Main course information	
Academic subject	General and Inorganic Chemistry
Degree course	Natural Sciences (I level)
Degree class	L/32
ECTS credits (CFU)	6
Compulsory attendance	Yes
Teaching language	Italian
Accademic Year	2019/2020

Professor/Lecturer	
Name & SURNAME	Angela Dibenedetto
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Tutorial time/day	L-V ore 15.00-17.00

Course details	Pass-fail exam/Exam with mark out of 30	SSD code	Type of class
	Exam with mark out of 30	CHIM03	Lecture/workshop

Teaching schedule	Year	Semester
	I	I

Lesson type	CFU/ECTS	Lessons (hours)	CFU/ECTS lab	Lab hours	CFU/ECTS tutorial/workshop	Tutorial/workshop hours	CFU/ECTS field trip	Field trip Hours
	5	40	0.5	7.5	0.5	7.5	0	

Time management	Total hours	Teaching hours	Self-study hours
	150	55	95

Academic Calendar	First lesson	Final lesson
	October	January

Syllabus	
Course entry requirements	Elementary knowledge of physics, mathematics, algebra
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)	
Knowledge and understanding	Acquisition of a solid and rigorous knowledge of the fundamentals of General and Inorganic Chemistry and of theoretical-operational tools for understanding chemical, biological and geological phenomena. Theoretical lessons and also numerical exercises in the classroom and laboratory will contribute to the achievement of these objectives. The level of knowledge acquired will be verified by the drafting of reports relating experiences carried out in the laboratory, and the evaluation test.
Applying knowledge and understanding	Ability to apply the acquired knowledge to chemical phenomena, to interpret them correctly and to know how to use the principles that govern them. Ability to apply the acquired knowledge: -to solving problems and numerical exercises related to the topics covered in the course (conversion of units of measurement; stoichiometric calculation; concentration and colligative properties of solutions; equilibria in gaseous phase and in solution; electrochemistry; description of structure and reactivity of molecules). The skills acquired will be verified by conducting classroom exercises, and during the written / oral examination.
Making informed judgements and choices	Students must demonstrate to have acquired aptitude for scientific reasoning and developed critical skills in the analysis of chemical phenomena and in the resolution of

	problems and exercises. The achievement of this objective will be verified by carrying out exercises in the classroom and during the written / oral examination.
Communicating knowledge and understanding	Acquisition of the correct terminology in the scientific and chemical field, acquisition of exhibition skills characterized by clarity and language properties. Students must be able to correctly expose definitions, fundamental concepts, theories concerning the contents of the course itself and to discuss clearly the problems presented to him. These skills will be evaluated during the oral examination.
Capacities to continue learning	Acquisition of the ability to investigate issues and topics related to the teaching discipline in an autonomous way through the consultation of texts, databases and scientific works available in the library or on the web and to identify the connections with other disciplines of the course of study. The acquisition of this ability will be verified by discussing the topics of the exam.

Syllabus	
Course content	Laboratory equipment. The SI system of Units of measurement. States of aggregation of matter, status changes. Homogeneous and heterogeneous systems. Definition of phase. Isolated, closed, open systems. Atoms and molecules. Elements and compounds. Atomic and molecular mass, Mole, Molar mass. The gaseous state: the ideal gas, the real gases. Properties of gases: experimental studies. General equation of state of the ideal gas. Kinetic theory, temperature and average energy. Boltzmann distribution law. (Kinetic gas model: gas state equation). Thermodynamic properties. Liquids. Ideal liquid and real liquids. Additiveness of volumes. Partial miscibility. Solutions: expression of the concentration of solutions. Solubility. Evaporation. Equilibrium Concept. Vapor pressure curves: experimental determination. Evaporation energy. State diagram of pure liquids: water, carbon dioxide. Two or more component systems. Raoult's law. Vapor pressure of two-component systems: Water status diagram for two-component systems. Colligative properties of solutions. Henry's law. Solid state. Structure of solids. (Crystalline lattices. Covalent, ionic, polymeric solids). The atom. Bohr model. Probabilistic theory. Orbitals: sequence of occupation of energy states. Ionization potential, electronic affinity. The Periodic Table. Periodic properties of the elements. Chemical bond: Valence Bond and LCAO theory. Bond in diatomic (LCAO) and polyatomic (VB) molecules. Structural formulas of elements and compounds. Oxidation state. Chemical reactions. Acid base and redox reactions. Reaction balance and stoichiometric calculations. Acids and bases: definition of Arrhenius, Broensted, Lewis. Strength of acids and bases. Acid and basic constants. Water self-protolysis: Kw. pH scale. Amphoteric substances. Buffer solutions. pH calculation of acids and bases solutions. Titrations and indicators. (Acid base and redox titrations: examples) Solubility product. (Influence of pH on solubility). Chemical kinetics: order of reaction. Electrochemical cell. Electrolysis. Chemistry of Group elements 1,2, 13-18. Transition elements. Laboratory exercises: Preparation of solutions; acid base and redox titrations; pH measurements.
Course books/Bibliography	Principi di chimica (P. Atkins, L. Jones - Casa Editrice Zanichelli) Elementi di stechiometria (P. Giannoccaro, S Doronzo - Casa Editrice EdiSES
Notes	Integration with other books available in library and lectures notes
Teaching methods	Power point Lectures, numerical exercises, lab experiences.
Assessment methods (indicate at least the type written, oral, other)	Written test to ascertain students' ability to understand
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and	The evaluation criteria include an oral test that will be preceded by a two-hour written test consisting of the resolution of four / five exercises or problems on topics covered in the course and questions regarding nomenclature, molecular geometry, redox reactions and titrations. Only those who pass the written test are admitted to

how many levels of achievement there are	the oral test. In the evaluation of the exam and in the assignment of the final grade, the following items will be taken into consideration: 1) the acquired level of knowledge of the course contents (insufficient, superficial, good, complete, excellent); 2) the ability to apply theoretical concepts and laws, and to interpret chemical phenomena (insufficient, discrete, good, excellent); 3) the capacity for critical analysis and judgment autonomy (fair, good, excellent); 4) clarity of exposition and ownership of language (confused and insecure; clear and correct; excellent and safe); 5) the ability to study in depth individual contents of the course and interdisciplinary links (discreet, good, excellent). Other factors, such as the active participation of students in lectures and laboratory exercises, the work done individually by the student in the form of written reports on the laboratory exercises carried out will also be evaluated in a positive sense. The mark is thirty, with possible ”laude”(merit). Passing the exam implies the achievement of a grade not lower than 18/30 and involves the assignment of the corresponding university educational credits. A necessary condition for passing the exam is to have achieved a non-negative assessment in relation to points 1,2,4. To achieve a score of 30/30 cum laude, the student must have achieved a level of excellence relative to points 1-5.
Further information	