هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Inorganic Spectroscopy**
Course Code:	**2044102-2**
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 (Theoretical)**
2. Course type	
a.	University ☐ College ☐ Department ☑ Others ☐
b.	Required ☑ Elective ☐
3. Level/year at which this course is offered:	**7th Level/ 4th Year**
4. Pre-requisites for this course (if any)**:**	**Inorganic reaction mechanism (2043207-2)**
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**	2 Theoretical 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**	-
3	**Tutorial**	-
4	**Others** (specify)	-
	Total	**30**

B. Course Objectives and Learning Outcomes

1. Course Description

This course deals with the basic principles of group theory, molecular symmetry, symmetry groups, application of group theory, theory of molecular orbits and hybrid orbits for inorganic compounds, electronic, vibration and rotation spectroscopy of inorganic compound. IR and Raman spectroscopy, NMR Spectra of Inorganic compounds.

2. Course Main Objective

Identify symmetry elements and symmetry operations, examining chemical bonding and visualizing molecular orbitals predicting whether a given molecule will be chiral, or polar, predicting whether a molecule may absorb light of a given polarization.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Recognize the vibrational motions of the molecule	K1
1.2	Describe the point group of different molecules	K2
2	**Skills:**	
2.1	Apply the vibrational motions of the molecules	S1

CLOs		Aligned PLOs
2.2	Predict the molecular structures of chemical compounds	S2
3	**Values:**	
3.1	Participate in the development of the performance of work teams	V1

C. Course Content

No	List of Topics	Contact Hours
1	Principles of Group theory: element of symmetry, molecular symmetry & symmetry operations, Point group in chemistry	2
2	Classification of compounds into their point group, point group of linear molecule, point group of non-linear molecule & Matrices and their properties – Addition and multiplication of matrices	2
3	Group theory and vibrational spectroscopy, Transformation matrices, Degrees of Freedom	4
4	Use of species character tables for calculation of principal vibrations, selection rules for vibration & Reducing a Representation, Molecular Vibrations	4
5	Reducible and irreducible representation Mulliken Symbols for Irreducible Representations.	2
6	Activity of vibrations in Infrared and Raman regions, use of spectra in inorganic chemistry	4
7	Selection rules of vibrations in Infrared and Raman regions IR and Raman spectra of $POCl_3$, SO_2	4
8	Mossbouer spectra, sources of gamma rays, applications	2
9	Nuclear magnetic resonance (NMR), Chemical shift, factors affecting Chemical shift	4
10	Application on NMR spectra on Zinc and Cadmium nucleus	2
Total		**30**

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 vibrational motions of the molecule	Lecture	Written exam
1.2	Describe the point group of different molecules	Lecture	Written exam
2.0	**Skills**		
2.1	Apply the vibrational motions of the molecules	Discussion	Homework Assignments
2.2	Predict the molecular structures of chemical compounds	Discussion	Homework Assignments
3.0	**Values**		
3.1	Participate in the development of the performance of work teams	Collaborative Learning	Individual presentations

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework Assignments (Electronic)	Throughout Semester	15%
2	Individual presentations	Throughout Semester	5%
3	Periodical Exam	7/8	15%
4	Mid Term Exam	11/12	15%
5	Final exam	16	50%

***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: A Modern Introduction, Therald Moeller, 1990. Krieger Pub Co, Latest Edition. ISBN: 978-0471612308. • Inorganic Chemistry: Principles of Structure and Reactivity, James E. Huheey, Ellen A. Keiter, Richard L. Keiter, 2008. PEARSON INDIA, Latest Edition ISBN: 978-0060429959.
Essential References Materials	• Group Theory for Chemists: Fundamental Theory and Applications, Kieran Molloy 2010. Woodhead Publishing, Latest Edition. ISBN: 9780857092410
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