

General information	
Academic subject	Analytical Chemistry I – module of the integrated course Chimica I (9CFU)
Degree course	Biological Sciences
Academic Year	First
European Credit Transfer and Accumulation System (ECTS)	2
Language	Italian
Academic calendar (starting and ending date)	I semester : October 4, 2021-january 21, 2022
Attendance	Compulsory (laboratory work)

Professor/ Lecturer	
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Virtual headquarters	TEAMS platform, code jptv02n
Tutoring (time and day)	Tuesday, Thursday, 15.00-17.00

Syllabus	
Learning Objectives	Full understanding of the equilibrium reaction concept, of the ways to express solution concentration, of the base operations in a chemical laboratory
Course prerequisites	Knowledge of physical quantities; knowledge of base mathematical operations: equivalences, I and II degree equations; operations with powers in base ten; logarithms
Contents	<p>Lectures:</p> <ul style="list-style-type: none"> -How to express and calculate solution concentration (Molarity, Normality, weight %, Volume %, molar fraction, ppm /parts per million, ppb/parts per billions) -Chemical properties of solutions and chemical equilibria: definition and significance of pH, electrolytes, acids, bases -Volumetric analysis: general principles, primary standards, acid-base titrations -Ox-Red equilibria and Nerst equation <p>Laboratory work</p> <ul style="list-style-type: none"> -Information on safety standards, safety devices, security arrangements, correct behavior in a chemical laboratory, Good Laboratory Practice (GLP) -How to use and clean laboratory glassware (pipettes, Eppendorf pipettes, burets, beakers, graduated flasks, cylinders, ...) and base instruments (balance, ionic exchange resins for water deionization, ...) -Preparation of standard solutions and dilutions -Titrimetric determination of bases and acids
Books and bibliography	<ul style="list-style-type: none"> -IL LABORATORIO DI CHIMICA di M.Consiglio, V. Frenna, S.Orecchio, EdiSES, Napoli -ELEMENTI DI STECHIOMETRIA di P. Giannoccaro S. Doronzo, EdiSES, Napoli
Additional materials	Slides and on-line sites are used to illustrate safety standards, devices (individual and collective) and procedures

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars,	Out-of-class study



		field trips)	hours/ Self-study hours
Hours			
50	8	15	27
ECTS			
2	1	1	
Teaching strategy	Lectures supported by powerpoint presentations; laboratory work; numerical exercises and resolution of typical stoichiometry problems		
Expected learning outcomes			
Knowledge and understanding on:	-Fundamental concepts of Analytical Chemistry, with peculiar reference to equilibrium chemical reactions in aqueous solution - The strategies for the qualitative identification and quantitative determination of all species present in solution		
Applying knowledge and understanding on:	-The laboratory work (compulsory frequency) provides the students with the technical ability in the base chemical operations (proper use of balance and laboratory glassware, preparation of solutions) -the understanding of phenomena relevant to dissolution of substances, chemical equilibria, chemical species transformation, phase changes -resolution of simple stoichiometry problems -pH calculation		
Soft skills	<ul style="list-style-type: none">• <i>Making informed judgments and choices</i> By the close combination of lessons, numerical exercises and laboratory works students develop the ability to critically evaluate the numerical result of an exercise as well as of a laboratory experiment• <i>Communicating knowledge and understanding</i> Students are encouraged to elaborate oral and written reports on laboratory experiences. The acquisition of scientific speech skills is promoted through the knowledge of correct scientific (chemical) terminology, the use of a clear language and synthesis ability.• <i>Capacities to continue learning</i> Students are stimulated to deepen the concepts and issues treated during the teaching course by consulting more textbooks, crosschecking information, evidencing interdisciplinary correlations and through the proper use of databases and on-line available literature		

Assessment and feedback	
Methods of assessment	Written exam as "self-evaluation" test (no mark), preliminary to oral exam
Evaluation criteria	<ul style="list-style-type: none">• <i>Knowledge and understanding</i> Students are requested to write and balance in a correct way chemical reactions and to solve simple problems related to analyte concentration and pH calculation.• <i>Applying knowledge and understanding</i> They must show to be able to work in the laboratory in a clean and safe way Work in team is also encouraged.• <i>Autonomy of judgment</i> They must show to be able to critically evaluate the obtained results• <i>Communicating knowledge and understanding</i> Students are expected to write clear reports and to expose topics in a clear way, by using proper technical terminology



	<ul style="list-style-type: none">• <i>Capacities to continue learning</i> <p>-The ability of students in crosschecking information received in different courses is evaluated</p>
Criteria for assessment and attribution of the final mark	<p>Exam with mark out of 30. Final mark is attributed as a weighted average between marks obtained for the two modules of the integrated course. The exam is passed when the mark is equal or better than 18/30.</p> <p>Particular attention in the exam evaluation will be paid to the student ability to correctly write chemical equilibria, to calculate pH values of acid/base solutions, to expose topics in a complete and clear way, by using a proper technical/scientific terminology.</p>
Additional information	///