

COURSE: **LABORATORY of ANALYTICAL CHEMISTRY I**

ACADEMIC YEAR: **2016-2017**

TYPE OF EDUCATIONAL ACTIVITY: (Basic, Characterizing, Affine, Free choice, Other) **Characterizing**

TEACHER: **Dr. Rosanna Ciriello**

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Language: **ITALIAN**

ECTS: <b>6</b> (2 of lessons and 4 of practice)	n. of hours: <b>64 (16 of lessons and 48 of practice)</b>	Campus: <b>Potenza</b> Dept./School: <b>Science</b> Program: <b>CHEMISTRY (L27)</b>	Semester: <b>II</b> (expected dates of course beginning and end: 06/03/2017, 15/06/2017)
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#### EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course is based on the experimental application of ionic equilibria treated in Analytical Chemistry I. The student will acquire the skills for qualitative and quantitative chemical analysis and also learn a method to write a complete and concise report on the analysis carried out and the results obtained during laboratory experiments.

Main knowledge:

- tools and general operations for quantitative analysis
- specific reactions and systematic procedures in qualitative analysis

Main skills acquired:

- accurate ways of weighing
- appropriate employment of graduated glassware
- main operations for quantitative and qualitative analysis such as precipitation, filtration, drying, calcination, centrifugation
- execution of analytical procedure with the maximum care, avoiding blunders
- identification of the principal sources of error associated with the equipment and procedures used

#### PRE-REQUIREMENTS

The contents of the course of "General and Inorganic Chemistry" are a prerequisite for the understanding of the topics treated in "Laboratory of Analytical Chemistry I". The basic knowledge of inorganic chemistry are required and in particular:

- measure units and IUPAC nomenclature of the main inorganic compounds;
- the mole concept, stoichiometry principles and chemical reaction balancing;
- types of solutions, concentration units and preparation of liquid solutions;
- equilibrium constants and their meaning, Le Chatelier's Principle;
- atom electron configurations and periodic table;
- the chemical bond.

#### SYLLABUS

**THEORY - Quantitative analysis:** tools and general operations for quantitative analysis. **Qualitative analysis:** specific reactions and systematic procedures. Dry methods of analysis: spot test on porcelain plate, experiments in test tubes. Wet methods of analysis: detection of major anions from alkaline solution, cations systematic search by separation into 6 groups.

**LABORATORY - Gravimetry:** determination of  $\text{Ba}^{2+}$  as  $\text{BaSO}_4$  by precipitation from a  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$  solution. **Volumetric analysis by precipitation:** standardization of a silver nitrate solution by Fajans method; analysis of a mixture of chlorides. **Acid-base volumetric analysis:** standardization of a NaOH solution with potassium hydrogen phthalate; determination of the acidity of commercial vinegar. **Volumetric analysis by complexometric titration:** determination of tap water hardness by titration with EDTA (total and calcium hardness); calcium quantification in a commercial milk. **Redox volumetric analysis:** standardization of a  $\text{KMnO}_4$  solution with  $\text{Na}_2\text{C}_2\text{O}_4$  and subsequent assay of Fe (II) in a solution of  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ . **Qualitative analysis, dry method:** recognition of carbonates, iodides and bromides, ammonium ion. **Qualitative analysis, wet method:** recognition of halides, sulfates, oxalates, phosphates, nitrites and nitrates by specific tests; separation and recognition of cations of Group I ( $\text{Ag}^+$ ) and Group III ( $\text{Al}^{3+}$ ,  $\text{Fe}^{3+}$ ).

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**TEACHING METHODS**

Theoretical lessons, Laboratory tutorials

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**EVALUATION METHODS**

The laboratory activities require the preparation of reports to be discussed during the oral examination which will be delivered to the teacher a week before the examination date.

One oral examination comprising the two courses 'Analytical Chemistry I' and 'Laboratory of Analytical Chemistry I'.

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**TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL**

- ARANEO, "CHIMICA ANALITICA QUALITATIVA", AMBROSIANA (MI)
  - D.C. HARRIS, "CHIMICA ANALITICA QUANTITATIVA", 2<sup>a</sup> EDIZIONE, ZANICHELLI, BOLOGNA
  - SKOOG, WEST, HOLLER, "FONDAMENTI DI CHIMICA ANALITICA" EDISES, NAPOLI
  - Lecture notes provided by the teacher
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**INTERACTION WITH STUDENTS**

At the beginning of the course the teacher informs the students about the objectives, the program and the verification methods. Simultaneously collects the list of students, together with name and e-mail. Since the frequency of the course is compulsory, the teacher will collect the signatures of the students at lectures and in laboratory. The teacher will provide students with an electronic copy of all the lessons projected in the classroom and distribute, with a week in advance, a detailed procedure of laboratory experiences. Each experience will be discussed in the classroom with the teacher so to provide to each student an adequate preparation to carry out all the required operations.

The office hours are as follows:

Monday: from 10 am to 11 am at the office 2DA302;

Tuesday: from 10 am to 11 am at the office 2DA302;

Wednesday: from 10 am to 11 am at the office 2DA302.

The teacher is available to meet at all times students by appointment agreed through its own institutional e-mail address ([rosanna.ciriello@unibas.it](mailto:rosanna.ciriello@unibas.it)).

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**EXAMINATION SESSIONS (FORECAST)<sup>1</sup>**

2/02/2017, 15/03/2017, 31/05/2017, 29/06/2017, 20/07/2017, 26/10/2017, 20/12/2017

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SEMINARS BY EXTERNAL EXPERTS    YES     NO

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**FURTHER INFORMATION**

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<sup>1</sup> Subject to possible changes: check the web site of the Teacher or the Department/School for updates.