Chim/01: Process Analytical Chemistry

Academic year: 2016/2017
Faculty: Dipartimento di Chimica
Study courses: LM 54 - SCIENZE CHIMICHE
Study plans/Curricula: SINTESI E REATTIVITA'
Type: CARATTERIZZANTE
Total Credits: 4
Didactic Methods: lectures
Didactic Period: second semester
Exam type: oral (exam linked to Instrumental Analytical Chemistry module)
Professor in charge: LUIGIA SABBATINI

Training objectives
Introduction to Industrial Analytical Chemistry; chemical process control strategies; instrumentations for process analytical chemistry; introduction to REACH regulation
Prerequisites
Fundamentals of Analytical Chemistry and Instrumental Methods of Analysis

Course programme

Lectures: (_ h)

1. Objective of the course ; introduction to Industrial Analytical Chemistry (1 h)
2. History of the job of a chemist: Wet chemistry, Instrumental Analytical Chemistry; Automation in Chemical Analysis; Large data treatment (2 h)
3. Interfacing analyzers to a chemical process: at-line, off-line, on-line, in-line, non-invasive (4 h)
4. Instrumental technologies for Process Analytical Chemistry: chromatography, spectroscopies (FT-IR, diode array detector), mass spectrometry, chemical sensors (FET), optical fibers (6 h)
5. Flow Injection Analysis and its use in Process Analytical Chemistry (2 h)
6. Sampling in a chemical process: frequency, devices (sampling lines, filters…) (2 h)
7. Control strategies for a chemical process: feedforward and feedback approaches; control loops (2 h)
8. Feedback control modes: on-off; proportional, proportional-integral; proportional-integral-derivated (2 h)
9. Feedforward: control ratio; feedforward + feedback; "cascade" control (2 h)
10. Statistical control (Shewhart control charts) (2 h)
11. Chemiometry in Process Analytical Chemistry (2 h)
12. REACH: significance and scope (3 h)

13. GHS e CLP: Classification, labelling and packaging of chemical substances (2 h)

Reference Texts

Records, slides, literature articles supplied by teacher