Form: Course Syllabus		
	Form Number	EXC-01-02-02A
	Issue Number and Date	2963/2022/24/3/2 5/12/2022
	Number and Date of Revision or Modification	2/(10/12/2023)
	Deans Council Approval Decision Number	50/2023
	The Date of the Deans Council Approval Decision	26/12/2023
	Number of Pages	06

1.	**Course Title**	Inorganic Chemistry (I)
2.	**Course Number**	0303221
3.	**Credit Hours (Theory, Practical)**	3 (theory)
	Contact Hours (Theory, Practical)	3 hrs/week (theory)
4.	**Prerequisites/ Corequisites**	General Chemistry (2), 0303102
5.	**Program Title**	B.Sc. Chemistry
6.	**Program Code**	0303
7.	**School/ Center**	The University of Jordan
8.	**Department**	Chemistry
9.	**Course Level**	Second Year
10.	**Year of Study and Semester (s)**	1st, 2nd, summer
11.	**Other Department(s) Involved in Teaching the Course**	NONE
12.	**Main Learning Language**	English
13.	**Learning Types**	☒Face to face learning ☐Blended ☐Fully online
14.	**Online Platforms(s)**	☐Moodle ☒ Microsoft Teams
15.	**Issuing Date**	
16.	**Revision Date**	26-8-2024

17. Course Coordinator:

Name: Prof. Dr. Murad A. AlDamen
Office number: Chemistry 2nd floor
Email: maldamen@ju.edu.jo
Contact hours: 8:00-10:00 Mon. Wed.
Phone number: N/A

18. Other Instructors:

Name: Dr. Hazem Amarneh

19. Course Description:

Fundamental particles of an atom, Bohr's theory; success in early quantum theory, an introduction to wave mechanics; atomic orbitals; quantum numbers; many-electron atoms; effective nuclear charge and Slater's rules; Hund's rule; Aufbau principle; ionization energies and electron affinities; Lewis bonding theory; valance bond theory (VB); molecular orbital theory (MO); octet rule and isoelectronic species; electronegativity and dipole moments; VSEPR model; stereoisomers; hybridization; structures and energies of metallic and ionic solids; packing of spheres; polymorphism in metals; alloys and intermetallic compounds; bonding in metals and semiconductors; Schottky and Frenkel defect; band theory and Fermi level; ionic lattices; lattice energy; Born-Haber cycle; Kapustinskii equation; acids, bases and ions in aqueous solution; solubility of ionic salts; energetics of dissolution of ionic salts; properties of water; Brønsted acids and bases; Hard/Soft Acid/Base Theory (HSAB); introduction to coordination complexes.

20. Program Intended Learning Outcomes: The program's student outcomes must fulfill the above ABET student outcomes. You can add new outcomes for your program, but all the six ABET-outcomes must be included.

SO-1. **Problem Solving**: Graduates will be able to apply mathematical and scientific knowledge to identify, formulate, and solve technical or scientific problems relevant to the discipline of chemistry.
SO-2. **Design**: Graduates will be able to use their understanding of chemistry concepts and principles to formulate and design systems, processes, procedures, or programs to meet desired goals and outcomes.
SO-3. **Experimental Skills**: Graduates will be able to design, conduct, and analyze experiments or test hypotheses, utilizing appropriate chemical techniques and scientific judgment to draw meaningful conclusions.
SO-4. **Communication**: Graduates will be able to communicate scientific information effectively and accurately to a range of audiences, including both technical and non-technical audiences.
SO-5**. Ethics and Global Context**: Graduates will understand and apply ethical and professional responsibilities in the context of the impact of technical and scientific solutions on global, economic, environmental, and societal issues.
SO-6. **Teamwork**: Graduates will be able to work effectively as part of a team, establishing goals, planning tasks, meeting deadlines, and analysing risk and uncertainty in the context of chemistry-related projects and initiatives.
SO-7. **Handling Chemicals**: An ability to apply the proper procedures for safe handling of chemicals.

