saddle River [etc.]: Pearson, 2015. ISBN 9781292068909.
- Luenberger, David G. Introduction to dynamic systems: theory, models and applications. New York, NY [etc.]: John Wiley and Sons, 1979. ISBN 0471025941.
- Slotine, Jean-Jacques E. ; Li, Weiping. Applied nonlinear control. Englewood Cliffs, NJ: Prentice-Hall, 1991. ISBN 0130408905.