

Syllabus

Course Description

Course Title	Bioinorganic chemistry
Course Code	44730
Course Title Additional	
Scientific-Disciplinary Sector	CHEM-03/A
Language	English
Degree Course	Master in Food Sciences for Innovation and Authenticity
Other Degree Courses (Loaned)	
Lecturers	Prof. - Ass. Walter Baratta, Walter.Baratta@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/43600
Teaching Assistant	
Semester	First semester
Course Year/s	2nd
CP	2
Teaching Hours	20
Lab Hours	0
Individual Study Hours	30
Planned Office Hours	6
Contents Summary	The course aims to provide the students the knowledge of the properties of transition metal compounds. Particular attention will be focused on the thermodynamic and kinetic aspects of chemical reactions with metal compounds. Furthermore, the role of metals within metalloproteins and metalloenzymes in biochemical processes will be presented with the aim to better understand their mechanisms.
Course Topics	
Keywords	
Recommended Prerequisites	Inorganic and organic chemistry

Propaedeutic Courses	
Teaching Format	
Mandatory Attendance	
Specific Educational Objectives and Learning Outcomes	The course gives a general overview of scientific contents on metalloproteins and their interaction and catalytic activity with metabolites. The aim is to understand and rationalize relevant biochemical processes involving metals in the cell. Chemistry of transition metals compounds, mono and polydentate ligands, aquo complexes, water exchange rate, complexes with EDTA, 18 electron rule, geometry of the complexes. Interaction of metals with small and organic molecules (eg. CO, carboxylic acids, phenols, amines), redox reactions and catalytic activity of metal complexes. Metals in biological systems (porphyrins, peptides, sulfur ligands). Transport, storage and control of iron. Metalloproteins and metalloenzymes: structure, oxygen transport mechanisms (hemoglobin, hemerythrin, hemocyanin), electron transfer mechanism (iron-sulfur proteins, copper blue proteins, cytochrome c). Enzymatic reactions with Zn (carbonic anhydrase, carboxypeptidase, alcohol dehydrogenase) and metals with different oxidation states, namely Fe, Cu and Co, involving oxygen, peroxides and radical reactions (cytochrome P-450, monooxygenase, dioxygenase, catalase, peroxide dismutase, vitamin B12), mediated by the NAD⁺ / NADH system. Anticancer Pt and Ru compounds: structure and their mechanism.
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	Oral exam with review questions to test knowledge and some application skills
Evaluation Criteria	Final mark is assigned taking into account the clarity of the answers, the ability to summarize, evaluate and establish relationships among different topics
Required Readings	Chemistry of Metalloproteins, Problems and Solutions in Bioinorganic Chemistry, J. J. Stephanos. A. W. Addison, John Wiley & Sons, Inc.

Supplementary Readings	Principles of Bioinorganic Chemistry, S. J. Lippard, J. M. Berg, University Science Books, Mill Valley, CA
Further Information	
Sustainable Development Goals (SDGs)	Good health and well-being