## *AUTOMATIQUE ET PHÉNOMÈNES NON-LINÉAIRES*

## AUTOMATIC CONTROL WITH NONLINEAR PHENOMENA

**Lecturers:**          **Gérard SCORLETTI, Giacomo CASADEI**

| Lecturers : 12.0 | TC : 18.0 | PW : 4.0 | Autonomy : 14.0 | Study : 0.0 | Project : 0.0 | Language : FR

### Objectives

The performance requirements in technological systems have led to the widespread use of feedback control and the emergence of non-linear phenomena. However, the most commonly used correctors are based on linearity. The course present the behaviour of non-linear systems and introduces methods for predicting the occurrence of these non-linear behaviours in closed-loop systems designed under the linearity assumption - it will address how to modify the control architecture to avoid these phenomena. The course will also present how to design a control architecture for a system which is described by a non-linear model. (Prerequisite to the Master "Automatic Control Engineering" and basis for the options "Aeronautics" and "Ground Transportation").

Keywords :  Automatic control, Nonlinear Systems, Control, Analysis

| **Programme** | - Introduction and problem formulation.<br>- Analysis of closed-loop systems in presence of nonlinearities.<br>- Analysis of nonlinear systems: a general approach.<br>- Control of nonlinear systems. |
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| **Learning outcomes** | • Analysis of the dynamical closed loop system behavior in presence of nonlinearities.<br>• Control of nonlinear systems.<br>• Pratical application to industrial cases. |
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| **Independent study** | Objectifs : | Develop an engineering design procedure by relying on the knowledge acquired during the AF. |
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| | Méhodes : | Solve a practical and original control problem in the presence of non-linearities by applying the methods and tools acquired during the AF. |

| **Core texts** | G. Casadei et G. Scorletti, *AUTOMATIQUE & PHÉNOMÈNES NON LINÉAIRES*, Document de cours ECS a 3, 2021<br>G. Scorletti *COMMANDE MULTI-ACTIONNEURS MULTI-CAPTEURS.*, Document de cours ECS a 4, 189 pages, 2018<br>H. Khalil*NONLINEAR SYSTEMS 3D EDITION*, Prentice Hall, 2002 |
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| **Assessment** | Final mark = 200/3% Knowledge + 100/3% Know-how<br>Knowledge mark = 100% final exam<br>Know-how mark = 100%  final exam |
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