



AMMAN - JORDAN

المستوى الذهبي

جامعة كل العرب

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

<b>Course Title:</b>	Inorganic Chemistry 1
<b>Course No.:</b>	1722221
<b>Prerequisite:</b>	1722102
<b>Concurrent:</b>	-
<b>Department:</b>	Chemistry
<b>Coordinator:</b>	Dr. Faten Aladwan
<b>Mode of Instruction</b>	<b>On- campus Learning</b> - 3 hours in-class (Synonym) learning

**\*Instructor:**

Lecturer	Office Phone	Room No.	Office Hours	E-mail
Dr. Faten Aladwan	1411	222	S,T: 9:30-11 M.,W: 12:30 – 2	f_aladwan@asu.edu.jo

**Course Description**

This course is devoted to provide the students with the basic concepts in chemical bonding, both ionic and covalent bonding. Since bonding theories use molecular orbitals based on solution of Schrödinger wave function. The student is exposed first to the basic assumptions of wave mechanics and the solution for hydrogen atom and hydrogen like orbitals. The course covers the ionic bonding, calculations of lattice energy and use of Born -Haber Cycle to calculate heat of formation. The course aim at giving the student the basis of bonding theories Valence shell electron pair repulsion. Valence bonding and molecular orbital theories. At the end the student will be able to determine the structure of any covalent compound, distribute the charges among bonded atoms and understand its chemical reactivity.

**Intended Learning Outcomes**

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

Amman – Jordan : عمان – الأردن : Tel: 5609999 \_ فاكس: 5232899 \_



## جامعة كل العرب

### A. Knowledge and Understanding (Student should):

- A1. Acquire good knowledge in fundamentals of inorganic chemistry including the covalent and ionic bonding.
- A2. Be able to understand the basic concepts of atomic structure and molecules.
- A3. Understand the trends of physical properties of inorganic compound.
- A4. Understand the types of acids and bases and to know how to determine their strengths

### B. Cognitive and Intellectual Skills (Student should):

- B1. Understand properties of ionic bonding and the structures of crystal lattices.
- B2. Perform calculations related to lattice energies, atomic structure, Born-Haber cycle, and thermochemical calculations of ionic compounds.

### C. Subject Specific Skills (Student should):

- C1. Understand the principles of valence bond theory and molecular orbital theory
- C2. Be able to use different theories to explain bonding, structure and properties of compounds.

### 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.
1.3	Align major issues currently at the frontiers of chemical research and development.
2.1	Differentiate between the different states of the matter, elements and compounds based on the recognition and quantification of the properties.
2.3	Analyze chemical and spectral data to identify and confirm chemical structures as well as determine chemical composition.
2.5	Solve the scientific problems using different mechanisms and procedures.
3.1	Demonstrate adequate life-long learning skills.
3.3	Select appropriate techniques and procedures for chemical synthesis and analysis.
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.



جامعة كل العرب

Course Learning Outcomes Alignment Matrix								
PLO	A1	A2	A3	A4	B1	B2	C1	C2
1.1	✓							
1.2	✓	✓						
1.3		✓	✓	✓				
2.1				✓	✓			
2.3						✓		
2.5							✓	✓
3.1							✓	✓
3.3				✓		✓		
4.3						✓		
4.4						✓		✓

Course Contents and Schedule

Week	Day and Date	Topics to be covered	Method of instruction	CLOs	PLOs
1	Sun. 17/10/2021 Tue. Official holiday	Chapter 1: Basic concept: atoms. Fundamental particles of atoms, Atomic number, mass number and isotopes,	In-class lecture In-class lecture	A2	1.2 1.3
2	Sun. 24/10/2021 Tue. 26/10/2021	Chapter 1: Successes in early quantum theory, introduction to wave mechanics, atomic orbitals. many-electron atoms.	In-class lecture In-class lecture	A2 A3	1.2 1.3
3	Sun. 31/10/2021 Tue. 2/11/2021	Chapter 1: The Aufbau principle, ionization energy and electron affinity.	In-class lecture In-class lecture	A2 A3	1.2 1.3
4	Sun. 7/11/2021 Tue. 9/11/2021	Chapter 2: Basic concept: molecules. Bonding models, Homonuclear diatomic	In-class lecture In-class lecture	C1 C2	2.5 3.1 4.4

