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جامعة كل العرب

Course Syllabus
Faculty of Arts and Science
Academic Department: Chemistry
Academic Year 2021 / 2022 Semester: second

Course Title:	Inorganic Chemistry 3
Course No.:	1722421
Prerequisite:	1722321
Concurrent:	None
Department:	Chemistry
Coordinator:	Dr. Faten Aladwan
Mode of Instruction	Blended Learning - 2 hours in-class (Synonym) learning 1 hour online asynchronous learning using Edu-Gate

***Instructor:**

Lecturer	Office Phone	Room No.	Office Hours	E-mail
Dr. Faten Aladwan	1411	222	Tu, Th: 11-1 M.,W: 11:30-12:30	<i>f_aladwan@asu.edu.jo</i>

Course Description

This course is devoted to provide the students with knowledge related to the inorganic chemistry of *s*- and *p*- block elements: their natural abundance, occurrence, extraction and uses, physical properties, general chemical properties and their important compounds, chemical reactions (formation of halides, oxides, hydroxides, oxoacids, oxoanions, the formation of polymeric inorganic compounds in groups 13,14,15,16 and 17), and introduction to the *f*-block metals and their compounds.

Intended Learning Outcomes

Upon the completion of the course, this module should lead to the following learning outcomes:

A. Knowledge and Understanding (Student should):

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رمز النموذج: UF 28 / 2

رقم القرار 24 / 233

تاريخ الاعتماد 2021/10/18



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- A1. Know the basic features of the chemistry of representative elements and *f*-block metals.
A2. Learn the occurrence of these elements in nature, their extraction and some industrial applications.
A3. Describe and compare the distinct properties of different elements.

B. Cognitive and Intellectual Skills (Student should):

- B1. Explain, predict and distinguish between the chemical reactivity of these elements, the ionic and molecular compounds.
B2. Ability to demonstrate knowledge and understanding of concepts and principles related to the chemistry of *f*-block elements
B3. Evaluate and interpret chemical information and data.

C. Subject Specific Skills (Student should):

- C1. Apply such knowledge and in-depth understanding to solve qualitative problems
C2. Research ability in the field of inorganic chemistry

Program Learning Outcomes (PLOs):

1.1	Describe the fundamentals of chemistry including structure, reactivity and properties of chemical substances, different situation of reaction and the states of matter.
1.2	Construct essential facts, principles and theories across the four principal areas of chemistry, i.e. analytical, organic, inorganic and physical.
2.1	Differentiate between the different states of the matter, elements and compounds based on the recognition and quantification of the properties.
2.2	Explain concepts, principles and determine the efficiency of chemical systems by applying mathematical expressions.
2.3	Analyze chemical and spectral data to identify and confirm chemical structures as well as determine chemical composition.
2.4	Establish and conclude mechanisms for physical and chemical processes.
2.5	Solve the scientific problems using different mechanisms and procedures.
2.6	Present scientific material and arguments clearly and correctly, in writing and orally, to a range of audiences
3.1	Demonstrate adequate life-long learning skills.
3.2	Collaborate effectively with other people in a team.
3.3	Select appropriate techniques and procedures for chemical synthesis and analysis.
4.1	Demonstrate information technology skills, especially in the areas of information retrieval, literature searching and use of library databases
4.2	Communicate effectively both orally and in writing with professionals and/or lay audience

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4.3	Interpret data derived from laboratory observations and measurements in terms of their significance and the theory underlying them.
4.4	Employ computational software's and data- processing skills in handling of chemical information and analysis of chemical data.

Course Learning Outcomes Alignment Matrix

PLO	A1	A2	A3	B1	B2	B3	C1	C2
1.1	√							
1.2		√						
2.1				√				
2.2	√							
2.3						√		
2.4			√					
2.5				√	√			
2.6							√	
3.1							√	√
3.2								√
3.3						√		
4.1								√
4.2								√
4.3						√		
4.4								√

Course Contents and Schedule

Week	Day and Date	Topics to be covered	Method of instruction	CLOs	PLOs
1	Sun. 6/3/2022	Hydrogen: Hydrogen: the simplest atom, the H ⁺ and H ⁻ ions, Isotopes of hydrogen, Dihydrogen , Polar and nonpolar E-H bonds, Hydrogen: Hydrogen bonding, Binary hydrides	In-class lecture	A1	1.1, 2.2
	Tues. 8/3/2022		In-class lecture		
	Thurs. 10/3/2022				

