PROCESS SIMULATION AND CONTROL

1.1. Identification

University:	Alma Mater Studiorum - Università di Bologna														
School:	School of Engineering														
Course:	Fluid Mechanics and Transport Phenomena														
ECTS:	6														
Semester:	*Winter*					X	*Summer*								
Category	*Fundamental course*					X	*Specialisation course*								
Module	*MFI*	X	*MFII*		*MFIII*		*MSI*		*MSII*		*MSIII*				
Teachers:	F.Doghieri, M.Giacinti														
Language:	*English*	X	*Italian*	X	*Swedish*		*Spanish*								

1.2. Learning-outcomes

- knowledge about specify strategies of control in process industries
- knowledge in solving problems of the system of control of a plant in operation.

1.3. Competencies

- **General**
  - to enable to the student of technical and scientific tools
  - to work and manage teams
  - communication skills
  - to work in an international context

- **Specific**
  - to design and to specify strategies of control in different industries
  - To analyze and to understand strategies of more complex control fruit of the development and application of the investigation
  - To know Elements of the circuit of control

1.4. Contents

Simulation techniques for apparatuses in process industry. Steady-state and dynamic models. Methods for numerical solutions of ordinary and partial differential equations, and set of ODE or PDE equations. Dynamic simulation of stirred, segregated and mixed chemical reactors. Dynamic simulation of flash-evaporation in pure component and flash-

distillation in multicomponent systems. Simulation of dynamic phenomena in heat exchanger apparatuses. Water hammer phenomenon in pipelines.
Analysis of dynamic conditions of specific processes through the use of dynamic simulation software: introduction and practice.

1.5. Teaching Methodology

- Lecture sessions
- Practical sessions

1.6. Evaluation

- written exams
- oral evaluation

1.7. Bibliography

- Claudio Bonivento, Luca Gentili, Andrea Paoli, Sistemi di automazione industriale - Architetture e controllo, McGraw-Hill, ISBN 8838664404, 2006.
- Corriou, J.P. (1996); Commande des procédés. Technique et documentation.
- Luyben, W. (1973); Process modelling, simulation and control for chemical engineers; McGraw-Hill.
- Luyben; W., Tyréus, B. y Luyben, M. (1999); Plantwide process control; Mc Graw-Hill.
- Ogata, K. (1995); Modern control engineering; Prentice Hall.
- Ogunnaike, B.A. y Ray, W.H. (1994); Process dynamics, modelling and control; Oxford Univerity Press