Amman – Jordan \_ عمان – الأردن: Tel: 5609999 \_ فاكس: 5232899



جامعة كل العرب

		molecules: valence bond (VB) theory	Quiz 1		
5	Sun. 14/11/2021 Tue.16/10/2021	Chapter 2: Homonuclear diatomic molecules: molecular orbital (MO) theory, Electronegativity, Dipole moments, MO theory: heteronuclear diatomic molecules, Molecular shape and the VSEPR model.	In-class lecture  In-class lecture	C1 C2	2.5 3.1 4.4
6	Sun. 21/11/2021 Tue.23/11/2021	Chapter 5: Bonding in polyatomic molecules. Valence bond theory: hybridization of atomic orbitals, Valence bond theory: multiple bonding in polyatomic molecules.	In-class lecture  In-class lecture	C1 C2	2.5 3.1 4.4
7	Sun. 28/11/2021 Tue.30/11/2021	Chapter 6: Structures and energetics of metallic and ionic solids Packing of spheres, Polymorphism in metals, Metallic radii, Sizes of ions.	In-class lecture  In-class lecture Assignment1	B1, B2	2.1 2.3 3.3 4.3 4.4
8.	<b>MID Term Exam</b>				
9	Sun. 12/12/2021 Tue. 14/12/2021	Chapter 6: Ionic lattices, Crystal structures of semiconductors, Lattice energy: the Born–Haber cycle, Defects in solid state lattices	In-class lecture  In-class lecture	B1, B2	2.1 2.3 3.3 4.3 4.4
10	Sun. 19/12/2021 Tue 21/12/2021	Chapter 7: Acids, bases and ions in aqueous solution Introduction, Properties of water.	In-class lecture  In-class lecture	A4	1.3 2.1 3.3
11	Sun. 26/12/2121 Tue.28/12/2021	Chapter 7: Definitions and units in aqueous solution, Some Brønsted acids and bases, Trends within a series	In-class lecture  In-class lecture	A4	1.3 2.1 3.3



جامعة كل العرب

		of oxoacids $EO_n(OH)_m$ .	Quiz 2		
12	Sun. 2/1/2022 Tue.4/1/2022	Chapter 7: Aquaedcations: formation and acidic properties, Amphoteric oxides and hydroxides, Solubilities of ionic salts.	In-class lecture  In-class lecture	A4	1.3 2.1 3.3
13	Sun. 9/1/2022 Tue.11/1/2022	Chapter 7: Common-ion effect, Coordination complexes: an introduction.	In-class lecture  In-class lecture Assignment 2	A4	1.3 2.1 3.3
14	Sun. 16/1/2022 Tue.18/1/2022	Chapter 7: Stability constants of coordination complexes	In-class lecture  In-class lecture	A4	1.3 2.1 3.3
15	Sun. 23/1/2022 Tue. 25/1/2022	Chapter 3: Introduction to molecular symmetry Introduction, Symmetry operations and symmetry elements	In-class lecture  In-class lecture	A2	1.2 1.3
16.	<b>Final Exam</b>				

**Grading Plan and Assessment Tools**

Assessment Tools	Weights	Due date
Mid-term	30	TBA
Assignments	10	TBA
Quizzes	10	TBA
Inter active lectures	-	-
Group Work	-	-
Presentation	-	-
Reports	-	-
Project	-	-
Case-Study	-	-
Final Exam	50	TBA



**ASU**  
جامعة العلوم التطبيقية الخاصة  
APPLIED SCIENCE PRIVATE UNIVERSITY



AMMAN - JORDAN

المستوى الذهبي

## جامعة كل العرب

### Supplementary Reading

#### **Textbook:**

Inorganic Chemistry, Catherine E. Housecroft and Alan G. Sharpe, 4<sup>th</sup> 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.



**ASU**  
جامعة العلوم التطبيقية الخاصة  
APPLIED SCIENCE PRIVATE UNIVERSITY



AMMAN - JORDAN

المستوى الذهبي

جامعة كل العرب

**Subject Coordinator**                      **Dr. Faten Aladwan**                      **Signature:** -----

**Head of Curriculum Committee**                      **Dr. Hussam Miqdad**                      **Signature:** -----

**Department Head**                      **Dr. Hussam Miqdad**                      **Signature:** -----

**Faculty Dean**                      **Dr. Hadeel Al Saed**                      **Signature:** -----

**Copy to:**

- Department Head.
- Head of Curriculum Committee.
- Course File.

Amman – Jordan – عمان – الأردن: 5609999 Tel: \_ فاكس: 5232899 Fax: \_ عمان – الأردن: Amman – Jordan

UF 28 /2: رمز النموذج

رقم القرار 24 / 233

تاريخ الاعتماد 2021/10/18