



Guia docent

300107 - CONTROL - Teoria de Sistemes de Control i Enginyeria de Control

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Unitat responsable: Escola d'Enginyeria de Telecomunicació i Aeroespacial de Castelldefels

Unitat que imparteix: **Titulació:** MÀSTER UNIVERSITARI EN INTEL·LIGÈNCIA ARTIFICIAL PER A INDÚSTRIES CONNECTADES (AI4CI) (Pla 2025). (Assignatura optativa).

Curs: 2025

Crèdits ECTS: 4.0

Idiomes: Anglès

PROFESSORAT

Professorat responsable: Soenke Rhein (Univ. Ulm)
Mylene Pischella (CNAM Paris)
Steffen Moser (Univ. Ulm)
Juan Carlos Aguado (UPC)

Altres:

CAPACITATS PRÈVIES

- Fundamentals of higher mathematics, especially linear algebra
- Fundamentals of signals and systems
- Basic design methods for LTI systems in frequency domain
- Description of linear, time-invariant systems in time and frequency domain,
- Laplace transform, analysis of LTI systems (Bode and Nyquist plots)

METODOLOGIES DOCENTS

Online lectures and activities

OBJECTIUS D'APRENENTATGE DE L'ASSIGNATURA

Students are able to discuss control theory in time domain. They are capable of applying the methods of model-based control theory of linear and non-linear systems. To an increasing degree, requirements on safety, sustainability and economic feasibility of technical products and production plants call for modern approaches of control-theory-based methods. Especially in the environment of control theory, simple and heuristically designed controllers have been reaching their limits. Systematic design of model-based controllers in the time domain allows considering of non-linearities and has the potential to achieve significantly improved controller results. Students are able to describe the necessary mathematics and system-theory basics. They are able to analyze time-continuous systems in the time domain. They are able to categorize systems according to system-theoretic properties. Further, they have the ability to apply formal methods in order to design controllers in time domain. They are also able to apply methods for designing controllers for non-linear systems and are capable of managing its operation.

HORES TOTALS DE DEDICACIÓ DE L'ESTUDIANTAT

Tipus	Hores	Percentatge
Hores aprenentatge autònom	64,0	64.00
Hores grup gran	36,0	36.00

Dedicació total: 100 h



CONTINGUTS

Control System Theory and Control Engineering

Descripció:

- Linear and non-linear time-continuous systems in state space
- Linearization and general solution of linear differential equations of states
- Structural properties of LTI systems in state space (stability, controllability, observability)
- Design of state controllers and state observers for linear systems
- Analysis of non-linear systems (Lyapunov-stability)
- Control and feedback control of non-linear systems

Dedicació: 100h

Grup gran/Teoria: 36h

Aprendentatge autònom: 64h

SISTEMA DE QUALIFICACIÓ

Exams