



CHIMICA ANALITICA APPLICATA

CHIM/01 - 6 CFU - 1° Semester

Teaching Staff

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LEARNING OBJECTIVES

The aim of the course is to widen and deepen the knowledge of basic and instrumental analytical chemistry, to strengthen the skills the student had acquired during the Bachelor's Degree. Food and industrial analytical assays will be carried out during practical exercises in the laboratory, those allow the student to develop the ability to critically analyse actual cases and to improve the ability formulating a correct evaluation of the analytical method and the data obtained, through the statistical treatment of analytical data and the validation of the analytical methods.

COURSE STRUCTURE

Lesson exercises and numerical exercises.

If the course would be at distance, or in presence and at distance at the same time, the necessary and appropriate changes to the statement originally declared will be introduced to comply to the program reported in the syllabus.

DETAILED COURSE CONTENT

Principles, aims and concerns of applied chemical analysis. Chemical analysis applied to quality control. Sampling and pre-treatment of solid, liquid and gaseous real matrices. Use of chromatographic, electrochemical and spectroscopic methods for the analysis of different types of samples. Control cards. Robustness of a method. Yield of recovery and matrix effect. Non-parametric tests.

Water cycle and water supply. The analytical requirements of water. Water characterization, analysis and expression of analytical data. Determination of some characterizing parameters. Study of the carbon dioxide, bicarbonate and carbonate system and determination of free carbon dioxide. Measurement of temperature and dissolved oxygen, pH, turbidity and fixed residue. Determination of carbonates and

bicarbonates, determination of temporary, permanent and total hardness by using complexometric techniques. Determination of sulphate and chloride. Water treatment. Determination of residual and free active chlorine: method with N,N-diethyl-p-phenylenediamine (DPD). Determination of fluoride, nitrate and nitrite ions, total and ammoniacal nitrogen, anionic surfactants and phosphorus. Evaluation of the health state of a water body: DO, BOD, COD, TOC, pesticide pollution, heavy metal pollution: determination of iron, chrome and manganese.

Wine analysis: determination of density, total dry extract, total acidity, alcohol content, methyl alcohol, glycerol, reducing and total sugars, esters, acids, polyphenols, proline, nitrogenous substances and mineral substances, vitamins and carbon dioxide.

Analysis of fatty substances. Classification and characterization of an olive oil: determination of refractometric degree, saponification number, acidity, number of peroxides and iodine number. Spectrophotometric characterization of an olive oil. Search for the presence of seed oil in olive oil using the Villavecchia Fabris method.

TEXTBOOK INFORMATION

1. D. A. Skoog, J. J. Leary, *Chimica Analitica Strumentale*, EdiSES, Napoli, 1995.
 2. APAT - IRSA CNR, *Metodi analitici per le acque*.
 3. R. Kellner, J.-M. Mermet, M. Otto, H. M. Widmer, *Analytical Chemistry*, Wiley-VCH, 1998
 4. S.E. Manahan, *Chimica Dell'Ambiente*, Piccin Editore
 5. F. Balestrieri, D. Marini *Metodi di Analisi Chimica dei prodotti alimentari*. Monolite editrice.
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