

**Course offered for the PhD program  
in Civil, Chemical and Environmental Engineering  
Curriculum in Chemical, Material and Process Engineering –  
a.a. 2019/2020 (cycles XXXV, XXXIV and XXXIII)**

(possibility of participation for students in other PhD cycles or other PhD courses)

**1. Title**

Fundamentals in Control of Chemical Processes

**2. Course Description**

The course aims at providing notions to the future PhD students on dynamics of process control in industrial processes.

The course will include the following topics:

- Characteristics and operation of the main types of control (Proportional, Integral and Derivative) and their combinations, highlighting their strengths and weaknesses in the application.
- Modeling of control systems (in the time domain) using block algebra through the concepts of Laplace transform and Transfer Function.
- Notions on the stability of a system, with particular attention to the response of first and second order systems to different types of forcing.
- Contextualization of the theoretical notions on the stability of the systems to the real scenarios that, at the plant level, lead to control systems that can be described with such formulations.
- Criteria for the study of the stability of systems (processes) subject to control (criteria of Bode, Ruth-Hurwitz, Root Locus and Nyquist), with particular reference to the most common application scenarios: Master-Slave, Feedforward, Priority, Override, Adaptive, Inferential, Ratio control and Smith Predictor.

**3. Course Organization**

The course, organized into a single module, will consist of classroom lessons.

**4. Teacher**

The course teacher will be Prof. Marco Vocciante.

**5. Duration and credits**

The course (10 hours) will consist of 5 lessons, 2 hours each, for a total of 2 credits.

**6. Activation mode and teaching period**

The course will be held yearly if at least one student will be registered by simple contact the teacher by email. The course will be held during the period March-June 2019. The exact dates of the lessons will be confirmed about one month before the beginning of the course.

**7. Deadline for registration**

Registration to the course must be made before February 20<sup>th</sup>, 2019. Students are requested to inform the teacher by e-mail (marco.vocciante@unige.it) about their registration.

**8. Final exam**

The final exam will consist in an interview on the topics covered by the course. The students are requested to contact the teacher by email to establish the date of the exam.