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**COURSE: Applied Analytical Chemistry**

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ACADEMIC YEAR: 2018-2019

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TYPE OF EDUCATIONAL ACTIVITY: **Basic**

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TEACHER: **Bianco Giuliana**

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e-mail: giuliana.bianco@unibas.it

website: scienze.unibas.it/site/home.html

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phone: 00390971205451

mobile (optional):

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Language: italian

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ECTS: 2 lessons and 4  
tutorials/practicen. of hours: 18 lessons and  
48 tutorials/practiceCampus: Potenza  
Dept./School: DIS  
Program: Chemistry (L27)Semester: I  
**from 01 October 2018  
to 20 December  
2018/20 January 2019**

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**EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES**

This course will introduce the student to modern instrumental methods of chemical analysis from a practical point of view. The applications associated with optical methods covering molecular UV-vis and atomic absorption spectroscopy, atomic and flame emission spectroscopy, electroanalytical techniques including potentiometric, voltammetric methods. Practice of liquid chromatography with an emphasis on high performance liquid chromatography (HPLC). Practice of gas chromatography with emphasis in capillary GC.

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**PRE-REQUIREMENTS**Exam of Analytical Chemistry II

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**SYLLABUS**

Sampling and sampling methods. Sample storage and packaging materials. Expression of results: confidence, confidence interval, tests of significance (2 hours). Shapiro-Wilk test, univariate regression, linear regression using least squares method, correlation coefficient, linearity testing using t test, calibration charts. Practice mode to perform a complete regression (2 hours). Assessment of uncertainties and the uncertainty of the slope, calculation of standard deviation of y. Calculation of the confidence of the extrapolated value (2 hours). Tools available for quality assurance of analysis: certified reference materials or not. Concept of traceability. Control charts: Shewhart, Moving average, CUSUM control chart, collaborative studies (2 hours). Validation of an analytical method, Validation of the methods according to UNI CEI EN ISO / IEC 17025; selectivity, limit of detection and limit of quantification. Dynamic range and linear dynamic range. Accuracy and Procedures for the evaluation of precision: repeatability and reproducibility, limit of repeatability and reproducibility limit. Calculation of measurement uncertainty according to the metrological approach, holistic and empirical. Robustness, recovery. Quantitative methods (8 hours). Laboratory practice of main analytical techniques (48 hours)

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**TEACHING METHODS**

Theoretical lessons. The course will be accompanied by a series of laboratory exercises on: optical methods covering molecular UV-vis and atomic absorption spectroscopy, electroanalytical techniques including potentiometric, voltammetric methods, liquid chromatography (HPLC) and gas chromatography.

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**EVALUATION METHODS**Discussion of a laboratory report and Oral examination

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**TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL**

- Assicurazione di qualità nel laboratorio chimico, Validazione dei metodi di analisi, Elio Desimoni, Barbara Brunetti, Bologna: CLUEB, 2003
  - Chimica Analitica Quantitativa, Daniel C. Harris, seconda edizione italiana condotta sulla sesta edizione americana, Bologna: Zanichelli 2005 Skoog, West, Holler, Crouch "Fondamenti di Chimica Analitica", Ed. Edises
  - slides of the course
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**INTERACTION WITH STUDENTS**

The teacher is open for discussion and additional teaching during the planned weekly colloquia, by email (giuliana.bianco@unibas.it) or by phone (0971 205451)

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

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

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SEMINARS BY EXTERNAL EXPERTS    YES     NO

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FURTHER INFORMATION

The lab reports must be submitted to the professor at least 3 weeks before the call for examination

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