



Faculty of Applied Sciences

INMA2370 Modelling and analysis of dynamical systems

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s): Georges Bastin, Vincent Wertz, Vincent Wertz (supplée Georges Bastin)
Language: French
Level: Second cycle

Aims

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- To make the students aware of the unifying character of the state space model concept in engineering sciences.
- To introduce the students to the principles of mathematical modelling, and to the methods of dynamical systems analysis.

Main themes

First part : presentation of the modelling principles and methods in various areas of engineering sciences : electricity, mechanics, chemical and biochemical processes, environment.

Second part : presentation of the major methods for the analysis of the structural properties of state space models : state transformations, equilibria, stability and attractors, controllability, singular perturbations.

Content and teaching methods

MODELING

- mechanical, electrical, electromechanical systems
- compartmental systems
- reactional systems
- systematic applications in various areas

ANALYSIS

- state transformations
- equilibria
- qualitative analysis of trajectories in the plane, periodical solutions, limited cycles, bifurcations
- stability analysis : Lyapunov methods
- controllability and stabilisation of linear and nonlinear systems

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

no special information

Other credits in programs

ELME22/M	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (mécatronique)	(5 credits)	
ELME23/M	Troisième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (mécatronique)	(5 credits)	
FSA3DA	Diplôme d'études approfondies en sciences appliquées	(5 credits)	
INCH23	Troisième année du programme conduisant au grade d'ingénieur civil chimiste	(5 credits)	
MAP22	Deuxième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)	Mandatory
MAP23	Troisième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)	
MECA23	Troisième année du programme conduisant au grade d'ingénieur civil mécanicien	(5 credits)	