

MÓDULO	MATTER	COURSE	SEMESTER	CRÉDITS	KIND
Optative subject	Bioinorganic Chemistry	2 ^o and later	1 ^o (a group) and 2 ^o (two groups)	6	Optative
TEACHERS⁽¹⁾			FULL CONTACT ADDRESS FOR TUTORIALS (Postal address, telephone, email, etc.)		
<ul style="list-style-type: none"> Juan Nicolás Gutiérrez Josefa María González Pérez 			Department of Inorganic Chemistry, 3rd plant, Faculty of Pharmacy. jniclos@ugr.es, jmgp@ugr.es		
			TUTORIAL SCHEDULE AND / OR LINK TO THE WEBSITE WHERE THE TUTORIAL SCHEDULES CAN BE CONSULTED ⁽¹⁾		
			Juan Nicolás Gutiérrez (L, J: 08,30-10,30 y 16,00-17,00) J. M ^a . González Pérez (M, J: 09,30-11,30 y 16,00-17,00);		
DEGREE IN WHICH IT IS IMPARTE			OTHER DEGREES WHICH COULD BE OFFERED		
Degree in Pharmacy			Degree in Chemistry and Degree in Biology		
PRERREQUISITOS Y/O RECOMENDACIONES (si procede)					
<p>-It is recommended to have the subjects of Inorganic Chemistry and Biochemistry approved. Have adequate knowledge about:</p> <ul style="list-style-type: none"> Protein structure and conformation Coordination Chemistry Knowledge of Bioelements 					
BREVE DESCRIPCIÓN DE CONTENIDOS (SEGÚN MEMORIA DE VERIFICACIÓN DEL GRADO)					

¹ Consulte posible actualización en Acceso Identificado > Aplicaciones > Ordenación Docente

BLOCK 1: GENERALITIES.

BLOCK 2: BIOINORGANIC CHEMISTRY OF SOME BIOLOGICAL SYSTEMS.

BLOCK 3: THERAPEUTIC ACTION AND TOXICITY.

GENERAL AND SPECIFIC COMPETENCES

- A. . General competences
- B. CG1. Identify, design, obtain, analyze, control and produce drugs and medicines, as well as other products and raw materials of health interest for human or veterinary use.
- C. CG4. Design, prepare, supply and dispense medicines and other products of health interest.
- D. CG11. Evaluate the toxicological effects of substances and design and apply the relevant tests and analyzes.
- E. B. Specific competences
- F. CEM1.1 Identify, design, obtain, analyze and produce active ingredients, drugs and other products and materials of health interest.
- G. CEM1.4 Estimate the risks associated with the use of chemicals and laboratory processes.
- H. CEM1.9 Know the origin, nature, design, procurement, analysis and control of medicines and health products

OBJECTIVES (EXPRESSED AS EXPECTED RESULTS OF TEACHING) medicines and health products

With the subject of BIOINORGANICA CHEMISTRY, it is expected that the student:

- A. Know the implications of metal elements in biological systems, with particular emphasis on the study of active centers of metalloproteinas as the main responsible for the activity that they play in biological systems.
- B. To introduce the student in the knowledge of the aspects of Inorganic Medicinal Chemistry, in particular, a subject is addressed to the study of inorganic compounds with antitumor action and another one where the student is introduced in the field of toxicology of metals, with special Mention of chelating therapy.

DETAILED OF THE SUBJECT

THEORETICAL TOPIC:

Block I GENERAL



Topic 1: INTRODUCTION AND GENERAL CONSIDERATIONS ABOUT THE PRESENCE OF METALS IN BIOLOGICAL SYSTEMS (S. B.).

Origin of the presence of metals in Biological Systems.

Chemical elements that are part of Biological Systems.

Biological functions of inorganic elements.

Topic 2: INTERACTIONS OF METALLIC IONS WITH BIOLOGICAL LIGANDS.

2.1 Generalities

2.2 General properties of metallic cations.

Biological ligands (Bioligands).

Metal-protein interaction.

Stability of complexes and factors affecting it.

Chelate and Macrochelate effects.

Topic 3: SOME ELECTRONIC CONFIGURATIONS OF IONES OF INTEREST IN BIOLOGICAL SYSTEMS.