21. Course Intended Learning Outcomes: (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

At the successful completion of this course you (the student) should be able to:

CLO-1: Demonstrate a comprehensive understanding of atomic structure principles and the periodic trends of the elements.
CLO-2: Analyze and apply theories of chemical bonding to both homo- and heteronuclear diatomic molecules.
CLO-3: Evaluate and apply bonding theories to trinuclear and polyatomic molecules, explaining their structural and electronic properties.
CLO-4: Explore and interpret the chemistry of solid-state materials, including their applications in contemporary technologies such as semiconductors.
CLO-5: Describe and explain the chemistry of acids, bases, and ions in aqueous solutions from an inorganic chemistry perspective, integrating theoretical concepts with practical examples.

Course CLOs	The learning levels to be achieved					
	Remembering	**Understanding**	**Applying**	**Analysing**	**evaluating**	**Creating**
1	✓	✓				
2	✓	✓				
3	✓	✓	✓			
4	✓	✓	✓			
5	✓	✓	✓			

22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

#CLOs	SO(1)	SO(2)	SO(3)	SO(4)	SO(5)	SO(6)	SO(7)
1	☑	☑					
2	☑	☑					
3	☑	☑					
4	☑	☑					
5	☑	☑					

23. Topic Outline and Schedule:

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types (Face to Face/ Blended/ Fully Online)	Platform Used	Synchronous / Asynchronous Lecturing	Evaluation Methods	Learning Resources
1	1.1	Introduction to inorganic chemistry	1	**Face to face**	In class	Syn.	MID, Final	textbook
	1.2	Fundamental particles of an atom, atomic number, mass number and isotopes	1	**Face to face**	In class	Syn.	MID, Final	textbook
	1.3	Introduction to quantum theories Introduction to wave mechanics	1	**Face to face**	In class	Syn.	MID, Final	textbook
2	2.1	Many-electron atoms	1	**Face to face**	In class	Syn.	MID, Final	textbook
	2.2	The periodic table	1	**Face to face**	In class	Syn.	MID, Final	textbook
	2.3	The *aufbau* principle Atomic states and Hund's rule	1	**Face to face**	In class	Syn.	MID, Final	textbook
3	3.1	Atomic states and Hund's rule.	1	**Face to face**	In class	Syn.	MID, Final	textbook
	3.2	Periodicity of the elements.	1	**Face to face**	In class	Syn.	MID, Final	textbook
	3.3	Shielding	1	**Face to face**	In class	Syn.	MID, Final	textbook
4	4.1	The sizes of atoms	1	**Face to face**	In class	Syn.	MID, Final	textbook
	4.2	Ionization energy	1	**Face to face**	In class	Syn.	MID, Final	textbook
	4.3	Lewis structures	2,3	**Face to face**	In class	Syn.	MID, Final	textbook
5	5.1	Basics of VB Theory	2,3	**Face to face**	In class	Syn.	MID, Final	textbook
	5.2	VB Theory applications	2,3	**Face to face**	In class	Syn.	MID, Final	textbook
	5.3	Basics of MO Theory	2,3	**Face to face**	In class	Syn.	MID, Final	textbook
6	6.1	MO of diatomic molecules and ions	2,3	**Face to face**	In class	Syn.	MID, Final	textbook
	6.2	Electronegativity: Pauling, Mulliken, and Allred–Rochow methods	2,3	**Face to face**	In class	Syn.	QUIZ, Final	textbook
	6.3	Dipole moments and partial charge calculations	2,3	**Face to face**	In class	Syn.	QUIZ, Final	textbook
7	7.1	VSEPR theory , Determination of molecular geometries based on VSEPR theory	2,3	**Face to face**	In class	Syn.	QUIZ, Final	textbook

