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جامعة كل العرب

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

<b>Course Title:</b>	Inorganic Chemistry 2
<b>Course No.:</b>	1722321
<b>Prerequisite:</b>	1722221
<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	Tu, Th: 11-1 M.,W: 11:30-12:30	f_aladwan@asu.edu.jo

**Course Description**

This course is devoted to provide the students with introduction about molecular symmetry, fundamental of coordination chemistry: ligands, nomenclature, coordination number, symmetry, characteristic properties of coordinated compounds; Bonding in d-block metal complexes; valence bond theory; crystal field theory; crystal field stabilization energy; Jahn-Teller distortion, magnetic and spectroscopic properties; the main mechanisms of inorganic reactions, thermodynamic and kinetic properties of the reactions of metal complexes.

**Intended Learning Outcomes**

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

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

- A1. Understands symmetry elements, operations, and point groups.
- A2. Be able to describe and explain the bonding in transition compounds by different bonding theories.
- A3. Understand the trends in properties and reactivity of the d-block elements.

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A4. Understand the thermodynamic and kinetic properties of the reactions of metal complexes

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

B1. Use group theory to recognize and assign symmetry elements of complexes, and to predict properties of complexes based on symmetry.

B2. Interpret the electronic spectra of d-metal complexes.

B3. Be able to discuss the concepts of metal ligand bonding in transition complexes through the different bonding theories.

B4. Describe and classify the main mechanisms of inorganic reactions.

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

C1. Employ online researching in different topics in the field of inorganic chemistry.

C2. Explain the fundamental concepts in coordination chemistry of transition metals based on different theories.

#### **D. Transferable Skills (Student should):**

D1. Promote problem-solving skills

### 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.

### Course Learning Outcomes Alignment Matrix

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PLO	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	D1
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. 6/3/2022 Tue. 8/3/2022 Thu. 10/3/2022	Chapter 3: Introduction to Molecular Symmetry, Symmetry elements and symmetry operations	In-class lectures	A1	1.1
2	Sun. 13/3/2022 Tue. 15/3/2022 Thu. 17/3/2022	Chapter 3: Point groups and introduction to character tables.	In-class lectures	A1, B1	1.1, 2.1
3	Sun. 20/3/2022 Tue. 22/3/2022 Thu. 24/3/2022	Chapter 19: Ground state and electronic configuration of d- block metals.	In-class lectures Quiz 1	A3	1.3
4	Sun. 27/3/2022 Tue. 29/3/2022 Thu. 31/3/2022	Chapter 19: physical properties and reactivity of d-block metals.	In-class lectures	A3	1.3
5	Sun. 3/4/2022 Tue. 5/4/2022 Thu. 7/4/2022	Chapter 19: characteristic properties	In-class lectures	A3, C1	1.3, 3.1



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6	Sun.10/4/2022 Tue. 12/4/2022 Thu. 14/4/2022	Chapter 19: electroneutrality principle, the Kepert model and coordination numbers. nomenclature	In-class lectures Assignment1	A3	1.3
7	Sun.17/4/2022 Tue. 19/4/2022 Thu. 21/4/2022	Chapter 20: Bonding in d-block metal complexes; valence bond theory	In-class lectures	A2, B3	1.1, 1.2, 2.5
8.	<b>MID Term Exam</b>				
9	Sun.24/4/2022 Tue. 26/4/2022 Thu. 28/4/2022	Chapter 20: Crystal field theory; crystal field stabilization energy; Jahn-Teller distortion.	In-class lectures Quiz 2	A2, B3	1.1, 1.2, 2.5
10	Sun.1/5/2022 Tue. 3/5/2022 Thu. 5/5/2022	Chapter 20: spectrochemical series; molecular orbital theory.	In-class lectures	A2,B3, C1	1.1, 1.2, 2.5, 3.1, 4.4
11	Sun. 8/5/2022 Tue. 10/5/2022 Thu. 12/5/2022	Chapter 20: ligand field theory, electronic spectra.	In-class lectures Assignment 2	A2, B2,B3	1.1, 1.2, 2.3, 2.5
12	Sun. 15/5/2022 Tue. 17/5/2022 Thu. 19/5/2022	Chapter 20: Microstates and term symbols	In-class lectures	A2, C2	1.1, 1.2, 3.3
13	Sun. 22/5/2022 Tue. 24/5/2022 Thu. 26/5/2022	Chapter 20: magnetic properties	In-class lectures Quiz 3	A2	1.1, 1.2
14	Sun. 29/5/2022 Tue. 31/5/2022 Thu. 2/6/2022	Chapter 20: Thermodynamic aspects	In-class lectures	A2, D1	1.1, 1.2, 4.3
15	Sun. 5/6/2022 Tue. 7/6/2022 Thu. 9/6/2022	Chapter 26: d-block metal complexes: reaction mechanisms	In-class lectures	A4, B4	2.3 4.3
16.	<b>Final Exam</b>				



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### **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

### **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, 3<sup>rd</sup> edition, John Wiley, 1995.
2. Inorganic Chemistry, Huheey, Keiter and Keiter, 4<sup>th</sup> edition, Harper Collins, 1993.
3. Inorganic Chemistry, Miesler and Tarr. 3<sup>rd</sup> edition, Oxford, Pearson, 2004.

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<b>Subject Coordinator</b>	<b>Dr. Faten Aladwan</b>	<b>Signature:</b> -----
<b>Head of Curriculum Committee</b>	<b>Dr. Hussam Miqdad</b>	<b>Signature:</b> -----
<b>Department Head</b>	<b>Dr. Hussam Miqdad</b>	<b>Signature:</b> -----
<b>Faculty Dean</b>	<b>Dr. Hadeel Al Saed</b>	<b>Signature:</b> -----

**Copy to:**

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

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