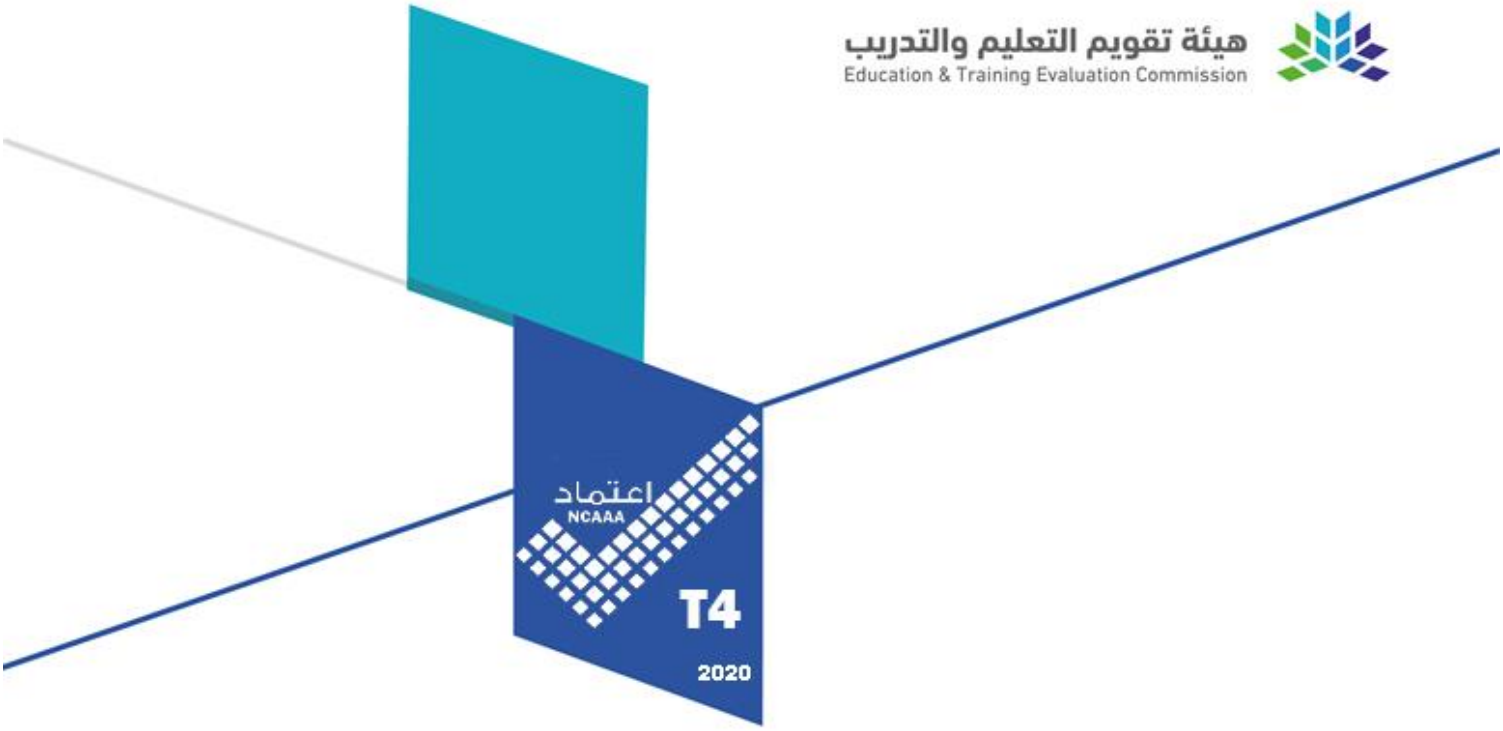
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Group theory**
Course Code:	**CHEM 425**
Program:	**Bachelor in Chemistry**
Department:	**Chemistry**
College:	**College of Science**
Institution:	**Jazan University (JU)**

Table of Contents

A. Course Identification

1. Credit hours: 2 hrs **Workload: 114 ECTS: 4.1**	
2. Course type	
a. University ☐ College ☐ Department ☑ Others ☐	
b. Required ☑ Elective ☐	
3. Level/year at which this course is offered: L 8 Year 4	
4. Pre-requisites for this course (if any)**:** *non*	
5. Co-requisites for this course (if any)**:** **non**	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	30	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**	0
3	**Tutorial**	0
4	**Others** (specify)	0
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

Course Title	*Course Number*	*Contact Hours (CH)*		*Credit unit (CU)*	*Year*	*Level*	*Pre-requisite*
		Lec.	*Prac.*				
Group Theory	CHEM 425	2	---	2	Fourth	Eighth	-------

Course objectives: They are to identify the following.