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2	Sun. 13/3/2022	Group 1: Introduction, Occurrence, extraction and uses, Physical properties, The metals: Appearance, reactivity, Halides	In-class lecture	A1, A2	1.1, 1.2, 2.2
	Tues. 15/3/2022		In-class lecture		
	Thurs. 17/3/2022		In-class lecture		
3	Sun. 20/3/2022	Group 1: Oxides and Hydroxides, Salts of Oxoacids, Aqueous solution chemistry	In-class lecture	A3, B1	2.1, 2.4
	Tues. 22/3/2022		In-class lecture		
	Thurs. 24/3/2022		In-class lecture		
4	Sun. 27/3/2022	The group 2 metals: Introduction, Occurrence, extraction and uses, Physical properties, The metals: Appearance, reactivity, Halides, Oxides and Hydroxides, Salts of Oxoacids	In-class lecture	A1,A2	1.1, 1.2, 2.2
	Tues. 29/3/2022		In-class lecture		
	Thurs. 31/3/2022		In-class lecture		
5	Sun. 3/4/2022	The group 2 metals: Complex ions in aqueous solution, Complexes with amido or alkoxy ligands. Diagonal relationships between Li and Mg, and between Be and Al	In-class lecture	A3, B1,	2.1, 2.4
	Tues.5/4/2022		In-class lecture		
	Thurs. 7/4/2022		In-class lecture		
6	Sun. 10/4/2022	The group 13 elements: Introduction, Occurrence, extraction and uses, Physical properties, The elements, Simple hydrides, Halides and complex halides, Oxides, oxoacids, oxoanions and hydroxides, Compounds containing nitrogen	In-class lecture	A1, A2	1.1, 1.2, 2.2
	Tues.12/4/2022		In-class lecture		
	Thurs. 14/4/2022		In-class lecture		
7	Sun. 17/4/2022	The group 13 elements: Aluminium to thallium: salts of oxoacids, aqueous solution chemistry and complexes, Metal borides. Electron-deficient borane and carbaborane clusters: an introduction. The group 14 elements: Introduction, Occurrence, extraction and uses, Physical properties.	In-class lecture	A1, A2,B1	1.1, 1.2, 2.1, 2.2
	Tues. 19/4/2022		In-class lecture		
	Thurs. 21/4/2022		In-class lecture		
8.					
9	Sun. 1/5/2022	The group 14 elements: Allotropes of carbon, Structural and chemical properties of silicon, germanium, tin and lead, Hydrides, Carbides, silicides, germides, stannides and plumbides, Halides and complex halides, Oxides, oxoacids and hydroxides, Siloxanes, Sulfides, Cyanogen, silicon nitride and tin nitride	In-class lecture	A1,B1	1.2, 2.2 2.1, 2.5
	Tues. 3/5/2022		Online (Asynchron ous)		
	Thurs. 5/5/2022				



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10	Sun. 8/5/2022	The group 14 elements: Aqueous solution chemistry and salts of oxoacids of germanium, tin and lead. The group 15 elements: Introduction, Occurrence, extraction and uses, Physical properties. The elements, Hydrides, Nitrides, phosphides, arsenides, antimonides and bismuthides, Halides, oxohalides and complex halides, Aqueous solution chemistry of sulfur, selenium and tellurium.	In-class lecture	A1, A2	1.1, 1.2, 2.2
	Tues. 10/5/2022		Online (Asynchronous)		
	Thurs. 12/5/2022				
11	Sun. 15/5/2022	The group 15 elements: Oxides of nitrogen, Oxoacids of nitrogen, Oxides of phosphorus, arsenic, antimony and bismuth, Oxoacids of phosphorus, Aqueous solution chemistry and complexes	In-class lecture	A3, B1	2.1, 2.4
	Tues. 17/5/2022		Online (Asynchronous)		
	Thurs. 19/5/2022				
12	Sun. 22/5/2022	The group 16 elements: Introduction, Occurrence, extraction and uses, Physical properties and bonding considerations, the elements, Hydrides, Metal sulfides, polysulfides, polyselenides and polytellurides, Halides, Oxides, Oxoacids and their salts, Compounds of sulfur and selenium with nitrogen,	In-class lecture	A1, A2, B1	1.1, 1.2, 2.1, 2.2
	Tues. 24/5/2022		Online (Asynchronous)		
	Thurs. 26/5/2022				
13	Sun. 29/5/2022	The group 17 elements: Introduction, Occurrence, extraction and uses, Physical properties and bonding considerations, the elements, Hydrogen halides, Metal halides, Interhalogen compounds, oxides and oxofluorides of chlorine, bromine, and iodine, Oxoacids and their salts, Aqueous solution chemistry.	In-class lecture	A1, A2, B1	1.1, 1.2, 2.1, 2.2
	Tues. 31/5/2022		Online (Asynchronous)		
	Thurs. 2/6/2022				
14	Sun. 5/6/2022	The group 18 elements Introduction, Occurrence, extraction and uses, Physical properties, Compounds of xenon, Compounds of argon, krypton and radon	In-class lecture	A1, A2, B3, C1	1.1, 1.2, 2.2, 2.3, 3.3, 4.3, 2.6, 3.1
	Tues. 7/6/2022		Online (Asynchronous)		
	Thurs. 9/6/2022				
15	Sun. 12/6/2022	The f-block metals: Lanthanoids and actinoids.	Assignment	A1, B2, C2	1.1, 1.2, 2.5, 3.1,



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	Tues. 14/6/2022	Introduction, f- orbitals and oxidation states, Atom and ions sizes, Spectroscopic and magnetic properties, Sources of Lanthanoids and actinoids.	Online (Asynchronous)		3.2, 4.1, 4.2, 4.4
	Thurs. 16/6/2022				
16.	Final Exam				

Grading Plan and Assessment Tools

Assessment Tools	Weights	Due date
Mid-term	30%	TBA
Assignments	10%	TBA
Quizzes	20%	TBA
Inter active lectures	-	-
Group Work	-	-
Presentation	-	-
Reports	-	-
Project	-	-
Case-Study	-	-
Final Exam	40%	TBA

Supplementary Reading

Textbook:

Inorganic Chemistry, Catherine E. Housecroft and Alan G. Sharpe, 4th edition, Pearson Education, 2005

References:

1. Basic Inorganic Chemistry, Cotton , Wilkinson and Gaus, 3rd edition, John Wiley,1995.
2. Inorganic Chemistry, Huheey, Keiter and Keiter,4th edition, Harper Collins, 1993.
3. Inorganic Chemistry, Miesler and Tarr. 3rd edition, Oxford, Pearson,2004.



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Copy to:

- Department Head.
- Head of Curriculum Committee.
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