Inorganic Chemistry

Educational subject description sheet

Basic information

Field of study Joint Bachelor in Sustainability	**Education cycle** 2025/26
Speciality Sustainable Physics & Chemistry	**Subject code** UJ.WPAJBSSPCS.840.16404.25
Organizational unit Faculty of Law and Administration	**Lecture languages** english
Study level first cycle (joint degree programme)	**Subject related to scientific research** Yes
Study form full-time degree programme	**Disciplines** Chemical sciences
Education profile General academic	**ISCED classification** 0588 Interdisciplinary programmes involving broad field 05
Mandatory obligatory	**USOS code**

Subject coordinator	Piotr Szwedo
Lecturer	Pedro Camargo

Period Semester 3	**Examination** exam **Activities and hours** Discussion class: 34	**Number of ECTS points** 5.0

Goals

C1	The course provides a foundation for inorganic chemistry. Starting with the chemistry of elements and periodic properties, the course covers acids and bases and their applications in sustainable chemistry. In addition, the course covers topics in redox reactions, solid-state chemistry, and coordination chemistry and introduces students to the latest research on inorganic chemistry in real life applications.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	describe the electronic structure and bonding of inorganic compounds	JBS_K1_W06, JBS_K1_W07	written exam
W2	explain the basic principles of inorganic chemistry, including the properties and reactions of inorganic compounds	JBS_K1_W06, JBS_K1_W07	written exam
W3	discuss the principles of acid-base chemistry and redox reactions in inorganic systems	JBS_K1_W06, JBS_K1_W07	written exam
W4	illustrate the role of inorganic chemistry in catalysis and energy production and storage, and environmental remediation	JBS_K1_W06, JBS_K1_W07	written exam, project
Skills – Student can:			
U1	identify and classify different types of inorganic compounds based on their structure and properties	JBS_K1_U02	written exam
U2	relate the structure and properties of inorganic solids using the principles of solid-state chemistry	JBS_K1_U02	written exam
Social competences – Student is ready for:			
K1	critically evaluate and verbalise their own competence and skills in the field of inorganic chemistry	JBS_K1_K04	project

Calculation of ECTS points

Activity form	Activity hours*
Discussion class	34
preparation for classes	30
exercises performance	6
preparation for the exam	60
preparation of a project	16

Student workload	Hours	ECTS
	146	5.0

* hour means 45 minutes

Study content

No.	Course content	Subject's learning outcomes
1.	Interactive lecture: Chemistry of the Elements • Atomic properties • Periodic trends	W1, W2, U1, K1
2.	Interactive lecture: Acids and bases I • Definitions and applications in sustainable chemistry and environment	W3, K1
3.	Interactive lecture: Acids and bases II • Definitions and applications in sustainable chemistry and environment	W3, K1
4.	Interactive lecture: Oxidation and reductions I • Reduction potentials, Redox stability, Diagrammatic presentation of potential data, • Chemical extraction of the elements	W3, K1
5.	Interactive lecture: Oxidation and reductions II • Reduction potentials, Redox stability, Diagrammatic presentation of potential data, • Chemical extraction of the elements	W3, K1
6.	Exercise session on the topics of previous sessions	W3, K1
7.	Interactive lecture: Solid State Chemistry I • The description of the structure of solids • The structure of metal and alloys	W1, W2, U1, U2, K1
8.	Interactive lecture: Solid State Chemistry II • Ionic and covalent-framework solids • Energetics of ionic bonding	W1, W2, U1, U2, K1
9.	Interactive lecture: Solid State Chemistry III • Defects and nonstoichiometry • The electronic structure of solids	W1, W2, U1, U2, K1
10.	Exercise session on the topics of previous sessions	W1, W2, U1, U2, K1
11.	Interactive lecture: Coordination Chemistry I • Constitution and geometry, Isomerism and chirality	W1, W2, W4, U1, K1

No.	Course content	Subject's learning outcomes
12.	Interactive lecture: Coordination Chemistry II • Crystal field and ligand field theories	W1, W2, W4, U1, K1
13.	Interactive lecture: Coordination Chemistry III • Electronic properties and magnetism	W1, W2, W4, U1, K1
14.	Interactive lecture: Coordination Chemistry IV • Reactions of coordination compounds	W1, W2, W4, U1, K1
15.	Interactive lecture: Organometallic Chemistry I • Definitions, representative ligands	W1, W2, W4, U1, K1
16.	Interactive lecture: Organometallic Chemistry II • Representative reactions and Industrial applications	W1, W2, W4, U1, K1
17.	Exercise session on the topics of previous sessions	W1, W2, W4, U1, K1

Course advanced

Teaching methods :

project method, conversation lecture, practicals

Activities	Examination methods	Credit conditions
Discussion class	written exam, project	Final exam – 70%; group presentation – 15%; homework assignments – 15%

Entry requirements

None

Literature

Obligatory

1. Descriptive Inorganic Chemistry; G. Rayner-Canham, T. Overton, 5th Edition, W.H. Freeman and Company
2. Inorganic chemistry, Shriver & Atkins, Oxford University Press
3. Principles of Descriptive Inorganic Chemistry, G. Wulfsberg, Brooks/Cole Publishing Company

Effects

Code	Content
JBS_K1_K04	The graduate can critically assess and verbalize own competencies and skills related to different aspects of sustainability as well as their need for development.
JBS_K1_U02	The graduate can present and report knowledge, methodologies, ideas, problems and solutions, clearly and comprehensively, in different forms destined for different audiences – including discussions and debates which require defending a substantiated opinion, as well as conversations in a foreign language at the CEFR B2 level.
JBS_K1_W06	The graduate can describe interconnections between various aspects of sustainability and identify their significance in the context of natural and social sciences, with a special focus on disciplines included in the selected specialisation track (law and politics; chemistry and physics; chemistry and biology; economics and geography; economics, management and engineering; humanities).
JBS_K1_W07	The graduate can apply the theory and methodology of disciplines included in the selected specialisation track to sustainability-related problems, taking into consideration practical limitations such as protection of intellectual property.