linma2370

2018

Modelling and analysis of dynamical systems

5 credits	30.0 h + 22.5 h	Q1

Teacher(s)	Delvenne Jean-Charles coordinator ;Dochain Denis (compensates Delvenne Jean-Charles) ;Dochain Denis ;
Language :	English
Place of the course	Louvain-la-Neuve
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.
Aims	1 Learning outcomes: • AA1 : 1,2,3 • AA4 : 1,2,3,4 • AA5 : 2,3,5,6 More specifically, at the end of the course the student: • will be aware of the unifying character of the state space model concept in engineering sciences. • will be able to model a wide span of situations encountered in diverse engineering sciences • will be able to analyze the properties of those dynamical systems defined on a state space Transversal learning outcomes: • Using Matlab and Simulink for the modelling and simulation of dynamical systems. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	Project during the semester, with oral and written report. Written exam.
Teaching methods	Ex cathedra, with reading of notes by the students previously to the course.
Content	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
Inline resources	http://icampus.uclouvain.be/claroline/course/index.php?cid=LINMA2370
Bibliography	Notes de cours disponibles sur iCampus.
Faculty or entity in charge	MAP

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Electro-mechanical Engineering	ELME2M	5		🔍
Master [120] in Biomedical Engineering	GBIO2M	5		🔍
Master [120] in Statistic: General	STAT2M	5		🔍
Master [120] in Mathematical Engineering	MAP2M	5		🔍