3.1 Vanadium

3.2 Chrome

3.3 Manganese

3.4 Iron

3.5 Cobalt

3.6 Nickel

3.7 Copper

Topic 4: METHODOLOGY AND EXPERIMENTAL TECHNIQUES USED IN BIOINORGANIC CHEMISTRY.

4.1-Possibilities of approach of the investigation in Chemistry Bioinorganic.

4.2-Brief introduction of the different methods used in the characterization of model compounds with biological ligands and the like.

4.2.1- Diffractometric methods.

4.2.2- Spectroscopic methods (electronic and vibrational).



4.2.3- Measures of magnetic susceptibility.

4.2.4- Electronic spin resonance.

4.2.5- Other techniques used in the study of model compounds:

Block II BIOINORGANIC CHEMISTRY OF SOME BIOLOGICAL SYSTEMS

opic 5: BIOINORGANIC CHEMISTRY OF OXYGEN AND NITROGEN.

5.1 General aspects.

5.2 Activation of Oxygen.

5.3 Biological oxidation.

5.4 Transport and Storage of dioxygen.

5.5 Activation of nitrogen.

Unit 6: BIOINORGANIC CHEMISTRY OF IRON.

6.1 General aspects.

6.2 Iron proteins containing heme groups

6.3 Iron / sulfur proteins

6.4 Systems containing Fe-O-Fe units.

6.5 Iron metabolism.

Topic 7: BIOINORGANIC COPPER CHEMISTRY.

7.1 General. Copper type1; Copper type 2; Copper type3

7.2 Oxidases.

7.3 Electron transporters.

7.4 Superoxide dismutase (SOD)

7.5 Hemocyanines.

7.6 Copper metabolism.

Topic 8: COBALT BIOINORGANIC CHEMISTRY.



8.1 General aspects.

8.2 Vitamin B12.

8.3 Cobalt metabolism

Block III THERAPEUTIC ACTION AND TOXICITY

Topic 9: ANTIMORAL COMPOUNDS

9.1 Cancer. Origin and treatment.

9.2 Structure-activity relation antitumor. Empirical rules.

9.3 Antitumor activity-reactivity to DNA.

9.4 Some considerations about the coordination chemistry of Pt.

9.5 Structural features of DNA. Functional groups of DNA as ligand.

9.6 Reaction modes of Pt (II) complexes with DNA.

9.7 Other compounds with antitumor properties.

Topic 10: TOXICOLOGY OF SOME TRANSITION METALS

10.1 General information.

10.2 Mechanisms of defense and detoxification.

10.3 Some typical contaminants.

TEMARIO PRÁCTICO:

Lab practices

NOTEBOOK Nº 1 $(AdeH_2)[Cu(HEDTA)(H_2O)] \cdot 2H_2O$

NOTEBOOK Nº 2 $[Cu(MIDA)(AdeH)(H_2O)] \cdot H_2O$

NOTEBOOK Nº 3 $[Cu(NBzIDA)(AdeH)(H_2O)] \cdot H_2O$

Execution of the Practices

First and Second days: general information of the Program of Practices and Synthesis of the selected compound.

Third day and following: Isolation and characterization. [...]

BIBLIOGRAPHY



A) FUNDAMENTAL BIBLIOGRAPHY:

"QUIMICA BIOINORGÁNICA" J. S. Casas, V. Moreno, A. Sánchez, J. L. Sánchez, J. Sordo. Ed. Síntesis (2002).

"QUÍMICA BIOINORGÁNICA" Enrique Baran Ed. McGraw-Hill

"BIOINORGANIC CHEMISTRY: INORGANIC ELEMENTS IN THE CHEMISTRY OF LIFE" Wolfgang Kaim and Brigitte Schwederski. Ed. John Wiley and Sons.

"INTRODUCCION A LA QUIMICA BIOINORGANICA" M. Vallet, J. Faus, E. García-España y J. Moratal Ed. Síntesis (2003).

B) COMPLEMENTARY BIBLIOGRAPHY:"PRINCIPLES OF BIOINORGANIC CHEMISTRY" Stephen J. Lippard and Jeremy M. Berg. Ed. University Science Books.

"BIOINORGANIC CHEMISTRY" Bertini; Gray; Lippard and Valentine. Ed. University Science Books.

"THE BIOLOGICAL CHEMISTRY OF THE ELEMENTS. THE INORGANIC CHEMISTRY OF LIFE" J.J.R. Frausto da Silva and R.J.P. Williams. Ed. Oxford University Press.

