Program	09TT- Engineering in Telecommunication Technologies and Services

Course number and name	
Number	95000066
Name	Electronic Control Systems Sistemas Electrónicos de Control
Semester	Y4-S8

Credits and contact hours	
ECTS Credits	4.5
Contact hours	45

Coordinator's name	Félix Monasterio-Huelin Maciá

Specific course information

Description of course content

This is a first course on the theoretical and practical principles of modeling, analysis and design of feedback controllers. The main objective is the design of controllers under qualitative and quantitative specifications: stability, setpoint signal tracking and suppression of perturbation signals. Students must learn to use algebraic and graphical representations of linear dynamical systems, perform numerical simulations and apply their results to real physical systems.

List of topics to be covered

1. Laplace and Z transforms. Final value theorem. 2. Transfer function and state space representation. Controllability. 3. Discretization methods. 4. Stability, steady-state and transient response. 5. Feedback control structures: direct, parallel and feedforward. Input perturbation. Control systems with two degrees of freedom. 6. Controller design: analytical techniques (algebraic), graphical techniques (root-locus, Bode, Nyquist).

Prerequisites or co-requisites

None.

Course category in the program

__ R (required)	__ E (elective)	X SE (selective elective)

Specific goals for the course

Specific outcomes of instruction

RA72 - Knowledge of feedback theory and electronic control systems.

RA224 – Know and learn to present the experimental results in a scientific way. RA303 - Understand the theoretical foundations of feedback, knowledge of systems of first and second order and the ability to analyze the behavior of systems of higher order. Properly use the terminology and the concepts in the area of Systems and Automatic Engineering. RA305 - Analysis: To correctly apply the Routh-Hurwitz criterion to analyze the stability of continuous systems. RA307 - Ability to design correctly analog and digital compensators and PID controllers, such that the feedback control system meets preset design specifications. RA308 – Mastery of simulation programs of the dynamic behavior of feedback control systems. RA309 - Ability to properly interpret graphical techniques for the analysis and design of controllers: in the time domain, in the complex domain (root locus) and in the frequency domain (Bode and Nyquist). RA310 - Modeling: obtain the transfer function and the state equation of linear control systems._
Student outcomes addressed by the course
CG2, CG8, CG9 and CG10 CE-SE6, CE-SE8

Bibliography and supplemental materials
- G.F. Franklin, J.D. Powel and A. Emami-Naeini, Control de Sistemas Dinámicos con Retroalimentación, Addison Wesley, 1991 (or later). - K. Ogata, Ingeniería de Control Moderna, Prentice Hall, 4th Edition, 2003 (or later). - www.robolabo.etsit.upm.es: specific teacher's material for the course.

Teaching methodology			
X **lectures**	X **problem solving sessions**	X **collaborative actions**	X **laboratory sessions**
Other:			