

Programme of “Dinamica e Controllo dei Processi Chimici” “Chemical Processes Analysis and Control”		
<ul style="list-style-type: none"> • Code: I1H005 • type of course unit: Compulsory • level of course unit): second cycle • year of study (if applicable): 1st , semester: 2nd 		
Number of ECTS credits: 9 (workload is 225 hours; 1 credit = 25 hours)		
Teacher: Franco Evangelista (franco.evangelista@univaq.it)		
1	Course objectives	Acquiring knowledge and understanding of dynamic models and control configurations for chemical processes. Design and validation of feedback, feedforward and advanced control schemes for multiple variables chemical processes.
2	Course content and Learning outcomes (Dublin descriptors)	Topics of the module include: Dynamic models: continuous stirred tank heater, heat exchangers, flash and counter-current stage operations, continuous contact operations. Transfer function (TF), autoregressive (ARX), and state-space (SS) models. Feedback controllers: analysis, design, stability, and validation of feedback control loops. Advanced control Systems: long dead time and inverse response processes; multiple loop, selective, inferential, cascade, feedforward and feedforward-feedback. Multiple input and output systems, interaction and decoupling of control loops. digital control: converters, configurations, stability, feasibility, and responses. State estimation and control: Kalman filter, pole placement and optimal regulators. Adaptive control: model reference adaptive control, self tuning regulator. On successful completion of this module, the student should: <ul style="list-style-type: none"> - have profound knowledge of chemical process dynamics; - have knowledge and understanding of fundamentals and advanced control schemes; - understand and explain the behavior of controlled and uncontrolled processes; - demonstrate skill in developing control configuration and ability in their design; - demonstrate capacity for their validation.
3	Prerequisites and learning activities	The student must have knowledge acquired in the first degree cycle and technical calculations.
4	Teaching methods and language	Lectures, exercises, and optional home work, team work. Language: Italian Suggested Text books <i>G. Stephanopoulos</i> , Chemical Process Control: An Introduction to Theory and Practice; Prentice-Hall International Editions, Englewood Cliffs 1984. <i>W. L. Luyben</i> <i>M.L. Luyben</i> , Essentials of Process Control, McGraw-Hill Book Company, New York, 1997. <i>Dale E. Seborg</i> , <i>Thomas F. Edgar</i> , <i>Duncan A. Mellichamp</i> Process Dynamics and Control, 2° Edition, Wiley 2006.
5	Assessment methods	Oral exam and optional written exam, short report.