DIPARTIMENTO DI SCIENZE

COURSE: **ANALITICAL CHEMISTRY**			
ACADEMIC YEAR: **2018-2019**			
TYPE OF EDUCATIONAL ACTIVITY:**Basic**			
TEACHER: **Prof. Giuliana Bianco**			
e-mailgiuliana.bianco@unibas.it		website:	
phone: **0971205451**		mobile (optional):	
Language: **ITALIAN**			
ECTS: **8** (**7** lessons and **1** tutorials/practice)	n. of hours: **68** (**56** lessons and **12** tutorials/practice)	Campus: **Potenza** Dept./School: **Department of Sciences** Program: **Pharmacy (LM-13)**	Semester**: I** (form 01 March 2019 to 31 May-20 June 2020)

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES:

The course aims to provide students with the basics for understanding the most important implications not only of a numerical and conceptual nature but also for the solution of problems of an applicative nature in the different contexts of Analytical Chemistry.

Knowledge and understanding
• classical and instrumental methods of analysis
• titrations
• spectroscopy
• chromatography
• potentiometry

Ability to apply knowledge and understanding
- Ability to calculate the equilibrium of species involved in acid-base equilibrium and / or redox equilibria;
- Design of solutions with pH buffering capacity;
- Definition of titration procedures;
- Application of the most common quantitative and / or semi-quantitative analytical methodologies;
- Application of potentiometer and spectrophotometry in absorption and emission;
- Applicability of chromatographic techniques.

PRE-REQUIREMENTS:

The optimal approach of the Course in Analytical Chemistry implies the minimal knowledge of: Mathematics and Physics.
In addition are required the basic knowledge of the General and inorganic Chemistry.

SYLLABUS:

1) CHEMICAL EQUILIBRIA: Thermodynamics concepts and constants of equilibria. (6h)

2) ACID-BASE Equilibria: Strong and weak acid-base species, pH calculation.
Concept of buffer solutions and calculation of buffer capacity. pH indicators.

Volumetric analysis, primary standards, titration curves,
Acid / base titration, indicators, titration errors.(8h)

3) REDOX Equilibria: Galvanic and electrolysis cells. Equation of Nernst
Definition of standard potentials and their experimental evaluation. Calculation of the equilibrium constants.
Redox titrations; redox indicators.
Permanganometry; Iodometry; Iodimetry. (10h)

4) POTENTIOMETRY: Galvanic Cells as of measuring instruments. Indicator Electrodes and reference electrodes. Types of membranes for ion-selective electrodes in potentimetry.
Glass electrode and pH measurement. Ion selective electrodes: applicative examples. (8h)

5) UV-VIS: General definitions of spectrophotometry . Lambert Beer law and its limitations.
Energy diagrams. Conditions of absorption.
Spectrophotometer schemes: single / dual beam.
Absorption analysis and applicative examples: direct analysis and spectrofotometric titrations.(8h)

6) SPECTROPHOTOMETRY IN EMISSION: Fluorescence: Properties and general definitions.
Molecular structure vs. quantum yield.
Fluorescence signal vs. concentration.
Instrumentation and relevant schemes. Examples of analytical applications. (8h)

7) SEPARATION TECHNIQUES:
Definitions and general properties. Factors of capacity, resolution, efficiency.
Equation of Van Deemter. Chromatographic techniques: Gas-chromatography: packed and capillary columns. stationary and mobile phases; examples of applications.

Liquid chromatography: stationary and mobile phases. Isocratic and gradient conditions. Types of chromatography: partition, ionic, size exclusion, etc. (8h)

TEACHING METHODS:

The teaching method is based on the traditional approach: lecture with extensive use of numerical presentation and exercises; in addition with laboratory experiences.
The course consists of 8 (7+1), 7 credits of frontal lessons and 1 laboratory.
An important part involves the use of the traditional approach and the use of software for electronic presentation based on the Power Point, EXCELL, etc.

EVALUATION METHODS:

The evaluation procedures provide a direct interaction phase with students during the cycle of lessons through numerical exercises and questions of topics interest regarding the modern aspects of the Analytical Chemistry.

The final and definitive evaluation concerning the verification of the learning state, is based on the written test and a subsequent oral examination considering the quantitative numerical approach to the subject of study.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL:

- **FONDAMENTI DI CHIMICA ANALITICA**, Skoog, West, Holler. EdiSES, Napoli.
- **ANALYTICAL CHEMISTRY**, G.D. Christian, 5th Ed. Wiley
- **Fondamenti di chimica analitica D.Harris,** Revisione di M. Taddia. Traduzione di S. Cerini, A. Malmusi, F. Mazzanti, 2017. Zanichelli
- **Chimica Analitica** Quantitativa, **D.Harris,** Zanichelli.

No on-line material is expressed required.

INTERACTION WITH STUDENTS

EXAMINATION SESSIONS (FORECAST)[1]

28/02/2019, 28/03/2019, 27/06/2019, 11/07/2019, 19/09/2019, 17/10/2019, 19/12/2019

SEMINARS BY EXTERNAL EXPERTS YES □ NO x

FURTHER INFORMATION

[1]Subject to possible changes: check the web site of the Teacher or the Department/School for updates.