	7.2	Introduction to isomerism in inorganic chemistry, Determination of stereoisomers of inorganic compounds	2,3	**Face to face**	In class	Syn.	QUIZ, Final	textbook
	7.3	Hybridization of polyatomic molecules	2,3	**Face to face**	In class	Syn.	QUIZ, Final	textbook
8	8.1	Orthogonality and normalization	2,3	**Face to face**	In class	Syn.	QUIZ, Final	textbook
	8.2	Directionality in bond formation	2,3	**Face to face**	In class	Syn.	QUIZ, Final	textbook
	8.3	π-Bonding in VBT	2,3	**Face to face**	In class	Syn.	QUIZ, Final	textbook
9	9.1	Structure of crystal lattices	4	**Face to face**	In class	Syn.	Final	textbook
	9.2	Efficiency of packing in crystal lattices	4	**Face to face**	In class	Syn.	Final	textbook
	9.3	Structure of ionic solids	4	**Face to face**	In class	Syn.	Final	textbook
10	10.1	Calculation of the number of atoms in different unit cells	4	**Face to face**	In class	Syn.	Final	textbook
	10.2	Factors that influence the structure of ionic compounds	4	**Face to face**	In class	Syn.	Final	textbook
	10.3	Polarizability effect on covalency	4	**Face to face**	In class	Syn.	Final	textbook
11	11.1	Radius ratio rules	4	**Face to face**	In class	Syn.	Final	textbook
	11.2	Types of alloys	4	**Face to face**	In class	Syn.	Final	textbook
	11.3	Band theory and bonding in metals	4	**Face to face**	In class	Syn.	Final	textbook
12	12.1	Rationalization of metal properties based on band theory	4	**Face to face**	In class	Syn.	Final	textbook
	12.2	Metals, insulators, and semiconductors	4	**Face to face**	In class	Syn.	Final	textbook
	12.3	Calculations of the lattice energy of ionic compounds using electrostatic model equations	4	**Face to face**	In class	Syn.	Final	textbook
13	13.1	Calculations of the lattice energy of ionic compounds using Born-Haber cycle	4	**Face to face**	In class	Syn.	Final	textbook
	13.2	Factors that affect lattice enthalpies	4	**Face to face**	In class	Syn.	Final	textbook
	13.3	Properties of water, Energetics of dissolution of ionic compounds in water	5	**Face to face**	In class	Syn.	Final	textbook
14	14.1	Effects of ionic size/charge on solubility	5	**Face to face**	In class	Syn.	Final	textbook
	14.2	Effects of polarization on solubility	5	**Face to face**	In class	Syn.	Final	textbook
	14.3	Effects of polarization on solubility	5	**Face to face**	In class	Syn.	Final	textbook
15	15.1	Acid/base behaviour	5	**Face to face**	In class	Syn.	Final	textbook
	15.2	Hard/Soft Acid/Base Theory (HSAB)	5	**Face to face**	In class	Syn.	Final	textbook

15.3	Introduction to coordination chemistry	5	**Face to face**	In class	Syn.	Final	textbook

24. Evaluation Methods:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
Quiz+Homework	20	As per Sec. 23 above	1,2	Week 8	In class
Midterm	30	As per Sec. 23 above	3 or 4	Week 12	In class
Final Exam	50	As per Sec. 23 above	1,2,3,4,5	End of the semester	In class

25. Course Requirements:

(Scientific calculator)

26. Course Policies:

A- Attendance policies: All students are expected to follow the of attendance policies of the University of Jordan, absences exceeding 15% of total number of class meeting (6-hour classes) will result in F grade or course drop.

B- Absences from exams and handing in assignments on time: University rules and regulations regarding make-up exams.

C- Health and safety procedures: N/A

D- Honesty policy regarding cheating, plagiarism, misbehavior: University rules and regulations.

E- Grading policy: University rules and regulations

F- Available university services that support achievement in the course: N/A

27. References:

A- Required book (s), assigned reading and audio-visuals:

1. Inorganic Chemistry, by Catherine E. Housecroft and Alan G. Sharpe, 5th edition, Pearson, 2018.

B- Recommended books, materials, and media:
1. Inorganic Chemistry, by Miessler, Fischer, and Tarr, 5th Edition, Pearson, 2014.
2. Inorganic Chemistry, by Shriver, Weller, Overton, Rourke, Armstrong, 6th Edition, Oxford University Press, 2014.
B- Recommended books, materials, and media:

28. Additional information:

there is a need to revise excluding sections from chapter (Quantum Mechanics)

Name of the Instructor or the Course Coordinator: **Dr. Murad AlDamen, Prof.**	Signature:	Date: 26-8-2024
Name of the Head of Quality Assurance Committee/ Department **Dr. Haytham Saadeh, Prof.**	Signature:	Date:
Name of the Head of Department **Dr. Firas Awwadi, Prof.**	Signature:	Date:
Name of the Head of Quality Assurance Committee/ School or Center **Dr. Murad A. AlDamen, Prof.**	Signature:	Date:
Name of the Dean or the Director **Dr. Mahmoud I. Jaghoub, Prof.**		