هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	**Coordination Chemistry**
Course Code:	**2043101-3**
Program:	**Bachelor in Chemistry**
Department:	**Department of Chemistry**
College:	**College of Sciences**
Institution:	**Taif University**

Table of Contents

A. Course Identification

1. Credit hours: 3 (2 Theoretical, 1 Lab)
2. Course type **a.** University ☐ College ☐ Department √ Others ☐ **b.** Required √ Elective ☐
3. Level/year at which this course is offered: 7th Level/ 3rd Year
4. Pre-requisites for this course (if any)**: Inorganic Chemistry 2 (2042204-3)**
5. Co-requisites for this course (if any)**: NA**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	3 Theoretical and 2 Practical hours/ Week	100 %
2	**Blended**	-	-
3	**E-learning**	-	-
4	**Distance learning**	-	-
5	**Other**	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	20
3	**Tutorial**	-
4	**Others** (specify)	-
	Total	**50**

B. Course Objectives and Learning Outcomes

1. Course Description

The course describes the basic terms used in the field of coordination chemistry and recognizes the properties of the transition elements, types of complexes, rules of nomenclature of complexes, Werner and Chain theory, coordination number, types of ligands, effective atomic number, Valence bond theory, Crystal field theory, Ligand field theory, spin-orbit coupling, and electron paramagnetic resonance.

2. Course Main Objective

The course aims to recognize different types of chemical bonds and theories that address the chemical bonding of transition elements.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Recognize the basic concepts of chemistry of the Coordination compounds and the most important applications in the environment.	K1
1.2	Interpret the theories that address the interdependence of transition	K2

CLOs		Aligned PLOs
	metal complexes elements compounds.	
2	**Skills:**	
2.1	Describe methods for the nomenclature of metal complexes.	S1
2.2	Explain the similarities and differences in the chemistry of transition metal complexes.	S2
3	**Values:**	
3.1	Illustrate the concept of personal responsibility for achieving duties by teamwork.	V1

C. Course Content

No	List of Topics	Contact Hours
1	Basic terms used in the field of coordination chemistry.	3
2	Properties of the transition elements and types of complexes.	3
3	Rules of nomenclature of metal complexes.	3
4	Werner and Chain theory.	3
5	Coordination number.	3
6	Types of ligands.	3
7	Effective atomic number	3
8	Valence bond theory	3
9	Crystal field-Ligand field theories and spin-orbit coupling	3
10	Electron paramagnetic resonance in coordination compounds	3
Total		**30**

Lab Content

No	List of Topics	Contact Hours
1	Introduction to coordination chemistry Lab: Safety and Instrumentations.	2
2	Preparation and characterization of the double salt ammonium nickel(II) sulfate	2
3	Colors associated with ligand changes in some copper(II) complexes	2
4	Preparation and characterization of the coordinated compound copper(II) ammonium sulfate	2
5	Preparation and characterization of the coordinated compound nickel(II)dimethylglyoxime.	2
6	Preparation of Iron(II) and Iron(III) Oxalate Complexes	2
7	Preparation and characterization of tris(thiourea)copper(I) sulfate complex	2
8	Synthesis and characterization of hexaaminecobalt(III) chloride and chloropentaminecobalt(III).	2
9	Synthesis and characterization of cis- and trans-isomers of $\{K[Cr(C_2O_4)_2(H_2O_2)_2]\cdot 3H_2O\}$	2
10	Synthesis of the Schiff bases Salen[N,N-bis(salicyladehyde)ethylene-diamine and its cobalt(II) complex.	2
Total		**20**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize the basic concepts of chemistry of the Coordination compounds and the most important applications in the environment.	Lecture	Written exam
1.2	Interpret the theories that address the interdependence of major groups' elements compounds.	Lecture	Written exam
2.0	**Skills**		
2.1	Describe methods for the nomenclature of metal complexes.	Discussion	Homework Assignments
2.2	Explain the similarities and differences in the chemistry of transition metal complexes.	Problem-Solving	Practical tasks and Exam
3.0	**Values**		
3.1	Illustrate the concept of personal responsibility for achieving duties by teamwork.	Collaborative Learning	Individual presentations

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework Assignments	Throughout Semester	5%
2	Individual presentations	Throughout Semester	5%
3	Mid Term Exam	6	20%
4	Practical tasks	Throughout Semester	25%
5	Final practical Exam	10/11	5%
6	Final exam	11/12	40%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Commitment to the rules of the Academic Advising Department at the university in accordance with the academic guidance manual approved by the university and the attached forms, there are different arrangements made by teaching staff to support student consultations including;
- Office hours: 8 hours per a week for each academic member.
- Academic guidance: an academic member has a number of students to guide them throughout degree journey.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	• Principles of Modern Chemistry (Chapter 8), Oxtoby, David W.; Gillis H. P.; Campion, Alan (2012). Brooks/Cole Cengage Learning, Boston (USA), Latest Edition. ISBN: 9781111427832.

	https://tinyurl.com/496ebe7h
Essential References Materials	• A Cyclic Voltammetry Experiment Illustrating Redox Potentials, Equilibrium Constants, and Substitution Reactions in Coordination Chemistry. Toma, Henrique E.; Araki, Koiti; Dovidauskas, Sergio. *"J. Chem. Educ."* 2000, 77, 10, 1351. https://doi.org/10.1021/ed077p1351. • Toofan, Jahansooz. "A Simple Expression between Critical Radius Ratio and Coordination Number." *J. Chem. Educ."*1994, *71*, 147. https://doi.org/10.1021/ed071p147. • Myers, Thomas R. "Rules for coordination number of metal ions (CEC)."*J. Chem. Educ."* 1981, *58*, 681. https://doi.org/10.1021/ed058p681.1.
Electronic Materials	• Saudi Digital Library (SDL) https://apps.tu.edu.sa/sdl/default.aspx
Other Learning Materials	• Learning Management System (Blackboard). https://lms.tu.edu.sa/

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture hall with 100 seats. • Equipped Lab with essential instrumentations.
Technology Resources (AV, data show, Smart Board, software, etc.)	• Computer and data show with Wi-Fi access.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching and assessment	Students	Survey (indirect method)
Extent of achievement of course learning outcomes	Program leader	Reports (Direct method)
Quality of learning resources	Peer referees Students	Reports (Direct method) Survey (indirect method)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	**Department Council/ Quality assurance committee**
Reference No.	2-5-1444
Date	01/11/2022