C) ENCYCLOPEDIA AND SERIES:

"METAL IONS AND BIOLOGICAL SYSTEMS" Astrid Sigel and Helmut Sigel. Ed. Marcell Dekker.

"HANDBOOK OF THE TOXICOLOGY OF METALS" Lars Friberg; Gunnar F. Nordberg and Velimir B. Vouk.Ed. Elsevier.

"HANDBOOK OF NUCLEOBASES COMPLEXES" J. R. Lusty, P. Wearden, V. Moreno . CRC Press (vol. II)

RECOMMENDED LINKS

<http://www.hindawi.com/journals/bca/>

(Bioinorganic Chemistry and Applications, open access journal)

http://investigacion.ugr.es/ugrinvestiga/static/Buscador/*/grupos/ficha/FQM283

http://biomec.ugr.es/datos_inicio/

TEACHING METHODOLOGY

The teachings will be based mainly on expository theoretical classes.

Lectures on the contents of each topic supported by presentations. The material used in class will be available to students at the beginning of each subject in the meadow palate (SWAD and / or teaching board). Laboratory Practices with sessions of discussion of results of the techniques of isolation and those used in the in the characterization of the compounds used.characterización of the compounds used.caracterización de los compuestos utilizados.



ACTIVITY PROGRAM					
Second term	Themes	In-person activities (NOTE: Modify according to the teaching methodology proposed for the subject)	Non-face-to-face activities (NOTE: Modify according to the teaching methodology proposed for the subject)		
		Theoretical Sessions Practical sessions (*) Exhibitions and seminars Collective tutorials (**) Exams	Individual Tutorials Study and individual work of the student Team work		
Week 1	1	3	3		
Week 2	2	4	5		
Week 3	3	4	5		
Week 4	3	3	9		
Week 5	4	4	5		
Week 6	5	4	6		
Week 7	6	5	7		
Week 8	6	3	4		
Week 9	7	5	7		
Week 10	7-8	5	7		
Week 11	8	5	6		
Week 12	9	4	7		
Week 13	9	4	6		
Week 14	10	4	7		
Week 15	10	3	6		
Total hours		60	90		

(*)Practices will be given to groups of 15 students for 3 consecutive sessions of 2.5 hours plus 2.5 hours of laboratory visits

(**) The tutorials will be distributed throughout the course according to the criteria of the student and the teacher



EVALUATION (EVALUATION INSTRUMENTS, EVALUATION CRITERIA AND FINAL RATING PERCENTAGE, ETC.)

To qualify for this evaluation, the following instruments will be taken into account:

- Periodic checks in class hours.
- Overall assessment at the end of the course.
- Assessment of practices.
- The evaluation will be based on the presentations and / or expositions of theory and problem work and the exams in which the students will have to demonstrate the acquired competences.
- Exceeding any of the tests will not be achieved without a uniform and balanced knowledge of all

matter

Evaluation criteria and percentage of the final grade:

The evaluation criteria should be clarified in advance, based on the correction of exams (Written). For the final grade of the subject, the following percentages

- Theory note: 70%.
- Internship note: 20%.
- Class attendance and scheduled activities:

DESCRIPCIÓN DE LAS PRUEBAS QUE FORMARÁN PARTE DE LA EVALUACIÓN ÚNICA FINAL ESTABLECIDA EN LA "NORMATIVA DE EVALUACIÓN Y DE CALIFICACIÓN DE LOS ESTUDIANTES DE LA UNIVERSIDAD DE GRANADA"

Those students who can not benefit from the continuous assessment plan for various reasons may avail themselves of a final evaluation process, requesting it to the Director of the Department in the first two weeks of the course. This evaluation will consist of a single written (or oral) test, where the knowledge of the subject will be assessed and the grade will be considered as the final grade of the subject

ADDITIONAL INFORMATION

The students of Bioinorganica Chemistry will be informed in a timely manner of the research that is being carried out in this field. In this regard, the European Biological Inorganic Chemistry Conference (EUROBIC, September 2012, the teachers of the subject were involved in the organization of the 11th Edition of the Same (www.eurobic11.com))

For additional information, consult the teaching guide or the website of the Faculty of Pharmacy:

<http://farmacia.ugr.es/cont.php?sec=2&pag=29>

