

Course guide 340130 - ENCO-K6007 - Control Engineering

Last modified: 06/02/2025

Unit in charge: Teaching unit:	Vilanova i la Geltrú School of Engineering 707 - ESAII - Department of Automatic Control.	
Degree:	BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject). BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Compulsory subject). BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).	
Academic year: 2024	ECTS Credits: 6.0 Languages: Catalan, Spanish	

LECIURER	
Coordinating lecturer:	Francisco Javier Ruiz Vegas
Others:	Francisco Javier Ruiz Vegas Ramón Guzmán Solà

PRIOR SKILLS

It is advisable to have taken and passed the subjects Fundamentals of Automation (FOAU) and Automatic Regulation (REAU).

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

- 1. CE25. Knowledge and ability of systems modeling and simulation.
- 2. CE26. Knowledge of automatic regulation and control techniques and its application into industrial automatization.
- 3. CE29. Ability to design automotion control systems.

TEACHING METHODOLOGY

Face-to-face training activities

- Expository and participatory classes
- Carrying out individual and/or group exercises
- Carrying out individual and/or group laboratory practices
- Tutoring and formative evaluation of the learning process
- Non-face training activities
- Review of theoretical concepts, study, work, individual and/or group
- \cdot Carrying out individual and/or group exercises. \cdot
- Preparation of individual and/or group laboratory practices

LEARNING OBJECTIVES OF THE SUBJECT

The subject Engineering of Control tries:

- Standardization of knowledge of the students in Control Engineering on the analysis of linear control systems in continuous time as well as discrete time.

- To enable grade students with the capacity of analysing control systems in state-space
- To enable grade students with the capacity of designing control systems in state-space



STUDY LOAD

Туре	Hours	Percentage
Hours large group	15,0	10.00
Hours small group	45,0	30.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

Analysis of control systems in state-space. Continuous systems

Description: In construction

Full-or-part-time: 6h Theory classes: 1h Self study : 5h

Analysis of control systems in state space. Discrete systems

Description:

Objectives

The specific objective of the subject is to redefine the technique of the space of state for sampled systems.

Contents

- 1. Solution of the homogenous equation
- 2. Calculation of the transition matrix.
- 3. Solution of the complete equation.

Activities, knowledge, abilities, aptitudes

The pupils will have to be able of:

- To formulate the control systems in discreet time by the route of state variables.
- To solve equations of state for systems in discreet time.

Commentaries

The development of the subject can be followed through [Dom02]. A theoretical complement, as well as of exercises and examples], [Oga99]

Full-or-part-time: 15h Theory classes: 2h Laboratory classes: 3h Self study : 10h

title english

Description: content english

Full-or-part-time: 36h Theory classes: 4h Laboratory classes: 12h Self study : 20h



title english

Description: content english

Full-or-part-time: 16h Theory classes: 2h Laboratory classes: 5h Self study : 9h

Disturbance management

Description: content english

Related competencies : . CE29. Ability to design automotion control systems.

Full-or-part-time: 15h Theory classes: 2h Laboratory classes: 4h Self study : 9h

title english

Description: content english

Full-or-part-time: 36h Theory classes: 4h Laboratory classes: 12h Self study : 20h

title english

Description: content english

Full-or-part-time: 26h Theory classes: 2h Laboratory classes: 9h Self study : 15h

GRADING SYSTEM

The grade for the course takes into account all the work done throughout the course, assessing both theoretical and practical aspects. For the theoretical part, there will be two written exams: partial (P) and final (F). The grade for the theory will be calculated as T=max (F, 0.5P+0.5F).

For the practical part, a computer test will be done during the last practice session (Pr). This test will also include a part of the content seen in the control laboratory. The final grade will be calculated as:

Final grade: 0.7 T+0.3 Pr

Students with a final grade between 2 and 4.9 can retake the course in a single reassessment exam with a theoretical part and a practical part with a weight of 100%. The final grade obtained will follow what is indicated in the School's regulations.



BIBLIOGRAPHY

Basic:

- Dominguez, Sergio ... [et al.]. Control en el espacio de estado. 2a ed. Madrid [etc.]: Prentice Hall, 2006. ISBN 8483222973.

- Ogata, Katsuhiko. Ingeniería de control moderna [on line]. 5a ed. Madrid: Pearson Prentice Hall, 2010 [Consultation: 16/02/2024]. A v a i l a b l e o n :

https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1259. ISBN 9788483226605.

- Vaccaro, Richard J. Digital control : a state-space approach. New York [etc.]: McGraw-Hill, 1995. ISBN 0-07-066781-0.

- Wang, Liuping. Model Predictive Control System Design and Implementation Using MATLAB® [Recurs electrònic] [on line]. London: Springer London, 2009 [Consultation: 12/02/2024]. Available on: https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-1-84882-331-0. ISBN 1282018310.

- Slotine, Jean-Jacques E; Li, Weiping. Applied nonlinear control. Englewood Cliffs : Upper Saddle River: Prentice Hall International, 1991. ISBN 0130408905.

- Franklin, Gene F; Powell, J. David; Emami-Naeini, Abbas. Feedback control of dynamic systems [on line]. 8th ed. Harlow, England: Pearson Education Limited, 2020 [Consultation: 06/03/2024]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5770 170. ISBN 1-292-27454-9.