1- Recognizing the elements of symmetry and point groups.
2- Recognizing the reducible and irreducible representations.
3- Recognizing the vibrational spectroscopy.
4- Recognizing the infrared absorption bands and Raman lines.

Syllabus: A-Theoretical contents

Elements of symmetry and point groups – Reducible and irreducible representations – Character tables – Vibrational spectroscopy – Infrared absorption bands and Raman lines – Bonding in transition elements complexes – Spectra of octahedral, tetrahedral and square planar complexes.

Syllabus: B-Practical contents

Non

2. Course Main Objective

The course of Group theory designed to give the students some information about the principles of symmetry and group theory, laws, and their applications in chemistry.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding** Upon completion of the course, student will be able to	
1.1	Demonstrate a broad, knowledge in the symmetry element and recognize symmetry operations, resonance, molecular vibrations. (M)	K.1
1.2	Describe the essential facts, principles and theories in group theory and its application in chemistry. (M)	K.2
2	**Skills :** Upon completion of the course, student will be able to	
2.1	Demonstrate the knowledge and skills in the aspects of group theory, to analyze the obtained from symmetry. (M)	S.1
2.4	Make effective use of communication, and online technology about chemistry topics in order to improve their basic knowledge in writing (report and paper/ poster) with a good verbal and clear scientific language. (M)	S.4

C. Course Content

No	List of Topics	Contact Hours
1	Symmetry Elements and Operations	5
2	Point Groups - Groups of Low and High Symmetry Other Groups	5
3	Properties and Representations of Groups - Matrices - Representations of Point Groups Character Tables	3+1 exam
4	Examples and Applications of Symmetry - Polarity & Chirality Molecular Vibrations	6
5	Resonance spectrum and reduced spectrum. - Infra-red spectroscopy Raman spectroscopy	6
6	Octahedral, tetrahedral and square planer complexes	3+1 exam
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** *Upon completion of the course student will be able to;*		
1.1	Demonstrate a broad, knowledge in the symmetry element and recognize symmetry operations, resonance, molecular vibrations. (M)	lecture / group work discussion / project-based learning / work shop / presentation	*MCQ* *Short answer Q* *Oral exam*
1.2	Describe the essential facts, principles and theories in group theory and its application in chemistry.(M)	lecture / group work discussion / project-based learning / work shop / presentation	*Short answer Q* *Oral exam*
2.0	**Skills** *Upon completion of the course student will be able to;*		
2.1	Demonstrate the knowledge and skills in the aspects of group theory, to analyze the obtained from symmetry. (M)	lecture / group work discussion / project-based learning / work shop / presentation	Papers, oral/ written exam questions, problems, class discussions, concept maps, homework
2.4	Make effective use of communication, and online technology about chemistry topics in order to improve their basic knowledge in writing (report and paper/ poster) with a good verbal and clear scientific language. (M)	research activities / project-based learning / Technology-enabled learning	assignments and reports / project / seminar / report

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework 1	3	1%
2	Homework 2	5	1%
3	Homework 3	7	1%
4	Med term1	8	15%
5	Homework 4	9	1%
6	Quiz	10	5%
7	Homework 5	11	1%
8	Presentation Session	12	0%
9	Med term2	13	15%
10	Final exam		60%
		TOTAL	100%

***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:

4h/week instructor will be available for student consultation in his office.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Inorganic Chemistry, 5th Edition by Gary L. Miessler, Paul J. Fischer, Donald A. Tarr, (2013)
Essential References Materials	Molecular Symmetry and Group Theory: A Programmed Introduction to Chemical Applications, 2nd Edition by Alan Vincent (2001)
Electronic Materials	http://symmetry.otterbein.edu/gallery/index.html
Other Learning Materials	3D sym op android program

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	***1 Lecture room(s) for groups of 50 students***
Technology Resources (AV, data show, Smart Board, software, etc.)	Add ***Smart board, Data show, Black board, internet*** 3D sym op android program.
Other Resources	http://symmetry.otterbein.edu/gallery/index.html

Item	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	Student	Likert-type Survey (CES) Indirect
Extent of achievement of course learning outcomes	Instructor & Course coordinator	Class room evaluation (direct & indirect)
Quality of learning resources	Program coordinator	Indirect
Exam Quality assessment	Assessment committee	Indirect

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	**Chemistry Department Council**
Reference No.	42 / 35 /102 112
Date	17 /09 /1442 Corresponding to 28 / 04 /2021