UCL Université catholique de Louvain

LINMA2671

2014-2015

Automatic : Theory and implementation

5.0 credits	30.0 h + 30.0 h	1q

Teacher(s) :	Hendrickx Julien ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	> http://icampus.uclouvain.be/claroline/course/index.php?cid=INMA2671
Main themes :	Model-based control (pole placement control, predictive control, LQ control, robust control) ; Implementation aspects of digital control
Aims :	Contribution of the course to the program objectives : -- AA1.1, AA1.2, AA1.3 -- AA2.1, AA2.2, AA2.3, AA2.4 -- AA3.1, AA3.2 -- AA5.3, AA5.4, AA5.5, AA5.6 -- AA6.4 The aim of this course is to present different methods of model-based control (pole placement control, predictive control, LQ control, robust control) and to study the implementation aspects of digital control. These methods will be supported by real life cases studies. The course also involves control design exercises (MATLAB), and a set of laboratory sequences during which the students will implement some of these methods on pilot processes at the laboratory. At the end of this course, the students will be able to : -- Understand the major issues of digital control design. -- Calculate, with specialized software, digital controllers with specified performances. -- Implement numerical control laws on real processes (in the laboratory). -- Present major aspects of a theory or an application in automatic control. *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".*
Content :	-- Discretization of continuous models, Shannon's theorem, choice of sampling periods -- Classical digital control (numerical PID) -- Predictive control -- Prediction compensation of measurable perturbations -- Multivariable control, decoupling, linear quadratic control -- Observers, Kalman filter -- Delay compensation -- Parameterization of Youla Kucera -- Recursive model estimation -- Robust control -- Iterative controller design -- Controller design with different methods using MATLAB and SIMULINK

	-- Test of different control methods on pilot processes. The course comprises a set of lectures on theoretical aspects in control design or regarding industrial control applications developed by members of the Automatic Control Lab, as well as a set of compulsory exercises and laboratory sequences. Moreover, each student will have to make an oral presentation on a theoretical topic, or on results obtained in the laboratory or, finally, on an article describing an industrial application.
Cycle and year of study :	> Master [120] in Biomedical Engineering > Master [120] in Mathematical Engineering > Master [120] in Electro-mechanical Engineering > Master [120] in Computer Science > Master [120] in Civil Engineering > Master [120] in Computer Science and Engineering > Master [120] in Mechanical Engineering > Master [120] in Electrical Engineering > Master [120] in Chemical and Materials Engineering
Faculty or entity in charge:	MAP