

SSD: **CHIM/03**

Academic year: **2017/18**

Faculty: **Department of Chemistry**

Study courses: **MODELS OF CHEMICAL SYSTEMS**

Study plans/Curricula: **Chemical Sciences Second degree (1st Level Master degree)**

Type: **Affine and Integrative activity**

Total Credits: **4**

Didactic Methods: **Lectures and exercises**

Language of the course: **Italian**

Didactic Period: **1° year - 2° semester (March – June)**

Exam type: **Written (with open questions)/Oral**

Professor in charge: **FABIO ARNESANO**

Training objectives: **1) to deepen knowledge in the field of chemistry of coordination compounds (metallic complexes, clusters, and bioinorganic systems), with models of chemical bonding and reactivity; 2) to rationalize the electronic structure, magnetic properties, and reactivity of *d*-metal complexes and biological metal sites through theoretical models and experiments; 3) to interpret the electronic spectra of *d*-metal complexes.**

Prerequisites: **Basic concepts of inorganic chemistry of bachelor degree**

Didactic Methods: **Chalk and blackboard teaching with power point presentation**

Course programme

COORDINATION COMPOUNDS. The *d*-Block Elements: Periodic Properties. Coordination compounds: definition. Coordinate bond. Coordination Numbers and Geometry. Valence bond theory. Crystal-field theory (octahedral, tetrahedral, square-planar geometry). Jahn-Teller effect. Ligand-field theory. Electronic states and spectroscopic terms. Correlation diagrams. Electronic spectra and magnetic properties of metallic complexes. Luminescence. Metal-metal bonded compounds and clusters.

REACTIVITY OF COORDINATION COMPOUNDS. Labile and inert complexes. Mechanisms of ligand substitution reactions (in octahedral and square-plane complexes). Mechanisms of redox reactions. The Marcus equation. Photochemical reactions.

BIOINORGANIC CHEMISTRY. Metal ions in biological systems. Metalloproteins and Metalloenzymes (Zn, Fe, Cu, Co, Mo). Chelating agents and metal-based drugs.

Reference Texts: Peter William Atkins, Tina Overton, Jonathan Rourke, Mark Weller, Fraser Armstrong. Inorganic Chemistry (Fifth Edition), W. H. Freeman and Company - New York (2010). Handouts and lecture notes.