# Synthesis of correctors and control architectures

Component
École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications

## In brief

- **Ametys Code:** N7EE05C
- **Open to exchange students:** Yes

# Presentation

## Objectives

**Be able to...**

Choose a type of controller suited to a set of specifications,

Simplify models and determine their validity range,

Calculate the parameters of a P, PI, phase advance, or PID controller using different methods,

Choose the method based on the context and specifications,

## Description

Scenario: support application

Advantages of closed-loop control: open-loop, closed-loop, proportional correction, stability, accuracy, speed = a cruel dilemma!, calculation of proportional controller/specifications

Integral controllers: dominant pole compensation method, symmetrical optimum method, 1/10 method, implementation

Derivative controllers: calculation of parameters by imposing bandwidth, by the pole compensation method, implementation

PID controllers: calculation by pole compensation, by PI combination – Phase advance

Experimental methods for adjusting PI and PID controllers: Expert adjustment, Broïda method, Ziegler Nichols method, and relay method

Control architectures: PI and more... More state variables to control; a little anticipation

Conclusion: comparisons, summary and outlook

## Pre-requisites

Basic calculations with Laplace transforms: signal transforms, inverse transforms, final value theorems, initial value theorems, delay theorems, etc.

Calculations with complex numbers.

Solving first- and second-order differential equations.

Proficiency with Bode and Nyquist diagrams.