هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Inorganic Reactions Mechanism**
Course Code:	**2043207-2**
Program:	**Bachelor in Chemistry**
Department:	**Department of Chemistry**
College:	**College of Sciences**
Institution:	**Taif University**

Table of Contents

A. Course Identification

1. Credit hours:	**2 (1 Theoretical, 1 Lab)**
2. Course type	
a.	University ☐ College ☐ Department ☑ Others ☐
b.	Required ☑ Elective ☐
3. Level/year at which this course is offered:	**6th Level/ 3rd Year**
4. Pre-requisites for this course (if any)**: Coordination Chemistry (2043101-3)**	
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**	1 Theoretical and 3 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**	15
2	**Laboratory/Studio**	45
3	**Tutorial**	-
4	**Others** (specify)	-
	Total	**60**

B. Course Objectives and Learning Outcomes

1. Course Description

This course describes the Ligand substitution reactions in complexes, associative and dissociative processes, substitution reactions of octahedral complexes, substitution reactions of square planner complexes, substitution reactions of tetrahedral complexes, oxidation–reduction mechanism, trans– effect and its application.

2. Course Main Objective

The course aims to provide the basic principles of the Inorganic Reaction Mechanism. To understand and study how to identify the different types of reaction mechanisms and the chemical bonding present in the complexes.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Out line the basic principales of the inorganic reaction mechanism	K1
1.2	Memorize the mechanisms of substitution reactions in different complexes	K2
2	**Skills:**	

CLOs		Aligned PLOs
2.1	Differentiate between the substitution reactions in Square Planner and Tetrahedral complexes	S1
2.2	Recognize the Trans Effect and its applications	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	Introduction to ligand substitution reactions in complexes, associative and dissociative processes	1
2	Order of Reaction and Reaction Mechanism	1
3	Techniques for Following Rates of Reactions. Factors Affecting Rates of Reactions	2
4	Inert and Labile Complexes	1
5	Mechanisms of Substitution reactions	2
6	Octahedral Substitution reactions	1
7	Substitution reactions of Square Planner complexes	2
8	Substitution reactions of Tetrahedral complexes	2
9	Mechanisms of Oxidation – Reduction Reactions	1
10	Trans – Effect and its application	2
Total		**15**

Lab Content

No	List of Topics	Contact Hours
1	Preparation and analysis of a double salt ammonium nickel sulfate, $(NH_4)_2SO_4.NiSO_4.XH_2O$	3
2	Nickel(II) ammonium sulfate: - Hydrate analysis - Estimation of the sulfate	6
3	Nickel(II) ammonium sulfate; Determination of the nickel(II)	3
4	Colours associated with ligand changes in some coordination compounds of copper(II).	3
5	Synthesis and analysis of a coordination compound of copper(II) ammonium sulfate, $Cu_x(NH_3)_y(SO_4)_z.aH_2O$	6
6	Copper(II) ammonium sulfate, $Cu_x(NH_3)_y(SO_4)_z.aH_2O$ - Gravimetric estimation of sulfate ion - Hydrate analysis	6
7	Copper(II) ammonium sulfate, $Cu_x(NH_3)_y(SO_4)_z.aH_2O$ (Iodometrically determination)	3
8	Preparation of iron(II) and iron(III) oxalate complexes	3
9	Synthesis of monooxalatoiron(II) complexes, $[FeC_2O_4].2H_2O$	6
10	Synthesis of potassium trioxalatoiron(III) complexes, $K_3[Fe(C_2O_4)_3].3H_2O$	6
Total		**45**

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	Out line the basic principales of the inorganic reaction mechanism	Lecture	Written exam
1.2	Memorize the mechanisms of substitution reactions in different complexes	Lecture	Written exam
2.0	**Skills**		
2.1	Differentiate between the substitution reactions in Square Planner and Tetrahedral complexes	Discussion	Homework Assignments
2.2	Recognize the Trans Effect and its applications	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	Periodical Exam	7/8	20%
4	Mid Term Exam	11/12	10%
5	Practical tasks	Throughout Semester	15%
6	Final practical Exam	15	5%
7	Final exam	16	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	• Inorganic Chemistry, G.L. Miessler and D.A. Tarr, 2004. Latest Edition, Prentice Hall (USA). ISBN-13: 978-0130354716. • Inorganic Reaction Mechanisms, Martin L Tobe, 1999. Latest Edition, John Burgess, Harlow, Essex, England; New York:

	Longman. ISBN: 9780582236776. • Chemical Kinetics and Inorganic Reaction Mechanisms, L. Asperger and A. Smiljko, 2003. Latest Edition, Springer Science & Business Media, LLC. ISBN: 978-1-4613-4871-9.
Essential References Materials	• Ligand Substitution Processes, C.H. Langford and H.B. Gray, 1966. Latest Edition, W. A. Benjamin, New York (USA). Record No., Caltech BOOK: 1966.001.
Electronic Materials	• Saudi Digital Library (SDL)
Other Learning Materials	• Learning Management System (Blackboard)

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture rooms with max 60 seats (must be equipped with data show facility).
Technology Resources (AV, data show, Smart Board, software, etc.)	Computer with smart board.
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.	7-3-1445
Date	27/2/1445 HJ 12/09/2023 G