

*Short course*

## ***Advanced Control and Operation for Modern Manufacturing***

**DEPARTMENT OF CHEMICAL ENGINEERING  
COLLEGE OF ENGINEERING  
LOUISIANA STATE UNIVERSITY**

### **BACKGROUND**

Due to the availability of new industrial control system architectures, there has been a vast broadening of the domain of what is technologically and economically feasible to achieve in the application of computers to control industrial manufacturing systems. Now, all aspects of data gathering, information processing, process control, on-line optimization, scheduling and production planning functions can potentially be included in the range of tasks to be carried out by the computer control system. This has made possible the realization of Integrated System Control (ISC) in which all factors influencing plant performance are taken into account. "Control systems today have an expanded role, replacing manual manufacturing activities with full automation. Modern process control is the functional integration of real-time information management with closed loop control."

### **COURSE OBJECTIVE**

The main objective of this course is to equip the participants with a good understanding of advanced process operation and control techniques. At the end of the course, the participants should:

- Understand where multivariable and advanced control algorithms are warranted.
- Have sufficient understanding of advanced operation and process control technology.
- Have an appreciation of modern data processing and reconciliation techniques.
- Be aware of the role of statistical process control and expert systems in the total quality management/process improvement process.

### **COURSE FORMAT**

The course comprises a series of short lectures and hands-on workshops using simulated processes. Ample time will be available for questions and discussion during sessions and breaks.

## WHO SHOULD ATTEND

Engineers, supervisors and specialists who are considering improving their process and plant performance or are involved in the design of new plants and wish to enhance their understanding in the field of Advanced Operation and Process Control.

## COURSE OUTLINE

- **Role of control in manufacturing:** conventional role of process control; expanded role of control in modern manufacturing; review of classical feedback control.
- **Multivariable Control:** multi-loop Control; decoupling control; plant-wide control -case studies.
- **“Advanced” model-based control:** delay compensation; internal model control; model predictive control; control under uncertainties.
- **Optimizing control: process optimization;** real-time optimal control and supervision; case study.
- **Expanded role of process control:** modern control architectures; control level decomposition; integrated systems control.
- **Data processing and reconciliation:** data-preprocessing and mining; process data reconciliation; detection of faulty sensors.
- **Advanced process monitoring:** statistical process control; the role of expert systems.

## INSTRUCTOR

**Professor Jose Romagnoli** is the Director of the Laboratory of Process Systems Engineering at the Louisiana State University which is a consortium including many control vendors companies with advanced pilot facilities under state-of-the-art industrial control systems. He has a vast experience in industrial applications of advanced operational and control strategies and is a worldwide recognized expert in the general area of Process Systems Engineering. He is and has been consultant of a number of International companies. Professor Romagnoli is the author of the books “Data Processing and Reconciliation for Chemical Process Operations” and “Introduction to Process Control”. He has over 250 international publications in the area of Process Systems Engineering and over 50 industrial reports.