

# Sampled systems



## Component

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

## In brief

- > **Ametys Code:** N7EE05B
- > **Open to exchange students:** Yes

## Presentation

---

### Objectives

- Fourier series decomposition,
  - SLC1, SLC2, and SLC3 courses: plotting Bode, Black, and Nyquist diagrams, calculating continuous linear correctors, nested loops, and feedforward chains,
  - elementary calculations with the Z transform, signal transform, inverse transform, final value theorem, initial value theorem, delay theorem, etc.
  - calculations with complex numbers,
- solving first- and second-order differential equations.

### Description

Presentation of a sampled speed control system: block diagram, functions implemented in a numerical control system.

Influence of the sampling period: influence of the sampling period on stability, destabilizing effect of sampling/blocking.

Study of control by approximation to a continuous system: definition of the equivalent continuous system, methods for studying sampled control systems, synthesis of the p-corrector, discretization of the continuous corrector.

Z-transform: definition and properties, discrete transfer functions, real poles-complex poles.

Temporal study of sampled servo systems: static study: accuracy, dynamic study: stability, temporal responses.

Criteria for choosing the sampling period: Shannon criterion, real poles, complex poles, phase shift due to sampling/blocking, processing time on the computer, derivation problem, influence of noise, number encoding on the microprocessor.

Experimental adjustment of sampled correctors